POPULATION DIVISION
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# Fertility in Pakistan

## A Review of Findings from the Pakistan Fertility Survey

Edited by Iqbal Alam,
with assistance from
Betzy Dinesen

PAKISTAN
COUNTRY
STUDIES

Alam and Dinesen Fertility in Pakistan

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**Edited by Iqbal Alam,**
**with assistance from**
**Betzy Dinesen**

1984
International Statistical Institute
World Fertility Survey

First published in 1984 by the International Statistical Institute, 428 Prinses Beatrixlaan, PO Box 950, 2270 AZ Voorburg, Netherlands

The recommended citation for this publication is: Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey.* Voorburg, Netherlands: International Statistical Institute.

# Foreword

In this publication *Fertility in Pakistan*, Iqbal Alam, with the assistance of Betzy Dinesen, has assembled together in a single volume the results of extensive analysis carried out using data from the Pakistan Fertility Survey 1975, which was undertaken as part of the World Fertility Survey programme. The ten research reports appearing in the volume cover a wide range of policy-relevant topics and provide much needed information leading to a better understanding of fertility and fertility-related issues in Pakistan. Levels and trends in fertility, socio-economic differentials in breast-feeding, the influence of community factors on individual behaviour, the use or non-use of contraception and the study of infant mortality and its relation to fertility are some of the topics which have yielded new information and new insights.

Moreover, the PFS data provide much detailed baseline information which will be needed for future monitoring of demographic change in Pakistan and for comparative analysis using data from subsequent surveys such as the Contraceptive Prevalence Surveys and the Pakistan Fertility Survey of 1979–80.

It is heartening and indeed highly commendable to note that most of the research reported in this volume has been carried out mainly by Pakistani scholars and this reflects their deep commitment to the country's needs and problems in spite of the temporary absence of many of them from Pakistan. The efforts made by the World Fertility Survey in tapping this source are very much appreciated.

This volume is the first of its kind ever compiled for Pakistan and, as far as I know, for any other country participating in the WFS programme. I believe future demographic research in Pakistan will benefit from this international collaboration and experience. The results from the survey have made positive contributions to the national planning efforts as most of the research findings presented had been made available to the planners long before this publication. Nevertheless one cannot ignore the fact that it has taken almost eight years after data collection to publish the results of this exercise and probably the impact of this good work would have been stronger among the policy-makers if it had come sooner.

Finally, I would like to congratulate all those who have contributed to this volume and in particular Dr Iqbal Alam, without whose strenuous efforts this volume would not have been produced. The contribution of WFS should not be under-estimated and I hope that similar international activities will be undertaken at frequent intervals. I believe such activities will make positive contributions to a better understanding of the population problem.

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# Preface

Pakistan was among the early participants in the World Fertility Survey programme. The formal agreement between the Government of Pakistan and the International Statistical Institute to carry out the Pakistan Fertility Survey (PFS) was signed in August 1974, fieldwork was carried out from May to December 1975 and the First Report, finalized in October 1976, was published in early 1977. In terms of content and coverage, the Pakistan First Report differs to some extent from the reports published later by other countries participating in WFS. This was mainly because the WFS Guidelines for the First Country Report and the related computer software were still in the process of finalization while the Pakistan Report was being drafted. Perhaps as a result, Pakistan belongs to the élite group of three countries — the other two being Nepal and Dominican Republic — which succeeded in publishing the First Report within a year of completion of the fieldwork.

Within the framework of WFS policy for second-stage analysis and in view of the limitations of the Report, the Government of Pakistan also agreed to organize further in-depth analysis of the PFS data. However, the re-organization of the Population Planning Council and the resulting abolition of the Training, Research and Evaluation Centre in 1977 caused further delay in organizing an analysis programme. In the meantime WFS was organizing the 1980 Conference in London and the Programme Committee of the Conference invited me to organize a session entitled 'Country Case Study'. After considering various factors, I decided to choose Pakistan as the country of study for this session, for more reasons than one. Almost two years had elapsed after the publication of the First Report without any serious action on second-stage analysis and the data were slowly becoming outdated. At the same time, in order to ensure increased training opportunities for the local researchers and also to prevent misuse of the data by foreigners, the Government decided that PFS data should be released for further analysis only if a Pakistani national was involved in the work. Above all, no special resources were available to commission a full case study specifically for the Conference session, while some of the Pakistani researchers working or studying outside Pakistan were interested in doing further analysis of the PFS data as part of their assignments without seeking substantial financial aid.

Having decided on Pakistan, my next problem was to establish a plan and a list of topics which were relevant in the Pakistani context. Here I had to compromise in favour of what could best be done in the circumstances as against a typical case study of what should be done. Considering the research interest of the possible contributors, the nature and type of data collected by the PFS and the major findings emerging from the First Report, I ended up with a list of seven topics. Here, I must confess that in the choice of the contributors I was obsessed by my unshakeable conviction that the alien researchers, particularly from the Western industrialized societies, in spite of their training and exposure to conditions in the developing world through repeated short visits or prolonged stays, are rarely able to comprehend the fertility-related behaviour of women from the developing world within their social and cultural setting. The price I paid was that for the Conference I could get contributors for only six of the seven topics planned, namely fertility levels and trends, fertility differentials, age at marriage, use of contraception, breastfeeding practices and community variables. The missing topic was infant and child mortality.

The WFS Conference Proceedings published by the ISI included only the organizer's statement and the discussions during the session. However, considering the high quality of the background papers as well as the relevance of the findings, it was felt necessary to publish the original papers separately and thus the idea of this contributed volume was born.

The authors were kind enough to spend some time revising their papers in the light of the discussions of the 1980 Conference. Also, in the interest of completeness and coverage, it was felt necessary to include a contribution on infant and child mortality which was missed in the Conference and on a couple of topics such as cohort nuptiality and intermediate variables which are important in the context of the changing fertility in Pakistan. The result of all this work is the present volume. It presents the results emerging from ten major pieces of research and also an appendix on sampling errors and related statistics which were not published in the First Report. Nine of the eleven chapters have been authored or co-authored by Pakistani researchers, in keeping with the WFS policy of involving local researchers in second-stage analysis as far as possible. The authors have made use of the most recent developments in methods of analysis, including the 'Illustrative Analyses' commissioned by WFS, in so far as these are applicable to Pakistan. It is evident that these analyses of PFS data have contributed significantly to a greater knowledge not only of fertility but also of infant and child mortality in Pakistan. We also hope that the methodological contributions, some innovative, made by the authors will be of use and interest to future researchers in these areas.

It is now my privilege to compliment each contributor to this volume for his/her high quality paper and in particular the editors, Iqbal Alam and Betzy Dinesen, for their untiring work. John Cleland's continuing input helped to improve quality and style. I wish to thank Mr Khalil Siddiqi, the National Director of the PFS from 1977 for his co-operation and valuable support. I must also put on record the very important contribution of M. Nizamuddin who as the National Director until 1976 saw the PFS through the difficult period of planning and data collection.

Before I conclude, let me say a few words about the time elapsed between the fieldwork and publication of the present volume. It should be stressed that the First Report was available in 1977, and that the findings from most of the analysis covered here have been made available to the Government of Pakistan and the results have found their way into the policy-making process. For instance, the three-year plan, officially reported as Population Welfare Planning Plan (1980–3), has made use of findings from the analysis of the PFS data.[1] With the implementation of this plan, which aims to reduce the annual rate of population growth to a level of 2.7 per cent in 1984, the policy-makers are naturally hoping to achieve a further decline in fertility. This means there will have to be future studies aiming to assess as well as explain the changes that may take place. It is in this framework, I hope, that the Pakistan Fertility Survey data will serve as an important benchmark for the study of change and that the information published in this volume will be of use both to researchers and to policy-makers.

V. C. CHIDAMBARAM
Deputy Project Director

[1] New Commitment in Pakistan, *People 8* (4), London 1981.

# Contents


Foreword by Dr Attiya Inayatullah v

Preface vii

Notes on Contributors ix

**1 Introduction** 1
Zeba Sathar
- 1.1 Background 1
- 1.2 History of data collection 3
- 1.3 Individual contributions 4

**2 The data and their quality** 9
Heather Booth and Iqbal H. Shah
- 2.1 The survey 9
- 2.2 Digit preference and the reporting of ages, dates and durations 11
- 2.3 Nuptiality 20
- 2.4 Fertility 22
- 2.5 Infant and child mortality 33
- 2.6 Conclusions 35

**3 Recent transitions in cohort nuptiality** 39
Samir M. Farid
- 3.1 Introduction 39
- 3.2 Data and methodology 40
- 3.3 The tempo of nuptiality 40
- 3.4 Levels of cohort nuptiality 44
- 3.5 Concluding remarks 48

**4 Differentials in age at first marriage** 51
Mehtab S. Karim
- 4.1 Introduction 51
- 4.2 Urban–rural differentials 51
- 4.3 The role of education 54
- 4.4 Pattern of work and work status 56
- 4.5 Geographic and linguistic affiliation 59
- 4.6 Conclusions 62

**5 Fertility levels and trends** 65
Iqbal Alam
- 5.1 Introduction 65
- 5.2 Methodological considerations 65
- 5.3 Fertility levels and trends 66
- 5.4 Levels and trends at the subnational level 71
- 5.5 Summary and conclusions 78

**6 Fertility differentials** 81
John Casterline
- 6.1 Introduction 81
- 6.2 Demographic, social and economic variables from the PFS 85
- 6.3 Analysis of children ever born 89
- 6.4 Analysis of births in the five years preceding the survey 98
- 6.5 Sources of the observed differentials 106
- 6.6 Summary and conclusions 109

**7 Intervening variables** 113
Zeba Sathar
- 7.1 Introduction 113
- 7.2 The model 114
- 7.3 Results 116
- 7.4 Conclusions 121

**8 Socio-economic differentials in breastfeeding** 123
Iqbal H. Shah
- 8.1 Introduction 123
- 8.2 Measurement of breastfeeding 127
- 8.3 Socio-economic differentials of breastfeeding 136
- 8.4 Summary and conclusions 142

**9 From non-use to use: prospects of contraceptive adoption** 149
Nasra M. Shah and Makhdoom A. Shah
- 9.1 Data 149
- 9.2 Levels of knowledge and use 149
- 9.3 A profile of users in 1968 and 1975 151
- 9.4 Continuous users, dropouts and never users 153

9.5 Future users 157
9.6 The hard-core group: why they won't use 159
9.7 Conclusions 161

10 **Community and programme variables and their effects on the fertility-related behaviour of rural Pakistani women** 163
M. Nizamuddin
10.1 Introduction 163
10.2 Analytical framework 164
10.3 Determinants of fertility-related behaviour at the individual level 165
10.4 Determinants of fertility-related behaviour at the community level 165
10.5 The source of data 166
10.6 The strategy of analysis 166
10.7 Summary of major findings 168
10.8 Community-level analysis 168
10.9 Individual-level analysis 173
10.10 Discussion of the findings and implications 179

11 **Infant and child mortality: trends and determinants** 187
Iqbal Alam and John Cleland
11.1 Introduction 187
11.2 Review of mortality estimates from other sources 188
11.3 Levels and trends of infant and child mortality rates, based on PFS data 191
11.4 Mortality differentials according to maternal age, birth order and gender 194
11.5 Birth spacing and mortality 197
11.6 Parental and family background and mortality 202
11.7 The effect of mortality on fertility 205
11.8 Discussion of the main findings 207

12 **Concluding remarks** 211
Iqbal Alam

**Appendix** **Pakistan Fertility Survey: sampling errors for selected estimates** 213
John McDonald

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# 1 Introduction

Zeba Sathar

## 1.1 BACKGROUND

Pakistan gained its independence from British rule in 1947. Its present socio-economic, cultural and political situation is deeply rooted in its history and the particular circumstances which led to the nation's creation as a separate state for Muslims. The infrastructure of the society is a legacy of British rule: institutions such as universities, schools, courts and the army are modelled on British lines. However, Islamic characteristics such as puritanical values, strong family and kinship ties, and a powerful emphasis on marriage and procreation are also dominant in Pakistan. Very recently, further 'Islamization' has been introduced into the society, with changes in criminal laws, the banking system and so on.

The geographical area currently comprising Pakistan is 76 095 square kilometres and the density of the population is 105 inhabitants per square kilometre. The former East Wing of Pakistan seceded to become Bangladesh in 1971. The geographical boundaries corresponded to those areas most densely populated by Muslims. Although 96 per cent of the Pakistani population is Muslim, there are vast differences in ethnicity across the country which differentiate people by dress, language and living styles. The major ethnic group consists of the Punjabis who live mainly in the province of Punjab and constitute 56 per cent of the population. Sindhis live mostly in the rural parts of the province of Sind and are the next largest group. A large proportion of immigrants from India (known as 'Mauhajirs') are concentrated in Karachi, the largest city of Pakistan and speak the Urdu language. The Urdu language is however understood by almost all the ethnic groups in the country. The tribal group known as the Pathans, who speak Pushto, reside mostly in the North West Frontier Province. The Balauchis and Baruhis are the smallest of the major ethnic groups. They reside mostly in the province of Balauchistan, which has the lowest density and contains only 5 per cent of the population. The provinces of Sind and NWFP contain 23 and 13 per cent of the population, respectively.

The country has undergone some profound changes since Independence: it has changed from a primarily agricultural peasant society and is becoming a semi-industrialized society. The Gross National Product has risen from 3601 million dollars in 1949–50 to 11 832 million dollars in 1980–1 at 1959–60 constant prices. Since population growth has been quite rapid, per capita income has not risen as much proportionately. It was 74 dollars in 1948–9 and has risen to 143 dollars in 1980–1 at 1959–60 constant dollar prices. Whereas the share of agriculture in the GNP was 53 per cent in 1950, this has fallen to below 29 per cent in 1980–1. The manufacturing sector, meanwhile, has become more important, with a rising share of the GNP from 8 per cent in 1949–50 to 15 per cent in 1980–1. The contents and direction of external trade have also undergone radical changes. However, the somewhat impressive economic performance of Pakistan does not necessarily imply corresponding improvements in all sectors of the economy, particularly social services such as housing, education and public health. And it must also be pointed out that aggregate statistics do not reveal the large inequalities of income growth between the various socio-economic groups of the population.

The population of Pakistan is growing at an extremely rapid rate of around 3 per cent per annum. In 1981, the total population size was estimated to be 83.8 million, ranking the country as the ninth most populous in the world. The rapid rate of population growth is largely an outcome of declines in mortality which began to occur as early as 1920 and have been more rapid in the 1950s (Robinson 1967; Davis 1957). The decline



Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey*: 1–7. Voorburg, Netherlands: International Statistical Institute.

in the death rate is the result of the curtailment of famines and of infectious diseases, such as cholera and smallpox. However, improvement in mortality is not equally distributed among all groups: infant mortality is still higher than 100 per 1000 live births and continuing high female mortality, particularly in the childbearing years, results in a higher expectation of life for males than for females. Further improvements in the conditions of mortality and morbidity would therefore require greater emphasis to be placed on providing health care to infants and women in childbearing years.

At the moment, most hospitals are located in the urban areas and most trained medical workers prefer to work there. The majority of the population (about 72 per cent) who live in the rural areas rely mainly on untrained indigenous health workers for medical attention. While 99 per cent of the urban population lives within a two-mile radius of a public or semi-public health institution, the equivalent percentage in rural areas is 32 per cent (Planning Division 1978). The result is a higher expectation of life in urban areas. However, although the urban–rural gap in mortality is stark, differentials in mortality and morbidity conditions are also identified by socio-economic status within the urban areas too. The poor who live in urban areas also find access to limited health facilities difficult as compared to those in the higher socio-economic strata.

Although Pakistan has become increasingly self-sufficient in terms of its food requirements, the standards of nutritional intake remain inadequate. Average caloric intake in 1969–70 was 2103 calories, which is less than the optimal caloric intake of 2350 calories (World Bank 1978). Once again, average figures of caloric intake conceal disparities of nutrition between socio-economic groups. Furthermore the needs of certain groups are particularly outstanding and are known to be neglected; these are infants and children under five and women of childbearing years who are pregnant or lactating (Planning Division 1978).

Although mortality has undergone a decline, fertility in Pakistan has remained high at around 40–45 annual births per 1000 population. High fertility has serious implications for the economy of a society. Primarily it means a very large proportion (45 per cent) is aged under 15 and this means a high dependency ratio. Moreover since most women of working age in Pakistan are reported not to be participating in the labour force, the dependency burden is aggravated. It also means that for the next 20 years the labour force population will be growing and will place demands on the economy for extra jobs to be created.

A young population also places an almost immediate demand on the educational system, as larger cohorts of children need to put through school. Only 54 per cent of children aged 5–9 and 20 per cent of those aged 10–14 were enrolled in primary and secondary school in 1978, respectively) (Planning Division 1978) and the goal of the universal primary schooling will require a much larger concentration of resources to be allocated to education. Considerable efforts have been outlined in the various five-year plans to improve the existing educational system and to expand the number of educational institutions. However, the bare fact remains that over two-thirds of the Pakistani population was illiterate in 1981. The chances of being literate are further lowered if one is female or if one lives in the rural areas. Only 13.7 per cent of females were literate, as compared to 31.8 per cent of males, and 14.8 per cent of the rural population were literate, as compared to 43.3 per cent in the urban areas in 1981 (Population Census 1981, unpublished tables).

Although a growing population does place heavier demands on any educational effort, the problem seems to be more of an inadequate emphasis on the sector rather than of just keeping up with an expanding school age population. The percentage of the GNP allocated to education in Pakistan remains one of the lowest in Asia (World Bank 1978). Also, although achieving universal primary schooling has been cited as an important objective in all the development plans, a large proportion of the limited resources allocated to education has in fact been diverted to higher educational institutions. A third aspect of the problem is that many parents, especially in the case of female children and children living in the rural areas, are not totally committed to the idea of sending their children to school. This is because of the importance of children's contribution to the family income, which means they cannot be spared to go to school. This problem is exacerbated by the failure to adapt the curriculum to local needs. In the case of females, the irrelevance of schooling is perceived even more, as women are not expected to take up paid employment and because sex segregation is considered desirable especially after puberty, and schools in certain areas may not have the capacity to accommodate segregation.

High fertility in Pakistan, since it is at present the major contributor to the growth rate, is a cause of some concern. It is a feature of many traditional societies that high fertility is seen as an advantage in terms of society and, even more, in terms of the family. Children, in these societies, are seen as potential producers of income and a source of support in old age and therefore a large number of children, particularly sons, are desirable. Also, Islam is a pronatalist religion which prescribes early and universal marriage and emphasizes the importance of lineage and the clan. Although procreation is encouraged by the religion, there are no clear references to the prohibition of any form of contraception and even abortion is permissible under some specific circumstances. Thus the use of some form of fertility control, especially in cases where parents desire smaller families, is not in contradiction to any intrinsic Islamic values.

Pakistan recognized it had a population problem as early as the 1950s. Economic planners felt from the results of many projections available at that time that something needed to be done to slow population growth in order to raise per capita living standards. In the 1960s, as the growth rate, which had previously been estimated at 2.6 per cent, was re-estimated as being 3.4 per cent, this concern became more acute and led to the initiation of an officially sponsored family planning programme in 1965. The programme has been in function since then but with little evidence of a significant impact on fertility (Robinson et al 1981). For the first few years, the programme was considered a success both at home and abroad and substantial national and international funds were expended on the programme. Initially the programme's approach was to introduce the use of contraceptives, mainly IUDs, and by 1968 traditional midwives (dais) were employed to promote contraceptives among their existing clientèle. In the few years that followed, some success was noted in the contraceptive adoption figures and the crude birth rate was thought to have dropped from 50 in 1965 to 41 in 1970. However the National Impact Survey conducted in 1968–9 showed that in terms of results the programme had not been very effective, with only 6 per cent of currently married women reporting that they were using a contraceptive method.

In 1970 another approach was adopted (referred to as the Continuous Motivation Scheme), whereby literate male and female teams were utilized to identify and approach eligible couples with contraceptive advice. The emphasis in this approach was more on continuous prevention and methods of postponing pregnancy. Contraceptives, which were thought to be in shortage, were made widely available throughout the country at nominal costs under the Contraceptive Inundation Scheme, which was meant to complement the Continuous Motivation Scheme. However the CMS approach was not feasible as the standards considered necessary for 'couple teams' to be effective were hard to meet. The inundation scheme was also not successfully managed as the number of outlets thought to be available were overestimated. Thus the population planning programme in Pakistan reached another impasse in 1976. Political disturbances in the next couple of years led to the virtual inactivity of the programme until recently when it has been revived in the shape of the Population Welfare Plan, drawn up by the President's advisor on population in 1980. The new plan hopes to amalgamate a maternal–child healthcare approach with family planning advice. One thousand existing family welfare centres are to provide MCH as well as administer family planning activities. The plan will also rely more on local leadership and will attempt to make the services more suited to local needs. In its broader context, it will try to improve women's conditions, provide employment opportunities and education facilities. It is expected to reduce the crude birth rate from 41 per 1000 in 1980 to 37.5 in 1983.

## 1.2 HISTORY OF DATA COLLECTION

Data on population has always been vital for any modern society and in British India, censuses were carried out nearly every ten years, starting in 1901. However, for the new state of Pakistan, the first census was carried out in 1951 and since then there have been three more in 1961, 1972 and 1981. The vital registration system in Pakistan is very deficient and the need for the estimation of vital rates required the collection of data additional to those collected in censuses. Thus, primarily as a substitute for registration of births and deaths in the population, some sample surveys have been conducted in Pakistan. Probably the best known one is the Population Growth Experiment (PGE) carried out in 1962–5 where data were collected using a dual record system. One of these was the longitudinal registration system (LR) where the registrar visited the sample areas and recorded births and deaths. The other was a cross-sectional periodic survey which was known as the CS system. Vital rates were computed on the basis of data from both these methods and then adjusted by the application of the Chandrasekaran–Deming formula which is designed to compensate for events missed by both CS and LR, under certain assumptions.

The Population Growth Survey (PGS) was another experiment undertaken in 1968 and was designed to collect data by way of periodic surveys. These were carried out between 1968–71 and 1976–9 and the data from the earlier PGS set are comparable with the CS system of the PGS. Both the PGE and PGS provide measures of fertility and mortality.

Although there has been sufficient data collected up to the 1960s for Pakistan which established that there has been little or no change in fertility, the need was felt for a data set which would be able to bring together some of the major correlates of fertility behaviour and relate them at an individual or a family level. Fertility estimates available thus far were national ones such as those produced by PGE, PGS and the first major attempt to examine the mechanisms responsible for the observed fertility levels and differentials was the National Impact Survey.

The National Impact Survey (NIS), which was conducted in 1968–9, was the first survey which actually collected detailed data on the process of family formation and knowledge, attitudes and practice of contraception at the national level. The earlier surveys had been more geared towards estimating mortality and fertility levels and the emphasis in the NIS was quite different. It was carried out about four years after the initiation of the family planning programme and was intended to provide a benchmark of knowledge, attitudes and practice (KAP) of contraception and to assess any impact of the programme. As mentioned earlier, the survey found that less than six per cent of currently married women were using any contraception. However knowledge of contraception seemed much more widespread and 97 per cent of currently married women of reproductive ages had heard of some contraceptive method. Some information on birth histories was gathered but the emphasis of the NIS was mainly to collect KAP data. However, since it was based on both the East and West wings of the then Pakistan, the sample comprising West Pakistani women was only 2910 currently married women.

In the early 1970s a need was felt to evaluate the programme and to assess any changes in fertility. A survey comparable to the NIS was desirable five years after the undertaking of the NIS, and the start of WFS programme coincided with this plan. The result was the Pakistan Fertility Survey (PFS), which has a much larger national sample of 4949 ever-married women. The PFS was thus a timely contribution taking place ten years after the initiation of the family planning programme and provided fertility data on a national level. It laid much emphasis on birth and marriage history data and the KAP component was given relatively less emphasis than in the NIS. As social and economic characteristics of the sample of ever-married women were also collected, the PFS provides a very good opportunity to incorporate into fertility analysis in Pakistan, background factors such as residence, education, work participation and to relate them to an individual's marriage history, birth history, infant mortality and contraceptive history data. The PFS being part of the World Fertility Survey programme also produced data which are comparable with the WFS surveys done in other countries.

Most recently, in 1980, the Pakistan Institute of Development Economics, in conjunction with the ILO and UNFPA, have conducted a survey of more than 11 000 households, to collect national sample data of the kind sought by the PFS along with detailed modules on labour force, migration and income components. This 'four in one' approach questionnaire contains a unique and exciting potential source of information which should enable linkages to be made between all four modules. Its other great merit is that since the fertility information is collected in almost identical format as the PFS, it provides an opportunity to observe, five years after the previous survey, changes in fertility, infant mortality and nuptiality. This data are currently being coded and edited and will be analysed shortly.

## 1.3 INDIVIDUAL CONTRIBUTIONS

Whereas the First Country Report provided a preliminary set of results, the PFS data set was still far from being totally exhausted in its research potential. More comprehensive analysis could be done using the data set and this task was undertaken by the contributors to this volume. The topics of the First Country Report were tackled in more detail and with more elaborate methodology by these researchers. Where, for instance, the First Country Report tables were mostly cross-tabulations, the papers comprising this volume have utilized, in most cases, multivariate techniques along with some more advanced models to analyse the data more fully. Although the First Country Report offers a thoroughly competent extraction of the major findings of the PFS, this volume is designed to complement it and to present a more intensive examination of the results for those interested in specialized demographic information on Pakistan.

The chapter by Booth and Shah evaluates the PFS data to check the quality of reporting, which in most developing countries, including Pakistan, has been known to be defective in the past. The task of evaluating the data is well worthwhile as the analysis to be done subsequently would be biased and incorrect if there is substantial misreporting of age at events such as deaths and birth dates of children, dates of marriage, etc. Overall reporting is found to be of good quality and tests such as P/F ratio method and the Gompertz relational model are used to prove this.

In the First Country Report the mean age at marriage for the sample of ever-married women was reported to be 16.1 years while the NIS (1968–9) estimate was 15.8 years, which indicated a rising trend in the age at marriage. The next chapter by Farid takes up the study of cohort nuptiality in Pakistan, applying two nuptiality models to show substantial changes in the age pattern of first marriage. Changes have been most marked with the youngest groups aged under 25 and age at marriage for these cohorts is thought to be almost three years higher than for the cohorts aged above 40. Also first marriages are found to become spread over a wider range. In the following chapter by Karim differentials in age at marriage are identified by residence and education, with urban residence and level of education being positively associated with timing of marriage.

The major emphasis of the PFS was the measurement and analysis of fertility behaviour. Therefore the largest part of this volume contains papers analysing fertility and related behaviour. The first contribution by Alam estimates fertility levels and trends for the population as a whole, for regions and for urban and rural areas. The author concludes that fertility has declined recently (mainly in the five years previous to the survey), primarily because of changes in the age at marriage. Marital fertility is not found to have changed appreciably in the recent past.

As has been discussed earlier in this introduction, it is important for us to analyse fertility in the context of many variables which together seem to affect changes in reproductive behaviour. The bivariate relationship between wife's education and husband's occupation and cumulative fertility, which was explored in the First Country Report, was reported to be almost negligible. But the number of children ever born to urban women was higher than the equivalent to rural women. A multivariate approach is more appropriate and just such an analysis is undertaken by Casterline where education, urbanization, type of family structure, preference for sons, and infant mortality are some of the major variables incorporated into his study of differentials. Although the paper finds relative homogeneity in fertility across groups with different characteristics, some interesting differentials, however small, emerge in the study. Marital fertility in urban areas is confirmed as being higher than rural fertility and a negative association is found between educational level and fertility. Differentials by province are small, as are those by work status and by family type but some evidence is found in support of the idea that the number of sons a couple had did affect their reproductive behaviour.

Although the characteristics of a woman or her family can be used to classify her residence, education, etc, the argument does not follow that her level of fertility can be automatically casually related to these characteristics. Most socio-economic and cultural characteristics influence the 'intermediate variables' which in turn directly influence fertility behaviour. The study of these intermediate variables has become of great interest only recently and one major reason for this is the earlier lack of data on these variables. The PFS does in fact have some data, especially on breastfeeding behaviour, which enables a detailed study to be made by I. Shah. Although from the First Country Report it was known that breastfeeding in a closed interval lasted 16 months on average, this chapter takes us much deeper into the problems of analysing length of breastfeeding in the closed and open intervals. It also demonstrates the importance of breastfeeding behaviour in the determination of fertility levels in Pakistan. Thus far researchers in Pakistan have had to rely on information on breastfeeding collected in Punjab, India and in Bangladesh as rough indicators of lactation, but this paper now makes available information on trends and differentials for this country.

A study by N. Shah, of contraceptive use, another powerful intermediate variable, utilizes the KAP part of the PFS to show how most use of modern contraceptives remains confined to women living in urban areas and to educated women. Once again, as shown in the First Country Report, most of the women in the sample had heard of at least one specific method of birth control and there was a huge gap between knowledge and use which was only about 10 per cent among currently married women. The analysis of trends in contraceptive use shows disappointingly little progress in the programme in reaching any more of the target population since the time of the National Impact Survey in 1969.

Another study by Sathar utilizes the Bongaarts framework for analysing the intermediate variables and applies it to PFS data. It is found that although breastfeeding, marriage and contraceptive behaviour are together able to explain a large proportion of fertility variation, there is clearly a gap in knowledge of behaviour related to abortion, spousal separation and some other intermediate variables for which information was lacking in the PFS. Fecundity is estimated to be much lower than the biological maximum, indicating that many practices in Pakistan lead to a lowering of natural fertility levels.

Another chapter by Nizamuddin examines the effects of community and programme variables on the fertility behaviour of rural Pakistani women. This paper once again tackles the relationships of factors affecting a community where changes at the community level may have repercussions at the individual level. For instance, the impact of agricultural extension programmes or a population planning clinic could be thought to influence changes in intermediate variables such as contraceptive behaviour and marriage patterns. Such intermediate factors would then in turn influence fertility. The findings of the paper, based on community-level data collected by the PFS, indicate that in fact the community level variables have very little impact on individual behaviour. However, this may be also a result of problems in the way in which the data were collected.

The last paper by Alam and Cleland estimates infant mortality from birth history data in the PFS. In the First Country Report infant mortality was deduced to be quite high, as 47 per cent of the ever-married women had experienced the loss of at least one child. From the average of 4.3 children ever born to ever-married women, of infant mortality only 3.2 survived at the time of the survey. Both direct and indirect estimates are made and the cross-checks prove once again that reporting of events by women is probably quite good. The PFS data enable the identification of levels of infant and child mortality as well as some idea of the trends and differentials. The paper also attempts to examine the inter-relationships between sex preferences, fertility and infant mortality. The two major findings are that infant mortality has remained stable and high since 1960 and that infant and child mortality is highly related to the length of the previous birth interval.

Many of the contributions point the way to areas in which data ought to be collected in future surveys. More data need to be collected on the family or household level; and on the individual level, on intermediate variables other than contraception, marriage and lactation. In addition the chapter by Nizamuddin points out the need for better data more suited to the social and economic context of Pakistani society to test the impact of community variables and other external changes on individual behaviour within the society. More details about the household, especially socio-economic characteristics such as income, landownership and flow of wealth within a family would be useful to analyse factors likely to affect fertility related behaviour.

But apart from the need for further research and ideas about data to be collected in future surveys, this volume provides a benchmark of the type of detailed research which can be conducted using information collected in the PFS or NIS type of surveys. It contributes a very specialized literature consisting of research, primarily on fertility, but where very important areas such as data evaluation, nuptiality and infant mortality are also handled with great detail. It is unique in its level of detail and it is also a most recent source of information on fertility and other topics.

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# 2 The Data and their Quality

## Heather Booth and Iqbal H. Shah

## 2.1 THE SURVEY

The Pakistan Fertility Survey was based on a random sample of 5246 households, representing 93 per cent of the total population. The remaining 7 per cent of the population was excluded from the sample due to logistic and administrative problems. Selected households were visited in 1975 by 36 specially trained female interviewers, closely observed by 9 supervisors and members of the senior staff of the executing agency. For all members of the selected households some basic information such as age, marital status, education and household composition, was obtained through the household schedule. All ever-married women up to the age of 50 years were then interviewed in detail. The household schedule was successfully completed for 4901 of the 5246 selected households, thus achieving a coverage level of 92.6 per cent. In these households 5046 women were found to meet the eligibility criteria for the individual questionnaire. Of these 4996[1] were successfully interviewed, the response rate thus being 99.0 per cent.

For individual interviews, the WFS core questionnaire was adapted to the socio-cultural conditions of Pakistan and then translated into the main local languages: Punjabi, Sindhi, Pushto, Baluchi and Brahui. The questionnaire contained all sections of the standard WFS questionnaire: background details of the respondent and her current (last) husband, a complete birth history with the relevant dates, a marriage history, knowledge and use of contraceptive methods, fertility preferences, and questions on exposure to the mass media.

One major difference in the PFS individual questionnaire from the WFS core questionnaire was that in Pakistan only the open-ended question on knowledge of contraception was asked. The reliance was placed entirely on asking the respondent to name all the methods she could remember, and there was no probing to see whether she had heard of methods that she had not mentioned. This was a deliberate decision, as there was evidence from previous surveys of a similar kind that women in Pakistan would overstate knowledge in response to a probe question. The questionnaire, therefore, restricted questioning on ever-use and current use to only those respondents who had mentioned at least one contraceptive method without prompting. There is some evidence that this restriction may have produced a downward bias in estimates of knowledge, and particularly in reported ever-use and current use of contraception (Vaessen 1981).

This survey is a useful source of estimates on fertility, nuptiality, infant and child mortality, contraceptive knowledge and use and other related factors and in subsequent chapters a detailed analysis of these topics is presented. However, before undertaking any further analysis of the data there is a need for a thorough evaluation of data, because retrospective survey data are subject to response and non-response errors, which at times bias these estimates. Response errors arise mainly from misreporting of age and the omission and displacement of vital events (Brass and Coale 1968; Potter 1977; Goldman, Coale and Weinstein 1979). Non-response errors mainly arise from the failure of the interviewer or respondent to ask or answer the questions and from refusal or non-availability of the respondent for the interview. In our analysis we are mainly concerned with response errors, and our aim is therefore to evaluate the quality of the information reported, ie to determine the accuracy of the data and to search for any apparent errors or inconsistencies in response, as well as to find out the extent to which these errors bias demographic estimates.

The analysis is mainly concerned with data

[1] Out of these, 47 women were aged exactly 50 years and were excluded from the analysis.



Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey*: 9–37. Voorburg, Netherlands: International Statistical Institute.

from individual questionnaires, and involves checks of internal consistency and, whenever possible, comparison with other sources of data.

The responses of the interviewed women were not always complete. In many instances respondents failed to provide the information asked, particularly with regard to dates of vital events. In such cases the missing information, for example missing dates, were imputed on the basis of response to related questions. If this was not possible, responses were coded as 'not stated'. Imputation can make it more difficult, if not impossible, to check on internal consistencies and response errors in the data. Table 2.1 summarizes the reporting of the dates of the occurrence of specific events in the individual survey. Fortunately the number of dates not stated for births, except for respondent's own birth, was very small and for these questions the effect of imputation is likely to be insignificant. It should, however, be mentioned that in the PFS, unlike many of the other WFS surveys, the information regarding calendar months of births was asked with reference to the English calendar or Islamic/lunar calendar months. In cases where the respondents were unable to report any type of calendar month, the season (winter, spring, summer or autumn) was ascertained. For cases initially assigned season only, the month of birth was imputed with constraints based upon the range of different seasons. For an event for which the month information was completely missing, the imputation of months was either made on a strictly random basis or on a related algorithm, within the limits imposed by such constraints as the minimum plausible interval between successive births. The conversion of reported Islamic/lunar months, season etc to the English calendar was done at the time of office editing.

Data collected from retrospective fertility surveys may suffer from various types of error which may bias the demographic measures. These errors arise from sources such as fault in the design of questionnaire, lack of knowledge among the respondents, misinterpretation of the questionnaire, memory lapse or poor interaction between respondent and interviewer. Of these, errors in reported age are perhaps the most obvious. This is manifested in the heaping that occurs at ages divisible by 5 and, to a lesser extent, by digits divisible by 2. Such errors may be related to parity in such a way that women with more children than average for their age may be reported (often by the interviewer) as older than their true age. Such biases will distort estimates of the levels and trends in fertility.

Marriage durations show the same digital heaping as age, because the unit of measurement is in years. Age at infant death, however, where the unit of measurement is years and months because of the much shorter durations involved, suffers from heaping on numbers of months that are divisible by three, with the most serious heaping on 12 and 24, because of rounding to whole years.

The reporting of month, in addition to year, of events may also be subject to error. This is important for the calculation of birth intervals, and for fertility rates because of their dependence on month (Chidambaram and Pullum 1981).

Infant mortality rates, dependent on both month of birth and month of death, will also be affected by such errors. In the case of Pakistan,

**Table 2.1** Reporting of date[a] of occurrence for specific events in the individual questionnaire

| | Month and year | Year only | Age at marriage | Total |
|---|---|---|---|---|
| Respondent's birth | 339 | – | 4613 | 4952 |
| All births | 16525 | 4117 | | 20642 |
| First birth | 3368 | 881 | | 4249 |
| Next to last birth | 2993 | 698 | | 3691 |
| Last birth | 3843 | 406 | | 4249 |
| Beg. of all marriages | 3781 | 1389 | | 5170 |
| End of all marriages[b] | 407 | 84 | | 501 |
| Beg. of first marriage | 3632 | 1320 | | 4952 |
| Beg. of current marriage | 3555 | 1114 | | 4669 |

[a]The surprisingly complete information about calendar year of birth owes much to the interviewers who calculated and noted calendar year when respondent provided the information to them, of age or duration (how long ago).
[b]Information about 228 dissolved marriages was reported in terms of 'years since first marriage'. During office editing these were converted to calendar years.

however, this issue does not arise since data on infant and child deaths are available only in broad categories.

Omission of births may also occur, especially for older cohorts, again distorting fertility levels and trends. In addition, the pattern of omissions within cohorts may be significant, leading to apparent increases in rates over time at young ages, for example, if children who have grown up and left the household are omitted on a large scale. The omission of children, especially females, who have died may also be a problem, affecting the levels of both fertility and child mortality. Differential omissions over time will also affect fertility patterns.

Other errors relate to the timing of the reported number of births. Brass (1971) has identified two types of timing error: error in the size of the reference period, and error in the location of the reference period. The combination of these two types of timing error can be quite complex, and is further complicated by the errors in the reported ages of women and by the pattern of omissions. The effects on fertility may be in similar or opposite directions and it is impossible to identify anything but the major biases in the data.

Potter (1977) has developed a model of event misplacement in which earlier events are reported less accurately than later events, and the date of the first reported event influences subsequent reported dates of events because intervals are taken into account. The model leads to an apparent or over-estimated decline in fertility, and produces evidence to show that such an effect occurs in data from Bangladesh and El Salvador, thereby substantiating the model.

These different types of reporting error are clearly not independent of each other, nor are their separate effects easily identifiable. Age misreporting and errors in the location of the reference period may have identical effects, or they may have opposite effects and largely cancel each other out. Intervals between births will also be related to omissions. It is likely that education is an important determinant of the quality of the data, and that women with less education who are more likely to misreport age are also more likely to misreport durations and misplace events.

## 2.2 DIGIT PREFERENCE AND THE REPORTING OF AGES, DATES AND DURATIONS

### Age reporting in females

The single-year age distribution of females included in the household survey is given in figure 2.1. There is clear evidence of a preference for digits divisible by 2 and 5 for ages 10–45. The absence of a similar peak at age 50 is conspicuous and could be related to the fact that only women aged less than 50 were eligible to be interviewed in detail (the individual questionnaire): women, or interviewers, who were aware of this fact might understate or overstate age according to their desire to be included or excluded. At older ages,

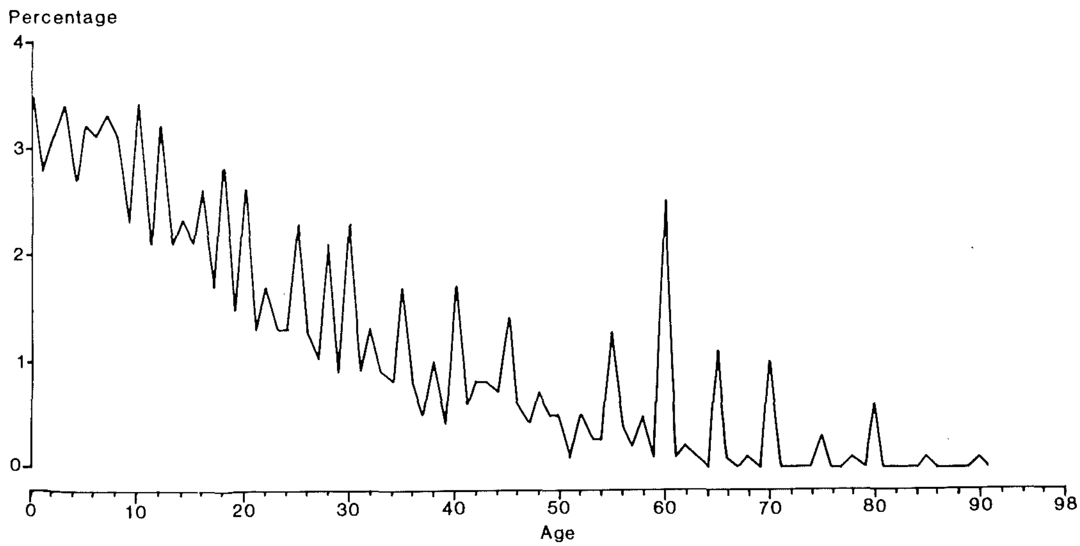


Figure 2.1 Reported single-year age distribution of females aged 0–98

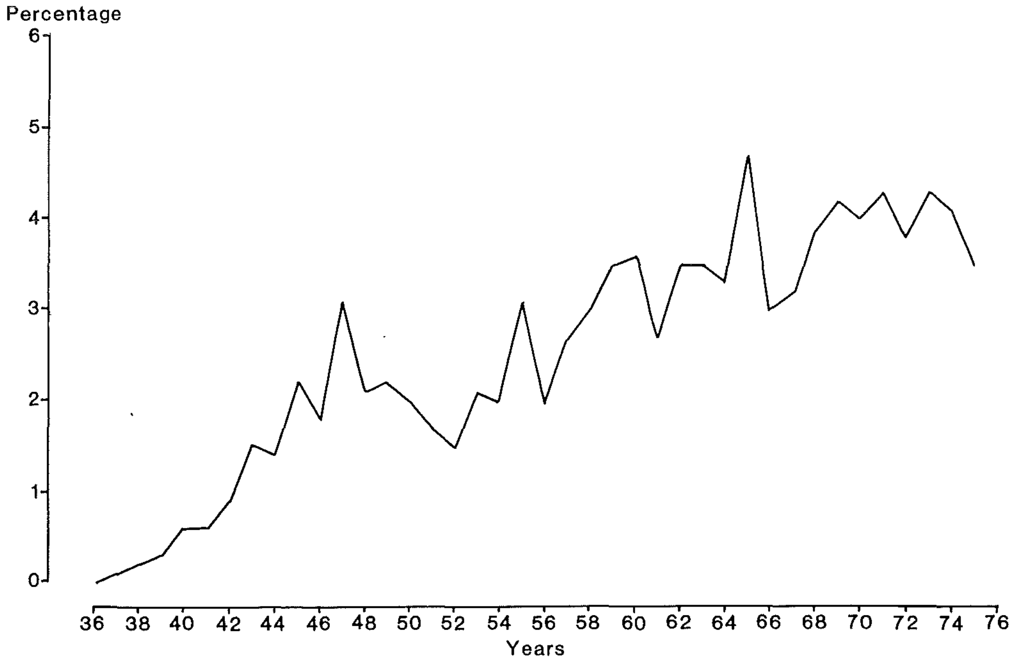


Figure 2.4 Year of current marriage as reported directly or indirectly

examine these three distributions separately because during field editing the three pieces of information were combined. This means that several different errors are combined, making it harder to detect individual errors. Despite this, it is possible to detect some heaping in the dating of marriages.

The distribution of year of current marriage is shown in figure 2.4. There is clear evidence of heaping at 1947, 1955 and 1965, but little evidence of the usual pattern of preference for digits divisible by 5 or 2. It seems that the reporting of date of marriage has been influenced by major historical events: 1947 was the year in which Pakistan gained independence, and in 1965 Pakistan was at war with India. It is also possible that the high percentage reporting marriage in 1959 is associated with the fact that martial law was introduced late in 1958, and that the peak at 1971 relates to the separation of what was previously East Pakistan and West Pakistan into Bangladesh and Pakistan. The possible effects of digit preference in reporting both year and duration of marriage will be amplified for years divisible by 5, because the year of survey, 1975, leads to heaping on the same years. This may have resulted in some heaping on 1940, 1945, 1955, 1960 and 1965. The absence of heaping on digits divisible by 2 (which would not coincide for year and duration) lends support to this argument.

## Month reporting

The reporting of the month of marriage for current first marriages is shown in figure 2.5. Separate distributions are shown for those women reporting month directly (56.3 per cent), and for those reporting month indirectly (14.3 per cent). If there is no seasonality of marriage, 8.3 per cent of marriages should occur each month. The two distributions fluctuate around this average, but there is no similarity in the patterns of deviations. A further 5.9 per cent reported season of marriage only, and for these and the remaining 23.5 per cent, month was assigned. The numbers reporting season only are too small for any meaningful analysis. For those giving no indication of month the distribution of assigned month is not based on the distribution of reported month, as was claimed to have been the case.

In order to examine more closely the different patterns of reporting of month of marriage for direct and indirect reporting, the distributions have been obtained for the urban and rural populations separately, and are shown in figure 2.6. The smaller fluctuations for the directly

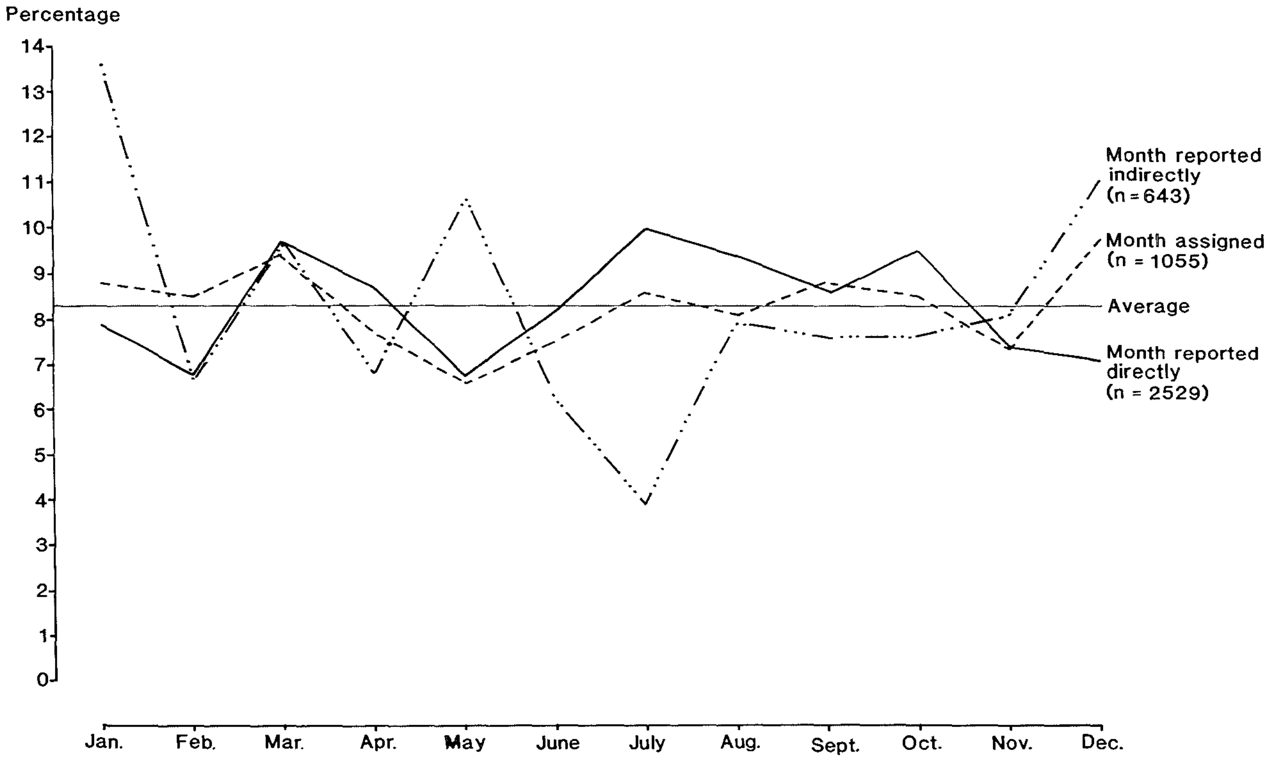


Figure 2.5 Month of marriage for current first marriages

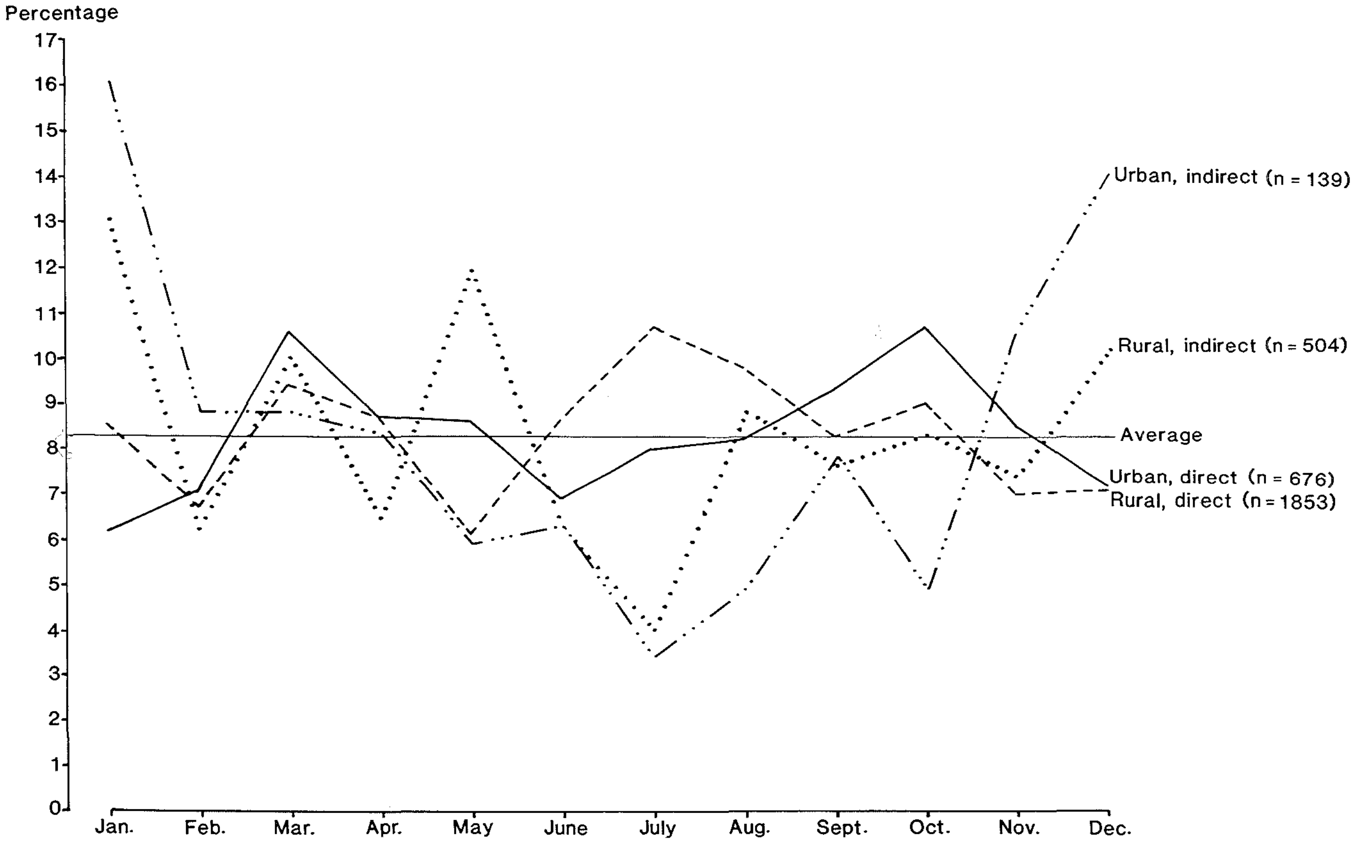


Figure 2.6 Month of marriage for current first marriages by urban–rural residence

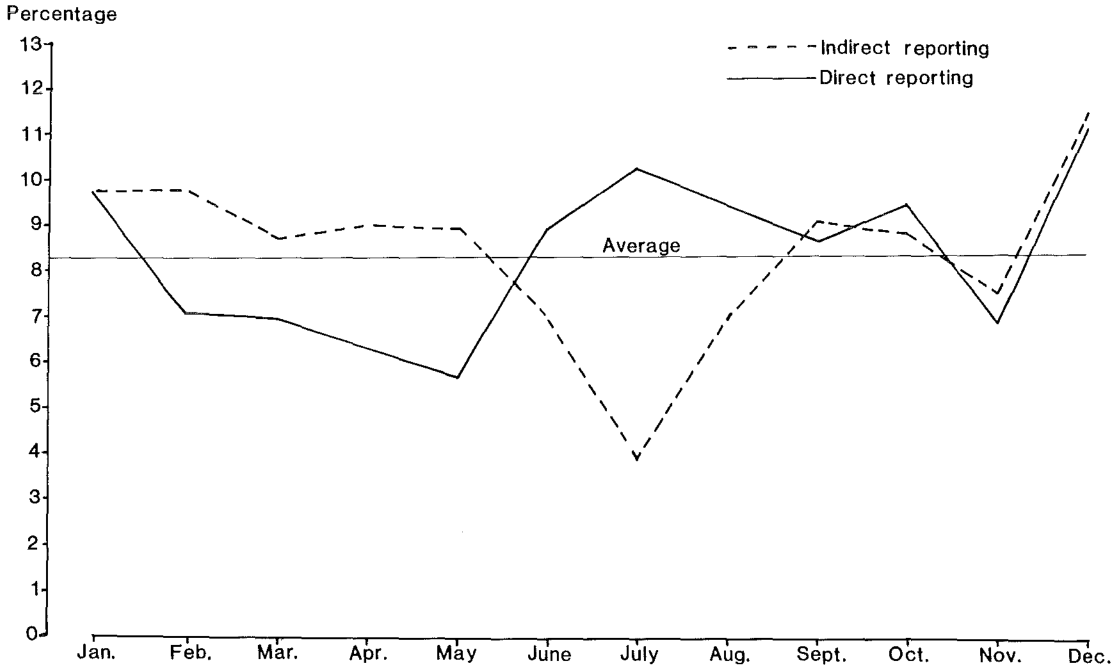


Figure 2.7 Month of birth by direct and indirect reporting

reported months are also found for both the rural and urban populations and the pattern of fluctuation is roughly similar for the two populations for about half of the year (October to April). For direct reporting, the fluctuations are considerably greater. Indirect reporting is done by relating a demographic event to the time of year, such as harvest time or religious festivals or fasting (but giving more precise information than season only). The greater fluctuations for indirect reporting may be related to these annual events and as different events are significant to the urban and rural populations, different reporting patterns result. For example, the peak of marriages in the month of May in indirect reports could be related to the harvesting of crops at that time, and indeed a peak is found in May for the rural population, but not for the urban population for whom harvesting has little significance. It also may be possible to relate frequency of reporting for other months (notably July and January–December) to other events.

The extent to which heaping on months occurs because of misreporting or because of real seasonal variation is difficult to detect. It is likely, for example, that rural marriages *are* concentrated around harvest time because after harvesting the financial situation is better and there is less demand for labour.

The distribution of reported month of birth for all births is shown in figure 2.7 for those births for which month is reported directly (10 709 births) and for those for which month is reported indirectly (4893 births). (A further 5112 births had month assigned because season only or no information was reported: these births have been omitted because they add nothing to the analysis of reporting.) Again, in the absence of seasonality, 8.3 per cent of births are expected to occur each month. In contrast to the reporting of month of marriage, the direct reports fluctuate only marginally less than the indirect reports. There are similarities, however, between reported month of marriage and reported month of birth in the patterns of direct and indirect reporting. For indirect reporting there is a marked deficit of both marriages and births in July and a peak in December–January; and for direct reporting there is an excess of both marriages (especially rural) and births in July. There is also an excess of births in December–January for direct reporting. For indirect reporting, this was not found.

Comparison with month of birth reported in

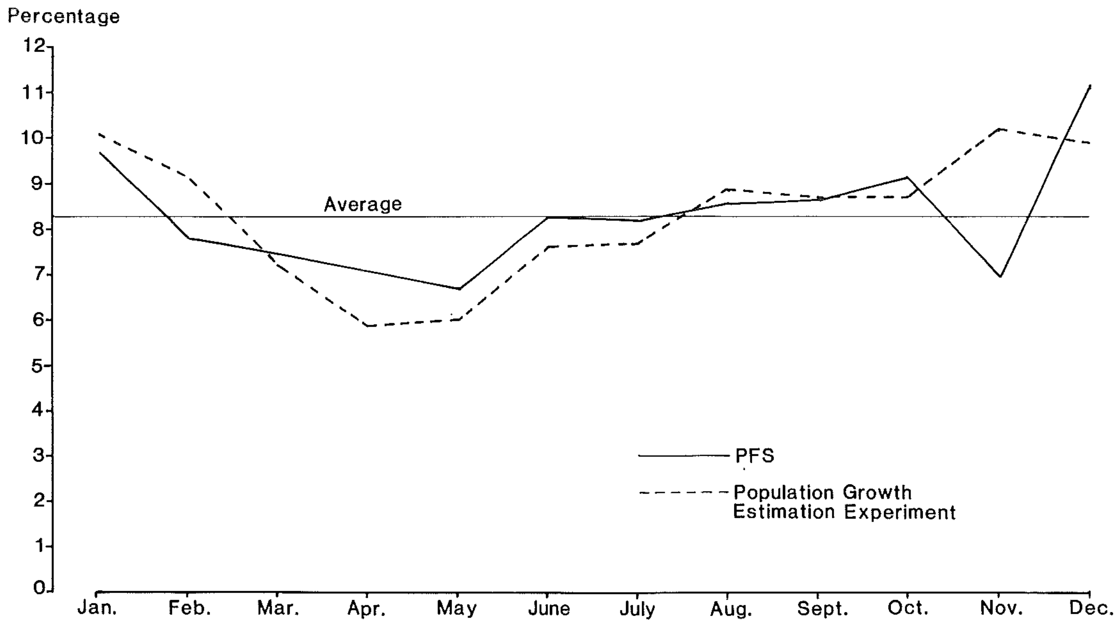


**Figure 2.8** Month of birth: a comparison between the Pakistan Fertility Survey 1975 and the Population Growth Estimation Experiment 1964

the PGE for 1964 is shown in figure 2.8. These are Chandrasekaran–Deming estimates,[2] based on both the reporting of births as they occur and on retrospective surveys with short recall lengths, and should therefore be considerably more accurate than reports of months of births occurring as long ago as 40 years. It is seen in figure 2.8 that the reporting of month of birth in the PFS (direct and indirect reports combined) follows a very similar distribution to that obtained in the PGE with the single exception of November where the PFS estimate is too low. In aggregate, therefore, the reported distribution of month of birth is reasonably good, though the existence of large discrepancies according to direct or indirect reporting remains.

## Reporting of breastfeeding

The questions on breastfeeding ('Did you breastfeed this child?' and 'If yes, how many months?') did not explicitly mention 'still breastfeeding' as a possible response. However, it was included in the printed questionnaire and the interviewers noted the response in the space provided for it. There are two main types of data which can be used separately or in combination. These are the retrospectively reported durations of breastfeeding, and the current breastfeeding status combined with the dates of the births concerned. Both are subject to rather different types of reporting error.

### *Retrospectively reported breastfeeding durations for children who have been weaned*

Retrospectively reported breastfeeding durations show a dramatic pattern of heaping at multiples of 6 and 12 months. Figure 2.9, for example, indicates that 20 per cent of all women reporting on their next-to-last live birth reported a breastfeeding duration of exactly 24 months. Whereas the reported breastfeeding durations ranged from zero to 42 months, 49 per cent of women reported durations of exactly 12, 18 or 24 months. A similar pattern of heaping emerged when the analysis of the reported durations of breastfeeding following the next-to-last live birth was restricted to those women who reported the month and year of birth of their penultimate child. Furthermore, the patterns of heaping for urban and rural women were found to be almost identical.

It is hard to determine the extent to which

[2] The pattern of reporting in LR and CS is the same, so that the overall CD pattern remains valid for this comparison.

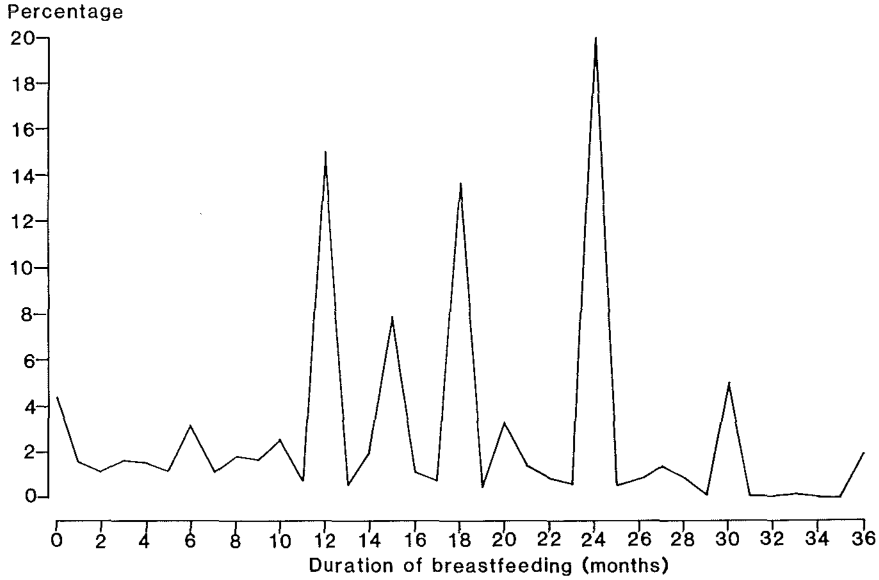


**Figure 2.9** Percentage distribution of women by retrospectively reported duration of breastfeeding following their next-to-last live birth, PFS 1975

heaping represents genuine concentrations of normative durations or the artifact of rounding. Although some of the heaping at 12 and 24 months could be real, much of it seems to be due to rounding. Therefore, the extent to which the shape of the distribution and perhaps the reported median and quartiles may be distorted is not known. Nevertheless, if there is no greater tendency to round up than to round down the observed mean may not be greatly distorted.

*Reporting of current breastfeeding status*

The proportions of children still breastfeeding by the number of months elapsed since the births in question (figure 2.10), do not show such large

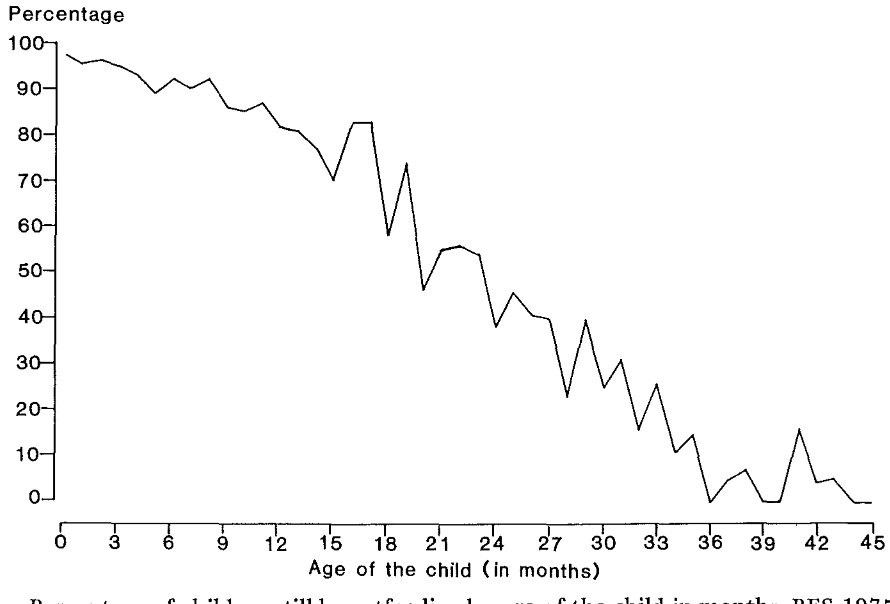


**Figure 2.10** Percentage of children still breastfeeding by age of the child in months, PFS 1975

drops at multiples of 6 and 12 months as one might expect if the heapings in the retrospective data were genuine. However, the proportions still breastfeeding may themselves be inaccurate. For example, women who were still breastfeeding their most recent child might have misunderstood the question 'how many months?', and responded in terms of an actual number of months instead of saying that they were still breastfeeding. Such a misunderstanding would affect both types of data, retrospectively reported durations and proportions still breastfeeding, although not in exactly the same way. It would lead to a downward bias in the apparent proportions still breastfeeding, while its impact on retrospectively reported durations would be either downwards (if women stated the number of months' breastfeeding to date) or negligible (if they stated the number of months they intended to breastfeed that child). It is hard to assess the possible extent of this misunderstanding; however, at first sight it appears to have been relatively minor. Among the 1443 women who had weaned their last child within the last five years, only 71 women (five per cent approximately) reported breastfeeding equal to or in excess of the recorded age of the child in question. Most (that is, 81 per cent) of these 71 women were illiterate. However, random imputation of dates would not explain the inconsistency, since 66 per cent of these women themselves reported the month and year of the births in question. In the majority of these inconsistent cases, where breastfeeding durations in excess of the recorded age of the child are reported, the responses appear to be a statement of the intended duration of breastfeeding.

The data on proportions still breastfeeding are also flawed by the errors in the recorded dates of birth. Both the imputation and indirect estimation, noted previously, affect the analysis of the proportions still breastfeeding. The result of heaping in the reported dates of birth would be to distort the shape of the distribution of proportions still breastfeeding rather than to affect its derived measure like the mean. The mislocation of dates of births affects the analysis on proportions still breastfeeding as well. In summary, it appears that neither of the two types of data available – retrospectively reported durations of breastfeeding and the proportions still breastfeeding by months elapsed since birth – are entirely free from reporting errors.

## 2.3 NUPTIALITY

The nuptiality data in the PFS consist of a detailed marriage history obtained through the individual

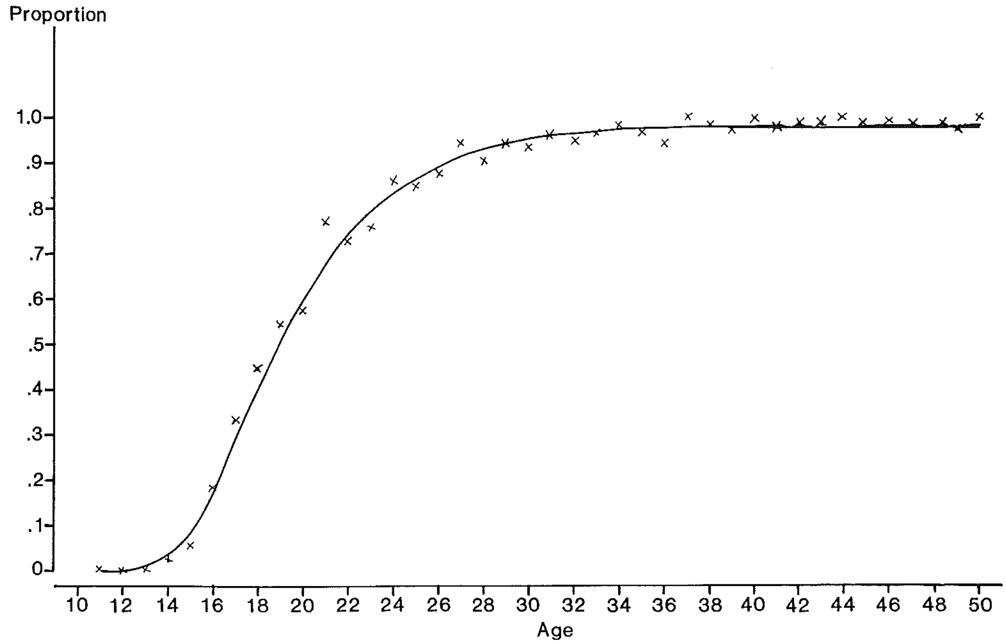


Figure 2.11 Reported and fitted proportions, ever-married women, by age

Table 2.2 Nuptiality parameter estimates based on household data, Pakistan 1975

| | All | Urban | Rural |
|---|---|---|---|
| $a_0$ | 11.573 | 11.671 | 11.711 |
| k | 0.663 | 0.741 | 0.613 |
| C | 0.983 | 0.984 | 0.982 |
| mean | 19.109 | 20.083 | 18.679 |
| s.d. | 4.365 | 4.873 | 4.036 |

questionnaire as well as reported marital status in the household schedule. Data in the individual questionnaire include date of onset of union and date of dissolution (if the marriage was dissolved) for each marriage in a woman's history. Since the individual questionnaire was administered only to ever-married women, much of the analysis on nuptiality is derived from the household survey data. Proportions ever married, in particular, must be derived from the household survey.

The reported proportions of ever-married women are shown in figure 2.11 where the fit of the Coale nuptiality model is also shown (Coale 1971). The fit is generally good, though there are a few erratic values, most notably at exact age 21.[3] The fitted parameters of the Coale nuptiality model are shown in table 2.2: $a_0$ is the age at start of first marriage, k is the inverse of the pace of first marriage and C is the proportion of women who ever marry. The mean age at first marriage and its standard deviation are also shown. It is seen that the mean age at first marriage is approximately one and a half years younger for the rural population than for the urban population. This is achieved not by a younger age at first marriage but rather by a slower pace of the first marriage distribution for each urban population.

[3] Because these proportions are cumulative, heaping at age 20 results in a high value at exact age 21.

## Trends in age at marriage

Trends in nuptiality over time can be detected by examining the data by marriage cohorts. Due to censoring, the estimates of mean age at marriage (MAM) will be underestimated for all cohorts, and the advantage of this exercise lies only in detecting errors in the data. Table 2.3 shows the mean age at first marriage by age at marriage for five-year marriage cohorts. The national estimates show a gradual rise in age at marriage, from 14.3 in 1946–50 to 16.5 in 1970–5. Within age at marriage categories, with the exception of the less than 15 category, MAM is more or less unchanged. The women marrying young (less than 15) show a gradual rise in MAM. This rise is consistent with the declining proportion married observed in population censuses since 1941 for the age group 10–14. This internal consistency of the data leads us to conclude that the overall quality of the nuptiality data is reasonably good.

## Comparison with external sources

A direct comparison of data in the PFS with data obtained from population censuses can be made through a reconstruction of marital status distributions at the date of censuses, and can be the basis for checking marriage histories.

In table 2.4 reconstructed proportions are compared with proportions from the 1951, 1961 and 1972 censuses. The reconstructed values are consistently higher than the census figures, particularly for 1951, and for the 15–19 age group. The differences between the 1975 survey and the 1972 census, especially the 10 per cent difference at age 15–19, are surprising. There are two possible explanations: first, the discrepancy may be caused by unmarried women in the census being systematically transferred into younger groups, or young married women being transferred into older groups; and secondly, PFS respondents

Table 2.3 Mean age at first marriage by age at marriage categories for marriage cohorts, Pakistan 1946–75

| Marriage cohort | All | <15 | 15–19 | 20–24 | 25–29 |
|---|---|---|---|---|---|
| 1946–50 | 14.31 | 12.62 | 16.33 | – | – |
| 1951–55 | 14.90 | 12.83 | 16.36 | 21.32[a] | – |
| 1956–60 | 15.24 | 12.87 | 16.41 | 21.77[a] | – |
| 1961–65 | 15.62 | 13.02 | 16.55 | 21.33 | 26.56[a] |
| 1966–70 | 15.35 | 13.12 | 16.74 | 21.58 | 26.57[a] |
| 1970–75 | 16.48 | 13.27 | 16.48 | 21.58 | 25.99[a] |

[a]Less than 25 women.

Table 2.4 Reconstruction of marital status percentage distributions of ever-married women for census dates from reported dates of marriage in the PFS, by five-year age groups

| Age group | 1951 | | 1961 | | 1972 | | 1975 |
|---|---|---|---|---|---|---|---|
| | Census | PFS | Census | PFS | Census | PFS | PFS |
| 15–19 | 0.543 | 0.750 | 0.534 | 0.591 | 0.344 | 0.443 | 0.380 |
| 20–24 | 0.823 | 0.935 | 0.880 | 0.905 | 0.787 | 0.817 | 0.780 |
| 25–29 | | | 0.949 | 0.977 | 0.928 | 0.943 | 0.914 |
| 30–34 | | | 0.970 | 0.987 | 0.964 | 0.972 | 0.965 |
| 35–39 | | | | | 0.979 | 0.986 | 0.979 |
| 40–44 | | | | | 0.985 | 0.990 | 0.985 |
| 45–49 | | | | | | | 0.990 |

*Source*: Government of Pakistan, Population Census 1961, Bulletin no 4; Population Census 1972, summary tables (mimeographed)

may have under-reported their age at marriage. Without further information, this issue is difficult to resolve, but a tendency to under-report ages of unmarried women in population censuses has been observed by Krotki and Perveen (1976). They have pointed out that for the 1961 census the low proportion married at ages 15–19 is due to a shifting of unmarried women into the 10–14 age group. If this tendency was also prevalent at the time of the 1972 population census, then it is quite possible that 20–24 year old unmarried women were shifted to the 15–19 age group, thus reducing the proportion married for this group. This is not improbable, particularly since age at marriage is rising.

## 2.4 FERTILITY

The detailed maternity histories obtained in the individual survey include the date of birth of each child born to the women, as well as date of death (or age at death) of each child who died.

Every effort was made to ensure that all live births were recorded. Hence, if these checks are accurate, it is possible to obtain fertility rates by age or marital duration (or by birth or marriage cohort), not only for the recent past but also for the more distant past. In the following paragraphs, we attempt to determine whether the levels and trends in fertility obtained through checks in the individual questionnaire are correct.

The Lexis diagram (figure 2.12) is a simple way of visualizing the birth histories of women obtained from the PFS. All ever-married women between the reported ages of 15 and 50 at the time of the survey are grouped into five-year age groups, representing seven different five-year births cohorts. Period is defined with reference to time of the survey and, in figure 2.12, it represents the historical location of the cohorts' experience from the time of attaining exact age 10 years. The experience of each cohort can be entered in the diagonal band of the Lexis diagram. For the purpose of the present study, this is first marriage, first birth, second birth, and so on, experienced after reaching exact age 10 up to the time of the survey. Unless otherwise specified, the birth cohort of a woman is always defined as her five-year age group at the time of the survey and, for the sake of brevity, referred to by the age group only.

The length of the recall period involved for different cohorts is evident from figure 2.12. In addition, figure 2.12 helps to identify three main areas of potential inaccuracy. First, women might have been misclassified by age. Secondly, the total number of children ever born may be subject to error. Finally the dates of birth might have been incorrectly reported.

In view of the lack of reliable registration data in Pakistan and the widespread controversy surrounding data from other external sources such as previous censuses and sample surveys (Krotki and Perveen 1975; Hobbs 1980; and Retherford and Mirza 1981), the evaluation, for the most part, has to rely purely on internal consistency checks. It was also not possible to evaluate the PFS data with respect to the post-enumeration survey (PES), since the data from the PES were never compiled because of a reported loss of a significant number of questionnaires. We have already noted that though it is generally possible to detect omissions or misplacement in time, it is extremely

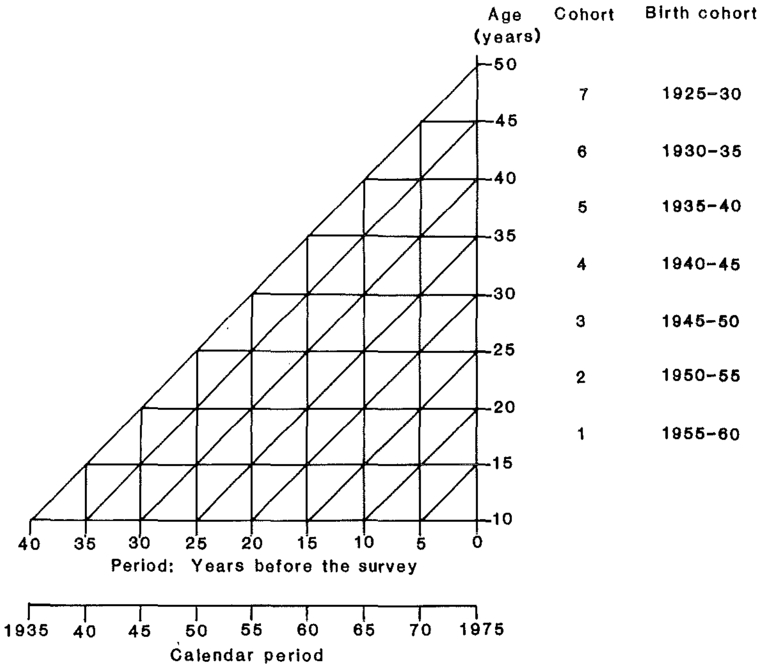


Figure 2.12 Lexis diagram classifying ever-married women by age and period (The presentation is simplified by assuming that all interviews took place at exactly the same time: 1 January)

difficult to correct for these. Furthermore, it is not always possible to distinguish between the effects of births being omitted or misplaced in time. For convenience, the two are dealt with separately, though their links are indicated where necessary. All analysis is based on data already edited and imputed, but dates which have been imputed can be identified.

## Omission of live births

The recording of the number of live births (hereafter referred to as 'births') which occurred to each respondent can be distorted both by over or under-reporting, though over-reporting is rare. Under-reporting of births is believed to be related to the age and educational level of respondents, i.e older and uneducated women are more likely to under-report. Furthermore, certain types of birth (for example, children born a long time ago, who died shortly after birth or who moved away from the respondent, or female births) are found to be more likely to be omitted. The procedures used here for screening omissions thus focus on these characteristics.

## Average parity by current age of women

Simple inspection of the increments in mean parity across age groups (see table 2.5) suggests some omission by women aged 45–49, if one assumes no genuine cohort increase in fertility for women now aged 40–44.[4]

The omission of births by older women is examined in detail in table 2.6. The percentage of sons living away from the household is considerably smaller than for daughters, reflecting the much younger age at which women marry and leave the household. For both sexes there are irregularities in the rising proportions living away by age, indicating possible omission of children living away. The association between the high percentage of women reporting all of their sons or daughters as living at home and low percentage of

[4] The examination of the P/F ratios for the year before the survey and the comparison of the cumulative fertility at similar stages of the life cycle for women now aged 40–45 and 45–49 also substantiate the possibility of omission by women aged 45–49. Average parity by duration since first marriage, however, does not reveal serious omissions for women who had been married longer (results not shown here).

Table 2.5 Average number of children ever born per ever-married women by age and background characteristics, PFS 1975

| Age at survey | Total sample | Place of residence | | Educational level | |
|---|---|---|---|---|---|
| | | Urban | Rural | Illiterate | Literate |
| All ages[a] | 4.2 | 4.3 | 4.2 | 4.3 | 3.2 |
| | (4920)[b] | (1311) | (3609) | (4393) | (527) |
| 15–19 | 0.6 | 0.6 | 0.6 | 0.6 | 0.5 |
| | (599) | (141) | (457) | (526) | (73) |
| 20–24 | 1.9 | 1.9 | 1.9 | 2.0 | 1.5 |
| | (848) | (229) | (619) | (723) | (125) |
| 25–29 | 3.4 | 3.5 | 3.4 | 3.5 | 2.9 |
| | (912) | (262) | (650) | (793) | (119) |
| 30–34 | 5.0 | 5.3 | 4.9 | 5.0 | 4.8 |
| | (818) | (222) | (596) | (731) | (87) |
| 35–39 | 6.0 | 6.1 | 6.0 | 6.2 | 4.9 |
| | (623) | (171) | (452) | (566) | (58) |
| 40–44 | 7.0 | 6.9 | 7.0 | 7.0 | * |
| | (618) | (151) | (467) | (580) | |
| 45–49 | 6.9 | 6.9 | 6.9 | 6.9 | * |
| | (502) | (135) | (368) | (475) | |

[a]All ages refer to women aged 15–49.
[b]Figures in parentheses show the number of ever-married women.
*Number of ever-married women fewer than 50.

children living away suggests that where omissions of this type occur, all, rather than some, of the children living away are omitted.

Average total numbers of children ever born by age of women vary somewhat but show no systematic irregularity. Similarly, sex ratios by age show no trend but are clearly too high on average. The average numbers of sons and daughters aged 15 and over increase with increasing age of women, as expected, except for the surprisingly high values for both sexes for women aged 46. Sex ratios for those aged 15 and over are very high (except at age 40), confirming the omission of female births for older cohorts and earlier periods. The proportion of children dead also shows no pattern.

## Sex ratios at birth

Sex ratios at birth, defined in terms of the number of male births per female birth, have been used to check for the possibility of differential omission by sex of the child. In general, the sex ratio at birth is about 1.05 or 1.06 and it ranges from 1.02 to 1.07 for most of the countries known to have relatively complete registration of births (Shryock and Siegel 1973).

The PFS indicates an overall ratio of 1.09, suggesting a three or four per cent omission of female births, taking the ratio of 1.05 or 1.06 which is what may be expected if coverage of births by sex is uniform. A slightly greater omission of female births is found among rural women with a ratio of 1.10 than among urban women (for whom the ratio equalled 1.08). Women of the Sind province (with ratio of 1.14) seem to omit female births substantially more than women in Punjab (ratio = 1.08) and the NWFP (ratio = 1.10).

Assuming that any misdating of births (in terms of pushing backwards or forwards from the true date of occurrence) is unrelated to the sex of the child, we may compare sex ratios at birth across different age groups of the mother or different periods of birth (defined as years before the survey) in order to check if sex differential omission exists for children born in the more distant periods or to older mothers. Table 2.7 suggests a systematic omission of female births among children born ten or more years earlier than the survey, and by women aged over 35 years at the survey. Omission of female children seems more common than omission of male children, as

Table 2.6 Mean number of children ever born by sex, residence and survivorship

| Age | Ever born | Living | Dead | Proportion dead | Sex ratio (1000) | |
|---|---|---|---|---|---|---|
| | | | | | Living | 15 + |
| **A Both sexes** | | | | | | |
| 40 | 6.81 | 5.08 | 1.74 | 0.255 | 1189 | 996 |
| 41 | 6.94 | 4.98 | 1.95 | 0.282 | 1178 | 1320 |
| 42 | 7.00 | 4.78 | 2.23 | 0.318 | 1162 | 1392 |
| 43 | 7.14 | 5.00 | 2.14 | 0.300 | 1027 | 1138 |
| 44 | 6.87 | 5.01 | 1.86 | 0.271 | 1059 | 1167 |
| 45 | 6.71 | 4.83 | 1.88 | 0.281 | 1246 | 1217 |
| 46 | 7.60 | 5.27 | 2.33 | 0.307 | 1097 | 1126 |
| 47 | 6.56 | 4.61 | 1.95 | 0.297 | 1088 | 1299 |
| 48 | 6.88 | 4.90 | 1.99 | 0.289 | 995 | 1043 |
| 49 | 6.79 | 4.87 | 1.92 | 0.282 | 1076 | 1073 |

| Age | Ever born | Living | | % of sons living away | % of women with all sons at home | Sons aged 15 + |
|---|---|---|---|---|---|---|
| | | At home | Away | | | |
| **B Son** | | | | | | |
| 40 | 2.76 | 2.66 | 0.10 | 3.6 | 88 | 1.46 |
| 41 | 2.69 | 2.51 | 0.19 | 6.9 | 83 | 1.80 |
| 42 | 2.57 | 2.39 | 0.18 | 6.8 | 83 | 2.10 |
| 43 | 2.53 | 2.39 | 0.14 | 5.6 | 87 | 2.12 |
| 44 | 2.58 | 2.35 | 0.23 | 8.9 | 81 | 2.08 |
| 45 | 2.68 | 2.42 | 0.26 | 9.7 | 74 | 2.34 |
| 46 | 2.76 | 2.39 | 0.37 | 13.3 | 71 | 2.89 |
| 47 | 2.40 | 2.04 | 0.37 | 15.2 | 73 | 2.65 |
| 48 | 2.44 | 2.14 | 0.30 | 12.4 | 74 | 2.53 |
| 49 | 2.52 | 2.04 | 0.49 | 19.3 | 67 | 2.61 |

| Age | Ever born | Living | | % of daughters living away | % of women with all daughters at home | Daughters aged 15 + |
|---|---|---|---|---|---|---|
| | | At home | Away | | | |
| **C Daughter** | | | | | | |
| 40 | 2.32 | 1.80 | 0.51 | 22.2 | 57 | 1.46 |
| 41 | 2.29 | 1.84 | 0.44 | 19.4 | 61 | 1.36 |
| 42 | 2.21 | 1.63 | 0.58 | 26.0 | 53 | 1.51 |
| 43 | 2.47 | 1.79 | 0.68 | 27.4 | 52 | 1.87 |
| 44 | 2.43 | 1.66 | 0.77 | 31.7 | 50 | 1.78 |
| 45 | 2.15 | 1.42 | 0.73 | 34.1 | 46 | 1.92 |
| 46 | 2.51 | 1.32 | 1.19 | 47.3 | 31 | 2.57 |
| 47 | 2.21 | 1.29 | 0.91 | 41.4 | 42 | 2.04 |
| 48 | 2.45 | 1.38 | 1.07 | 43.6 | 28 | 2.43 |
| 49 | 2.35 | 1.17 | 1.18 | 50.3 | 39 | 2.43 |

Table 2.7 Sex ratios at birth[a] by period of birth and age of the mother at survey, PFS 1975

| Age at survey | All periods | Period: years before the survey | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 0–4 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 | 30+ |
| All ages | 1.09 | 1.06 | 1.05 | 1.12 | 1.10 | 1.14 | 1.24 | 1.36 |
| | (9884)[b] | (2710) | (2518) | (1915) | (1353) | (846) | (455) | (87) |
| 15–19 | 1.18 | 1.17 | | | | | | |
| | (168) | (166) | | | | | | |
| 20–24 | 1.03 | 1.08 | 0.86 | | | | | |
| | (796) | (586) | (209) | | | | | |
| 25–29 | 1.06 | 0.99 | 1.09 | 1.27 | | | | |
| | (1496) | (745) | (588) | (162) | | | | |
| 30–34 | 1.04 | 1.02 | 1.00 | 1.12 | 1.05 | | | |
| | (1996) | (630) | (705) | (509) | (151) | | | |
| 35–39 | 1.10 | 1.09 | 1.11 | 1.12 | 1.06 | 1.16 | | |
| | (1792) | (344) | (460) | (486) | (389) | (111) | | |
| 40–44 | 1.14 | 1.24 | 1.04 | 1.10 | 1.07 | 1.23 | 1.39 | |
| | (2009) | (193) | (384) | (463) | (462) | (360) | (145) | |
| 45–49 | 1.12 | —[c] | 1.16 | 1.07 | 1.19 | 1.04 | 1.17 | 1.31 |
| | (1626) | | (171) | (293) | (349) | (375) | (307) | (86) |

[a]Number of male births per female birth.
[b]Figures in parentheses are number of female births.
[c]Ratios based upon fewer than 50 female births are not shown. These are, however, considered for 'all ages' and 'all periods'.

ratios exceed the expected range (of 1.02 to 1.07) in several cells.[5]

## Displacement of live births

More serious and complex errors in timing are the systematic displacement of birth dates by the mother nearer to, or further from, the time of the survey. Systematic errors in dating births have a characteristic pattern, concentrating births in the period 5–14 years before the survey, at the expense of births in earlier periods, and perhaps even from the most recent five-year period. To search for distortions of this sort, a large number of consistency checks were made.

Rates obtained from births in the past year can be compared with expected births based on current pregnancies. This provides a check on the reliability of the pattern of fertility but not on the level. Age-specific rates for all women were obtained from the product of the ever-married rates and the proportion ever married. These rates refer to ages which are on average three months older than the age reported at the survey. In order to compare them with reports of births in the last year, which took place on average six months before the survey, the rates have been linearly interpolated backwards by nine months. Table 2.8 shows the close agreement between the two

Table 2.8 Births in last year and current pregnancy rates from the PFS 1975

| Age | PFS 1975 | |
|---|---|---|
| | Births in last year | Current pregnancies |
| 15–19 | 0.077 | 0.089 |
| 20–24 | 0.205 | 0.202 |
| 25–29 | 0.249 | 0.252 |
| 30–34 | 0.222 | 0.219 |
| 35–39 | 0.155 | 0.139 |
| 40–44 | 0.086 | 0.083 |
| 45–49 | 0.005 | 0.015 |
| TFR | 1.000 | 1.000 |
| $\bar{m}$ | 29.8 | 29.0 |

[5] Further analysis indicated: (a) a greater omission of female children by illiterate women over 35 years; (b) an almost similar level and pattern of omission in urban and rural areas; and (c) no clear pattern in the sex ratios for the first order births suggesting findings broadly similar to those noted above for all children, though erratic fluctuations (probably due to sampling variation) were more prevalent in the ratios for first-order births.

Table 2.9 Percentage of women having first birth by exact age 20 and median age at first birth by current age, Pakistan 1975

| | Current age | | | | | |
|---|---|---|---|---|---|---|
| | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 |
| Percentage having first birth | 48.7 | 50.0 | 54.5 | 59.6 | 63.6 | 61.5 |
| Median age at first birth | 20.2 | 19.9 | 19.3 | 19.3 | 19.3 | 18.8 |

distributions. The mean age at childbearing ($\bar{m}$) estimated from the two methods is 29.3 and 29.0, and the agreement is remarkable.

The decreasing percentage of women having had a first birth by exact age 20 is consistent with the rising age at marriage as observed earlier (table 2.9). Whereas 64 per cent of women currently aged 40–44 had had a first birth by age 20, the corresponding figure for women aged 20–24 was 49 per cent. The corresponding increase in median age at first birth is also shown in table 2.9.

## Comparison of cohort and period fertility

In order to try to assess the extent of real fertility decline, two techniques are applied. The first is the P/F ratio technique, and the second is the transformed Compertz model.

### *The application of the P/F ratio technique*

One of the most commonly used indirect techniques for estimating the recent fertility is the P/F ratio method. The method was originally developed by Brass (1968) and has subsequently been revised and refined by many demographers, more recently by Hobcraft, Goldman and Chidambaram (1982) and is used to estimate recent fertility by combining data on number of children ever born (P) with cumulative age-specific fertility (F) from the recent past. Although the method was originally devised as a procedure for estimating fertility levels, it has proved to be a useful diagnostic tool for evaluating maternity history data.

Table 2.10 shows the cohort-period rates obtained from the PFS maternity history data and the P/F ratios derived from the rates. The cohort rates represent the fertility exposure of five-year cohort groups during specified time periods before the survey. Trends in fertility can be measured by computing the fertility experience of different cohorts as they passed through different ages of childbearing.

Fertility has not witnessed any major decline except perhaps for the last five years, where some decline appears to have taken place. The sharpest decline is in the rates of younger women aged 15–19 and 20–24, in the periods 5–9 and 0–4 years before the survey. This may have been caused by a recent change in the age structure of nuptiality. Although the overall picture in all periods other than the most recent is of a constant fertility, the erratic behaviour of some of the rates in the cohort–period fertility array suggests the existence of reporting errors. For instance, the sudden jumps for the rates centred at age 25–29 for the periods 10–14 and 5–9 years before the survey are almost certainly due to data errors. The same applies to the fertility rate centred at age 15–19 for the period 25–29 years before the survey (unless fertility underwent a sudden increase 25–30 years ago, which is unlikely).

The cohort–period fertility array depends on information obtained from individual respondents regarding their age, total number of children and the date of each live birth. Apart from the problem of biased reporting of the ages of individual respondents, which may confuse an attempt to explain the behaviour of cohort–period fertility rates, there are two kinds of memory error that sometimes operate in opposite directions: first, forgetting a birth entirely (ie omission), and secondly, displacement in time of a particular birth.

Omissions of births usually cause the cumulative fertility of older cohorts to decline with age. There is no indication that this is happening in the case of Pakistan, except perhaps for the most recent period for the cohort aged 45–49 whose cumulative fertility is lower than that of the cohort aged 40–44. It would seem, however, that the cumulative fertility at the end of the period

Table 2.10 Cohort–period rates, cumulative cohort and period fertility, and P/F ratios, by age at survey

| Age group of cohort at end of period | Number of women in cohort | Years prior to survey | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 0–4 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 | 30–34 |
| **A Cohort–period fertility rates** | | | | | | | | |
| 10–14 | 32 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 |
| 15–19 | 599 | 0.046 | 0.071 | 0.073 | 0.073 | 0.075 | 0.111 | 0.077 |
| 20–24 | 848 | 0.224 | 0.246 | 0.255 | 0.251 | 0.257 | 0.264 | |
| 25–29 | 912 | 0.298 | 0.333 | 0.322 | 0.306 | 0.303 | | |
| 30–34 | 818 | 0.300 | 0.303 | 0.311 | 0.302 | | | |
| 35–39 | 623 | 0.225 | 0.251 | 0.240 | | | | |
| 40–44 | 618 | 0.139 | 0.146 | | | | | |
| 45–49 | 502 | 0.033 | | | | | | |
| **B Cumulative fertility of cohorts at end of period (P)** | | | | | | | | |
| 10–14 | | 0.001 | 0.003 | 0.007 | 0.007 | 0.005 | 0.006 | 0.011 |
| 15–19 | | 0.233 | 0.365 | 0.374 | 0.371 | 0.381 | 0.567 | 0.392 |
| 20–24 | | 1.487 | 1.605 | 1.644 | 1.636 | 1.853 | 1.710 | |
| 25–29 | | 3.094 | 3.310 | 3.248 | 3.383 | 3.223 | | |
| 30–34 | | 4.810 | 4.765 | 4.940 | 4.735 | | | |
| 35–39 | | 5.889 | 6.195 | 5.937 | | | | |
| 40–44 | | 6.889 | 6.667 | | | | | |
| 45–49 | | 6.831 | | | | | | |
| **C Cumulative fertility within periods (F)** | | | | | | | | |
| 10–14 | | 0.001 | 0.003 | 0.007 | 0.007 | 0.005 | 0.006 | 0.011 |
| 15–19 | | 0.230 | 0.360 | 0.375 | 0.373 | 0.380 | 0.562 | 0.394 |
| 20–24 | | 1.352 | 1.591 | 1.648 | 1.628 | 1.667 | 1.880 | |
| 25–29 | | 2.842 | 3.258 | 3.259 | 3.157 | 3.180 | | |
| 30–34 | | 4.342 | 4.775 | 4.816 | 4.669 | | | |
| 35–39 | | 5.466 | 6.030 | 6.018 | | | | |
| 40–44 | | 6.160 | 6.759 | | | | | |
| 45–49 | | 6.324 | | | | | | |
| **D P/F ratios** | | | | | | | | |
| 10–14 | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 15–19 | | 1.012 | 1.011 | 0.999 | 0.995 | 1.003 | 1.009 | 0.996 |
| 20–24 | | 1.099 | 1.009 | 0.998 | 1.005 | 1.112 | 0.910 | |
| 25–29 | | 1.089 | 1.016 | 0.997 | 1.071 | 1.014 | | |
| 30–34 | | 1.108 | 0.998 | 1.026 | 1.014 | | | |
| 35–39 | | 1.077 | 1.027 | 0.987 | | | | |
| 40–44 | | 1.118 | 0.986 | | | | | |
| 45–49 | | 1.080 | | | | | | |
| **E P/F ratios excluding common cell** | | | | | | | | |
| 20–24 | | 1.583 | 1.038 | 0.990 | 1.023 | 1.491 | 0.698 | |
| 25–29 | | 1.187 | 1.033 | 0.993 | 1.139 | 1.026 | | |
| 30–34 | | 1.165 | 0.997 | 1.038 | 1.021 | | | |
| 35–39 | | 1.097 | 1.035 | 0.983 | | | | |
| 40–44 | | 1.133 | 0.985 | | | | | |
| 45–49 | | 1.082 | | | | | | |

0–4 years before the survey is too high. But it may also be explained in terms of parity-related age errors between the cohorts 40–44 and 35–39 and 45–49. This supports our suggestion that the age group 40–44 suffers a degree of age misreporting.

The change in fertility rates observed between the period 5–9 and 0–4 years before the survey is of some interest. While a new fertility trend may perhaps be emerging, the change might be a result of bias in timing, of the kind suggested by Potter (1977). In particular Potter suggests that there is often underestimation of fertility rates for earlier periods and overestimation for the period just

Table 2.11 Cohort–period rates, cumulative cohort and period fertility, and P/F ratios, by duration of marriage

| Marriage duration group of cohort at end of period | Number of women in cohort | Years before the survey | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 0–4 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 | 30–34 |
| **A Cohort–period fertility rates** | | | | | | | | |
| 0–4 | 983 | 0.265 | 0.286 | 0.265 | 0.246 | 0.240 | 0.235 | 0.208 |
| 5–9 | 890 | 0.357 | 0.369 | 0.354 | 0.334 | 0.297 | 0.333 | |
| 10–14 | 811 | 0.325 | 0.340 | 0.345 | 0.318 | 0.315 | | |
| 15–19 | 728 | 0.284 | 0.309 | 0.294 | 0.304 | | | |
| 20–24 | 515 | 0.222 | 0.238 | 0.247 | | | | |
| 25–29 | 622 | 0.114 | 0.148 | | | | | |
| 30–34 | 346 | 0.039 | | | | | | |
| **B Cumulative fertility of cohorts at end of period (P)** | | | | | | | | |
| 0–4 | | 0.639 | 0.684 | 0.615 | 0.553 | 0.523 | 0.587 | 0.391 |
| 5–9 | | 2.469 | 2.460 | 2.323 | 2.195 | 2.072 | 2.054 | |
| 10–14 | | 4.087 | 4.022 | 3.919 | 3.660 | 3.629 | | |
| 15–19 | | 5.444 | 5.463 | 5.131 | 5.149 | | | |
| 20–24 | | 6.576 | 6.318 | 6.383 | | | | |
| 25–29 | | 6.890 | 7.122 | | | | | |
| 30–34 | | 7.318 | | | | | | |
| **C Cumulative fertility within periods (F)** | | | | | | | | |
| 0–4 | | 0.639 | 0.684 | 0.615 | 0.553 | 0.523 | 0.587 | 0.391 |
| 5–9 | | 2.424 | 2.529 | 2.385 | 2.224 | 2.008 | 2.251 | |
| 10–14 | | 4.051 | 4.228 | 4.109 | 3.812 | 3.583 | | |
| 15–19 | | 5.474 | 5.772 | 5.580 | 5.333 | | | |
| 20–24 | | 6.586 | 6.960 | 6.813 | | | | |
| 25–29 | | 7.157 | 7.699 | | | | | |
| 30–34 | | 7.353 | | | | | | |
| **D P/F ratios** | | | | | | | | |
| 0–4 | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 5–9 | | 1.019 | 0.973 | 0.974 | 0.987 | 1.032 | 0.913 | |
| 10–14 | | 1.009 | 0.951 | 0.954 | 0.960 | 1.013 | | |
| 15–19 | | 0.995 | 0.946 | 0.920 | 0.966 | | | |
| 20–24 | | 0.998 | 0.908 | 0.937 | | | | |
| 25–29 | | 0.963 | 0.925 | | | | | |
| 30–34 | | 0.995 | | | | | | |

before the most recent period (ie 5–9 and 10–14 years before the survey). The most recent births are probably correctly reported. This fact is evident in the higher rates 5–9 and 10–14 years before the survey.

Also shown in table 2.10 are the P/F ratios for each cohort–period fertility cell. The advantage of the P/F ratios by cohort and period is that they serve as a tool for diagnostic screening for the detection of trends and data errors (Rashad and Brass 1980). If fertility has been declining, the P/F ratios will reflect a rising trend with age and time period. There is no reason to believe that this is the case in table 2.10. Instead there are some erratic sequences in the ratios both for cohorts and periods. For example, for the cohorts aged 30–34 and 40–44 years, the P/F ratios are high compared with other cohorts, which confirms the presence of age misreporting in this particular age range. The sudden jump between the P/F ratios for the periods 5–9 and 0–4 years before the survey suggests a recent moderate decline in fertility but

Table 2.12 P/F ratios by duration of marriage by different ages at marriage

| Marriage duration group of cohort at end of period | Number of women in cohort | Years before the survey | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 0–4 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 | 30–34 |
| A P/F ratios excluding common cell for age at marriage <14 | | | | | | | | |
| 5–9 | | 1.212 | 0.539 | 1.039 | 0.895 | 1.147 | 0.854 | |
| 10–14 | | 0.882 | 0.818 | 0.916 | 0.929 | 1.177 | | |
| 15–19 | | 0.914 | 0.834 | 0.891 | 1.076 | | | |
| 20–24 | | 0.935 | 0.809 | 1.004 | | | | |
| 25–29 | | 0.894 | 0.915 | | | | | |
| 30–34 | | 0.979 | | | | | | |
| B P/F ratios excluding common cell for age at marriage 14–15 | | | | | | | | |
| 5–9 | | 0.989 | 1.144 | 0.846 | 0.952 | 1.141 | 0.729 | |
| 10–14 | | 1.076 | 0.961 | 0.901 | 0.968 | 1.033 | | |
| 15–19 | | 1.031 | 0.920 | 0.924 | 0.958 | | | |
| 20–24 | | 0.968 | 0.928 | 0.922 | | | | |
| 25–29 | | 0.978 | 0.906 | | | | | |
| 30–34 | | 0.956 | | | | | | |
| C P/F ratios excluding common cell for age at marriage 16–18 | | | | | | | | |
| 5–9 | | 1.154 | 0.898 | 0.905 | 0.919 | 1.370 | 0.306 | |
| 10–14 | | 1.045 | 0.929 | 0.943 | 0.969 | 0.907 | | |
| 15–19 | | 1.007 | 0.992 | 0.925 | 0.854 | | | |
| 20–24 | | 1.080 | 0.948 | 0.890 | | | | |
| 25–29 | | 1.020 | 0.933 | | | | | |
| 30–34 | | 1.039 | | | | | | |
| D P/F ratios excluding common cell for age at marriage 19+ | | | | | | | | |
| 5–9 | | 0.985 | 0.931 | 0.890 | 1.186 | 0.666 | 0.000 | |
| 10–14 | | 1.007 | 0.945 | 0.972 | 0.870 | 0.608 | | |
| 15–19 | | 0.998 | 0.969 | 0.831 | 0.820 | | | |
| 20–24 | | 1.006 | 0.875 | 0.808 | | | | |
| 25–29 | | 0.962 | 0.870 | | | | | |
| 30–34 | | 0.967 | | | | | | |

also possible dating errors accompanied by omissions by older cohorts.

The effect of omission of births has been largely concealed by the recent fertility decline. Fertility decline due to changes in nuptiality has an immediate effect of rising P/F ratios with age. This may tend to wipe out any opposite P/F ratio trend due to omission. The computation of fertility rates and P/F ratios by duration of marriage suggests that this might well be the case (table 2.11). The advantage of the P/F ratios indexed by duration of marriage is that this controls for changing age at marriage. It is clear from table 2.11 that the effect of the changing marriage pattern has been wiped out and the data reflect the extent of omission of live births in the declining P/F ratios by cohort.

The evidence of recent fertility decline is further confirmed if one looks at the P/F ratios when the common cell in the cohort–period array is excluded from both P and F. First, when the P/F ratios are calculated by age at survey with the common cell excluded, the effect of the recent decline in fertility immediately appears in the form of P/F ratios substantially higher than unity for the most recent period, although they still fail to increase with age due to omissions (table 2.10 bottom panel).

On the other hand, when the common cell is excluded in the computation of the P/F ratios by marriage duration at specific ages of marriage, the effect of this fertility trend is wiped out and the ratios for the most recent periods are near to or less than unity because of omissions or dating and age errors (table 2.12). This is particularly true in the case of P/F ratios calculated for lower ages of marriage, suggesting that the decline is almost certainly due to a rising age at marriage, rather than to changes in marital fertility.

*The application of the transformed Gompertz model*

The transformed Gompertz model (Brass 1977; Booth 1979) aims to detect and correct timing errors that occur in the distribution of births over the reproductive period.

The parameter estimates obtained by fitting the model to cohorts aged 30–34 to 40–44 at the time of the survey are shown in table 2.13 (the model has not been applied to younger cohorts because of insufficient information for these women, nor to the oldest cohort because of obvious omissions). Estimates of the level of fertility are reasonably consistent, suggesting that the data are not badly affected by reporting errors. The slightly higher estimate for the cohort aged 30–34 does not necessarily imply an increase in fertility because of the lower reliability of estimates based on fewer points.

Observed and fitted cumulative fertility rates for the three cohorts appear in table 2.14. The corresponding age-specific fertility rates appear in table 2.15. The model suggests that under-reporting occurs in the most recent five-year period for the cohorts aged 30–34 and 35–39 at the survey, accompanied by over-reporting in the previous five-year period. For the cohort aged 40–44 at the survey, there is no evidence of

Table 2.13 Estimates of the parameters of the transformed Gompertz model

| Cohort: age at survey | Estimates: F | $\alpha$ | $\beta$ | P | Q |
|---|---|---|---|---|---|
| 30–34 | 7.25 | −0.138 | 0.964 | 0.317 | 0.381 |
| 35–39 | 7.07 | −0.089 | 0.933 | 0.335 | 0.394 |
| 40–44 | 7.11 | −0.021 | 1.015 | 0.360 | 0.362 |

Table 2.14 Observed and fitted cumulative fertility rates

| Age | Cohort 30–34 | | | Cohort 35–39 | | | Cohort 40–44 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed (1) | Fitted (2) | Difference (1)–(2) | Observed (1) | Fitted (2) | Difference (1)–(2) | Observed (1) | Fitted (2) | Difference (1)–(2) |
| 10–14 | 0.005 | 0.002 | 0.003 | 0.005 | 0.004 | 0.001 | 0.030 | 0.002 | 0.028 |
| 15–19 | 0.335 | 0.281 | 0.054 | 0.350 | 0.355 | −0.005 | 0.535 | 0.335 | 0.200 |
| 20–24 | 1.580 | 1.537 | 0.043 | 1.600 | 1.638 | −0.038 | 1.800 | 1.751 | 0.049 |
| 25–29 | 3.260 | 3.205 | 0.055 | 3.200 | 3.222 | −0.022 | 3.320 | 3.487 | −0.167 |
| 30–34 | 4.790 | 4.790 | – | 4.760 | 4.702 | 0.058 | 4.865 | 5.017 | −0.152 |
| 35–39 | – | 6.088 | – | 5.925 | 5.925 | – | 6.175 | 6.181 | 0.006 |
| 40–44 | – | 6.946 | – | – | 6.758 | – | 6.890 | 6.890 | – |
| 45–49 | – | 7.226 | – | – | 7.044 | – | – | 7.098 | – |

Table 2.15 Observed and fitted age-specific fertility rates

| Age | Cohort 30–34 | | | Cohort 35–39 | | | Cohort 40–44 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed (1) | Fitted (2) | Difference (1)–(2) | Observed (1) | Fitted (2) | Difference (1)–(2) | Observed (1) | Fitted (2) | Difference (1)–(2) |
| 10–14 | 0.005 | 0.001 | 0.004 | 0.005 | 0.004 | 0.001 | 0.030 | 0.002 | 0.028 |
| 15–19 | 0.330 | 0.280 | 0.050 | 0.345 | 0.352 | −0.007 | 0.505 | 0.334 | 0.171 |
| 20–24 | 1.245 | 1.256 | −0.011 | 1.250 | 1.283 | −0.033 | 1.265 | 1.416 | −0.151 |
| 25–29 | 1.680 | 1.668 | 0.012 | 1.600 | 1.584 | 0.016 | 1.520 | 1.736 | −0.216 |
| 30–34 | 1.530 | 1.585 | −0.055 | 1.560 | 1.480 | 0.080 | 1.545 | 1.530 | 0.015 |
| 35–39 | | | | 1.165 | 1.223 | −0.058 | 1.310 | 1.164 | 0.146 |
| 40–44 | | | | | | | 0.715 | 0.709 | 0.006 |

under-reporting in the most recent period, the two rates being almost equal, though over-reporting is apparent for the preceding period. Under-reporting at earlier ages is apparent for all three cohorts, though the unexpectedly high observed rate at 15–19 for the cohort aged 40–44 (noted above) contradicts this. Such a contradiction can also be causes if there has been a real decline in fertility in the most recent five-year period.

Graduated age-specific fertility rates by five-year periods before the survey are shown in table 2.16. Rates for cohorts aged 30–44 have been obtained directly using the fits discussed above. Those for the oldest cohort are identical to those obtained for the cohort aged 40–44 because of the obvious omissions in the reported data for the oldest cohort. For the cohorts aged 20–24 and 25–29, the estimated rates have been calculated using the pattern parameters obtained from fitting the model to data for the cohort aged 30–34 and the reported number of children ever born at the survey for the appropriate cohort. For the two

Table 2.16 Graduated age-specific fertility by period

| Age | Period: years before survey | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0–4 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 |
| A Age-specific fertility rates | | | | | | | | |
| 10–14 | 0.005 | | | | | | | |
| 15–19 | 0.235 | 0.005 | | | | | | |
| 20–24 | 1.184 | 0.265 | 0.001 | | | | | |
| 25–29 | 1.592 | 1.199 | 0.268 | 0.001 | | | | |
| 30–34 | 1.585 | 1.668 | 1.256 | 0.280 | 0.001 | | | |
| 35–39 | 1.223 | 1.480 | 1.584 | 1.283 | 0.353 | 0.004 | | |
| 40–44 | 0.709 | 1.164 | 1.530 | 1.736 | 1.416 | 0.334 | 0.002 | |
| 45–49 | 0.208 | 0.709 | 1.164 | 1.530 | 1.736 | 1.416 | 0.334 | 0.002 |
| B Cumulated rates | | | | | | | | |
| 10–14 | 0.005 | 0.005 | 0.001 | 0.001 | 0.001 | 0.004 | 0.002 | 0.002 |
| 15–19 | 0.240 | 0.270 | 0.269 | 0.281 | 0.354 | 0.338 | 0.336 | |
| 20–24 | 1.424 | 1.469 | 1.525 | 1.564 | 1.770 | 1.754 | | |
| 25–29 | 3.016 | 3.137 | 3.109 | 3.300 | 3.506 | | | |
| 30–34 | 4.601 | 4.617 | 4.639 | 4.830 | | | | |
| 35–39 | 5.824 | 5.781 | 5.803 | | | | | |
| 40–44 | 6.538 | 6.490 | | | | | | |
| 45–49 | 6.741 | | | | | | | |
| TFR | 6.75 | 6.93 | | | | | | |

youngest cohorts, reported fertility for the cohort aged 15–19 has been used. These graduated rates are cumulated within the period in the lower half of table 2.16. Since these rates refer to the ages at average parities, it is necessary to extrapolate to obtain total fertility rates. This is done for the two most recent periods by fitting the transformed Gompertz model to these data. The resulting estimates suggest that fertility has fallen from a level of 6.93 in the period 5–9 years before the survey to the current level of 6.75.

Several factors should be borne in mind in interpreting these results. The use of the pattern parameters for cohort 30–34 is not strictly valid for the two younger cohorts in the light of their increasing age at marriage. In addition, the previous analysis of P/F ratios has shown that there are possible problems related to the use of age-specific rates. The apparent inconsistency between these and the P/F results can also be partly explained by the fact that these are age–cohort data, while the section on the P/F approach deals with age–period data.

## 2.5 INFANT AND CHILD MORTALITY

The possibility of a greater omission of children who died before reaching the exact age of one year is not readily apparent from the probabilities of dying ($_1q_0$) shown in table 2.17. Within periods, there is a tendency for the rates to decrease with the increased age of the woman, suggesting that older cohorts are more likely to omit children dying before age one. The increase in rates as the period in question recedes suggests either that mortality conditions have improved or that reporting is better for events occurring in the distant past. There may also be a tendency to push the births and deaths of dead children into the past.

Except for some evidence of a greater omission by women in rural areas in periods 25 years or earlier and of female children who died before reaching exact age five years, further work showed that the differentials in infant and child mortality (more strictly, in $_1q_0$ and $_5q_0$) by socio-economic characteristics, birth order, and age of the mother at birth broadly conformed to plausible patterns. A parallel analysis based only on the first-order births revealed no strikingly different results.

Another way to look at the quality of the reporting of dead children is by analysing the data for birth cohorts of the children in question, instead of cohorts of women, which has the advantage that one can then compare these estimates with those obtained through other sources. Table 2.18 shows such results for each sex. The overall pattern is consistent with the expected trend of improving infant mortality levels. Part of the recent (1970–3) rise in infant

**Table 2.17** Infant mortality rates ($_1q_0$) by cohort and period

| Cohort | Years before the survey | | | | | |
|---|---|---|---|---|---|---|
| | 0–4 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 |
| All ages | 0.136 (763) | 0.137 (709) | 0.138 (548) | 0.161 (450) | 0.188 (334) | 0.232 (228) |
| 15–19 | 0.168 (56) | | | | | |
| 20–24 | 0.174 (209) | 0.243 (85) | | | | |
| 25–29 | 0.131 (198) | 0.157 (187) | 0.168 (55) | | | |
| 30–34 | 0.117 (152) | 0.125 (178) | 0.141 (148) | 0.197 (55) | | |
| 35–39 | 0.110 (81) | 0.112 (110) | 0.115 (117) | 0.149 (117) | 0.197 (43) | |
| 40–44 | 0.110 (49) | 0.129 (106) | 0.154 (150) | 0.175 (168) | 0.213 (86) | 0.273 (86) |
| 45–49 | 0.195 (18) | 0.110 (42) | 0.127 (77) | 0.138 (106) | 0.157 (120) | 0.214 (142) |

NOTE: Figures in parentheses give the number of deaths on which rates are based.

Table 2.18 Infant mortality rates by sex and birth cohorts

| Birth period | Both sexes | Males | Females |
|---|---|---|---|
| 1945–49 | 221 | 241 | 197 |
| 1950–54 | 194 | 219 | 166 |
| 1955–59 | 163 | 173 | 151 |
| 1960–64 | 145 | 148 | 141 |
| 1965–69 | 136 | 143 | 128 |
| 1970–73 | 146 | 142 | 150 |
| Total (1945–73) | 154 | 161 | 146 |

mortality rates can be attributed to changing environmental conditions in rural Pakistan.[6] Cows' milk, which used to be the main supplementary diet of infants, has become prohibitively expensive; and the incidence of malaria has risen considerably.

For periods for which the infant mortality rates are available from other sources, the PFS rates are considerably higher, 145 as against 136 (PGE–CD) for 1960–4 and 136 as against 115 (for the PGS) for 1965–9). The sex differentials in infant mortality follow the classical pattern of higher female mortality observed in the Indo-Pakistan subcontinent (Robinson 1967). The female rates are higher than male rates, a pattern consistent with that observed in the PGE.

## Comparison of the reported and expected proportions of children dead

One way to show the magnitude of any omission of dead children is to compare the reported proportions of children dead by age of the mother with those expected from the application of Brass's method of childhood mortality estimates. Using the original Brass (1975) version[7] of the child mortality estimation method and the West family of model life tables[8] (Coale and Demeny 1966) to represent the age pattern of mortality in Pakistan, expected proportions of children dead by age of women are computed. More specifically, the proportion of dead children in each age group is estimated on the basis of the average mortality levels obtained for the age groups of women of ages 20–24 and 25–29. The method thus provides a somewhat conservative estimate of the omission of dead children since the mortality level selected on the basis of reports for younger women reflects recent 'low' mortality levels and yields lower proportions of dead children for older women than was actually the case. If the expected proportions are still found to be higher than those reported, it is likely that women have omitted some of their children who had died.

Results shown in tables 2.19 and 2.20 confirm the trends already noted about the greater omission of dead children in rural areas and of the female sex. A more striking finding, however, is the indication of a greater omission by women aged 30–39 than by women over 40. The estimated total number of dead children omitted[9] amounts to 684, which is 3 per cent of all the births recorded in the PFS and 14 per cent of those children reported dead. Of all these 684 estimated omissions, 86 per cent were from the rural areas and 67 per cent are omissions of female children (table 2.20). Whereas almost equal numbers of boys and girls are omitted in urban areas, 70 per cent of the dead children omitted in rural areas are thought to be females.

Although the method is not subject to errors of dating (births or deaths), as no such information is involved, the estimates are dependent on the underlying mortality pattern used for estimating the expected number of births. Where there is some evidence that West family life tables do not

[6] The past rates are also underestimated because of censoring. Births to older women which are likely to have a higher incidence of infant mortality are omitted as time recedes.

[7] The variants proposed by Sullivan (1972) and Trussell (1975) could not be utilized for the present purpose because they do not make use of the information for women over 35 years.

[8] Calculations were also repeated for other regional families.

[9] The estimation procedure is as follows:

$$Y' = \frac{(C(a) \cdot P'(a)) - CD(a)}{1.0 - P'(a)}$$

where a represents each age group,
Y' is the estimated number of dead children omitted,
C is the total number of children ever born,
P' is the expected proportion dead, and
CD is the reported number of dead children.
More specifically, the amount by which dead children would need to be increased (or decreased) in each age group is being estimated to yield estimates of mortality level equal to the average obtained for women of the age groups 20–24 and 25–29 (assumed to be relatively free from omission errors). Note that computations were carried out for each sex separately and figures were added to obtain estimates for both sexes combined. Figures shown in table 2.19 represent those summed over all age groups (from 25–29 to 45–49).

Table 2.19 Observed and expected[a] proportions of children dead by sex of the child and age of the mother at survey, PFS 1975

| Age at survey | | Males | | | Females | | |
|---|---|---|---|---|---|---|---|
| | | Observed (1) | Expected (2) | Ratio (1)/(2) | Observed (1) | Expected (2) | Ratio (1)/(2) |
| 25–29 | Total | 0.196 | 0.216 | 0.907 | 0.211 | 0.231 | 0.913 |
| | Urban | 0.162 | 0.185 | 0.876 | 0.163 | 0.187 | 0.872 |
| | Rural | 0.209 | 0.229 | 0.913 | 0.232 | 0.250 | 0.928 |
| 30–34 | Total | 0.205 | 0.234 | 0.876 | 0.201 | 0.253 | 0.794 |
| | Urban | 0.161 | 0.201 | 0.801 | 0.172 | 0.207 | 0.831 |
| | Rural | 0.222 | 0.247 | 0.899 | 0.214 | 0.272 | 0.787 |
| 35–39 | Total | 0.194 | 0.250 | 0.776 | 0.219 | 0.273 | 0.802 |
| | Urban | 0.175 | 0.215 | 0.814 | 0.196 | 0.225 | 0.871 |
| | Rural | 0.201 | 0.264 | 0.761 | 0.228 | 0.294 | 0.776 |
| 40–44 | Total | 0.287 | 0.269 | 1.067 | 0.281 | 0.297 | 0.946 |
| | Urban | 0.259 | 0.231 | 1.121 | 0.264 | 0.244 | 1.082 |
| | Rural | 0.297 | 0.285 | 1.042 | 0.286 | 0.320 | 0.894 |
| 45–49 | Total | 0.286 | 0.288 | 0.993 | 0.292 | 0.321 | 0.910 |
| | Urban | 0.249 | 0.248 | 1.004 | 0.271 | 0.263 | 1.030 |
| | Rural | 0.300 | 0.305 | 0.984 | 0.300 | 0.345 | 0.870 |

[a]Using the Brass method of childhood mortality estimation (Brass 1975).

Table 2.20 Estimated omission of dead children by sex of the child and place of residence, PFS 1975

| | Both sexes | Males | Females |
|---|---|---|---|
| Total sample | 684 | 223 | 461 |
| Urban | 96 | 49 | 47 |
| Rural | 588 | 174 | 414 |

NOTE: See Brass 1975 and footnote 9 for further explanation of the method.

exactly represent the age pattern of mortality, the expected number of dead children obtained through this approach is of questionable quality. At best, these omissions may indicate some sex-selective omission of live births and dead children. Unfortunately, there is no way to determine definitely the level of omission from the available data.

## 2.6 CONCLUSIONS

This analysis of data on age reporting, breastfeeding, fertility and infant mortality indicates that overall there are no over-riding problems with the information collected in the PFS. Some irregularities are observed, however, but they are not serious enough to preclude reliable estimation of fertility, breastfeeding and infant mortality, provided that attention is focussed on the more recent past (where the data quality is higher) or analytical techniques are used to minimize the impact of errors.

An examination of age reporting by women reveals some evidence of heaping at digits divisible by 5 and by 2 but this found to be much less here in the PFS than in the earlier PGE survey. Age misreporting is likely to affect the pattern of fertility of women at ages 40 and more.

It appears that years of marriage were reported by women with reference to major historic events, such as wars, and months of marriage were reported with reference to harvesting; the observed heaping also tended to occur at the end of the year (December–January). However, age at first marriage was not subject to any systematic under or over-reporting. Marriage proportions reconstructed from the PFS seemed to agree with the corresponding proportions available from the 1951, 1961 and 1972 censuses.

The duration of breastfeeding in months as reported by mothers showed heaping at multiples of six and twelve. However, only 5 per cent of women reported current breastfeeding status which was inconsistent with the age of child; errors of this sort were thought to be largely due to erroneous recording of the age at birth of the child in question.

The detailed examination of the birth history data indicates that there is a 5–10 per cent omission of births which is considered modest in relation to the level found in other countries (Hobcraft *et al* 1982). In particular, female children and children born in earlier years were more likely to have been omitted. There is also some evidence of displacement of births. Events in the more recent years (0–4 years before the survey) are more accurately reported. Such a shift, if true, would suggest that the evidence of fertility decline in recent years is exaggerated. However, the detailed tests using the P/F ratio method showed that there was some evidence of a moderate fertility decline in the five years before the survey. These tests also confirmed displacement of births by 30–34 and 40–44 year old cohorts. By using the P/F ratios by duration of marriage, it was further clarified that the moderate decline had been caused by the rising age at marriage.

The infant mortality estimates are consistent with the expected trend of gradual improvement over time. However, some tendency on the part of older women to omit children dying before age one was observed. The estimates of past infant mortality rates are observed to be higher than those available from the PFS, but are almost identical to those of the PGE.

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# 3 Recent Transitions in Cohort Nuptiality

Samir M. Farid

## 3.1 INTRODUCTION

Marriage in Pakistan is almost universal. The Islamic 'Shari'a' marriage, which is usually legalized by the marriage contract, prevails. Women marry early, but men, in general, wait for quite some time until they establish themselves economically. Although divorce is fairly easy to obtain, first marriage is very stable. First marriage in Pakistan, as in many other societies, provides the primary social setting in which the biological event of childbearing occurs. While fecundity provides the biological potential for reproduction, age at first marriage and a variety of other factors interact with it to determine a woman's actual reproductive performance.

Early and universal marriage has traditionally served to further the fulfilment of what is seen as women's primary role, that of reproduction. A newly married couple is usually subjected to strong pressure for 'the family to become three', and a childless woman is considered a failure. The social pressure does not stop after the birth of the first child, and any undue delay in conception is viewed with suspicion as to the woman's ability to conceive. An attempt to regulate fertility for economic reasons amounts to an expression of lack of faith in God, the Provider.

The age at which women marry is, therefore, an important factor that can influence the rate of population growth in Pakistan. It also shapes the marital composition of the population which, in turn, affects various aspects of population dynamics. In this cultural context, shifts in the pattern of age at first marriage assume special demographic significance. Patterns of nuptiality were a major concern of all the WFS surveys, including the Pakistan Fertility Survey, and much attention has been directed towards recording marriage information well.

The basic approach underlying the demographic analysis of nuptiality is to view the process of first marriage as consisting of a one-stage transition that may be characterized by two aspects. One aspect is the distribution of persons entering first marriage by age, which is related to the timing or *tempo* of nuptiality. The other aspect is the proportion of persons who eventually enter first marriage, or the proportion ever married, which is related to the quantity or *level* of nuptiality. These two characteristics are not necessarily interdependent. A shift in the tempo of nuptiality may have no impact on the level of nuptiality, though it could produce wide fluctuations in the annual number of marriages over a number of years; and conversely the level of nuptiality may change while the age pattern of marriage remains unchanged.

In 1965, Hajnal described two basic marriage patterns, and distinguished between them partially on the basis of the history of the range of variations in the tempo and level of nuptiality in different societies. The first, described as the traditional or non-European pattern of early and universal marriage, has characterized most of the developing societies. The second is a European pattern of late marriage and high proportions remaining single, which characterized Western Europe before the Second World War. However, most of the developed societies have departed from the earlier European marriage pattern (Dixon 1971; Heeren, 1973; Farid 1976). There are also indications that many of the developing societies, with an increasing proportion of their populations becoming involved in rapidly changing modes of life, are moving away from the so-called traditional pattern (Smith 1980; McCarthy 1982). Marriage patterns in Pakistan are also changing rapidly (Karim 1980).

In this chapter, our concern will be with recent transitions in age patterns of cohort nuptiality using data from the Pakistan Fertility Survey conducted in 1975 as part of the World Fertility Survey.



Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey*: 39–49. Voorburg, Netherlands: International Statistical Institute.

## 3.2 DATA AND METHODOLOGY

There are two sources of information on nuptiality provided by the PFS. The household survey contains information on the current marital status of women aged 10 and over. The individual questionnaire – which was administered to ever-married women aged 50 and under – provides a complete marital history of each respondent.

The analysis strategy employed rests on the argument that the most effective way of validating and analysing the nuptiality data collected in the WFS surveys is to carry out the full, detailed analysis which would be appropriate for highly sohpisticated data. Our aim was, therefore, to reconstruct cohort nuptiality histories from the data collected in the PFS. This was achieved by employing the analytical framework suggested by Farid (1978) which involves the application of Coale's nuptiality relational model (1971) and the basic ideas behind the life-table model.

Coale's nuptiality model has been validated by the structural similarity of widely different nuptiality schedules and by the conformity of first marriage schedules in many populations to the standard schedules, when scale and origin had been appropriately selected. In the original version, formulated by Coale and McNeil (1972), the nuptiality schedule is a function of three parameters: a, the age at which a substantial number of first marriages begin to occur; k, the speed at which marriage takes place; and c, the proportion who ever (eventually) marry. Recently Rodríguez and Trussell (1980) have modified the first two parameters so that they are more readily interpreted (the mean and the standard deviation) and have written a computer package – called NUPTIAL – for finding maximum likelihood estimates of the parameters. Interested readers are referred to this paper for a complete description of the model, the estimation procedure, and tests of goodness of fit. An example of the application of NUPTIAL has been illustrated by Trussell (1980) in relation to age at first marriage in Sri Lanka and Thailand.

The reconstruction of cohort nuptiality histories for Pakistan was done in two major stages. In the first stage, the computer package NUPTIAL was fitted to real age cohorts aged 15–49 using the household survey data on marital status and age at interview for all women, and the individual survey data on age at first marriage and age at interview for ever-married women. The package was used to estimate only the mean and the standard deviation, whereas the value of the third parameter c, (ie the proportion ultimately marrying) was fixed at 98 per cent for women under age 35, 98.5 per cent for women aged 35–39 and 99 per cent for women aged 40–49.

In the second stage, the fitted proportions married by age generated by NUPTIAL were used as input data to a computer package called MARMOD to construct cohort gross nuptiality tables for single age cohorts aged 15–49 and for standard five-year age cohorts aged from 15–19 to 45–49. This computer program is an extension to a package known as GENMAR which was developed at the British Office of Population Censuses and Surveys to reconstruct nuptiality histories from registration and census data (Farid 1976). MARMOD was developed specifically to supplement NUPTIAL in such a way that makes it possible to derive a number of analytically related indices of tempo that are directed at abstracting maximum information from the WFS data on nuptiality. A detailed technical account of this computer program will be outlined elsewhere (Farid, forthcoming).

## 3.3 THE TEMPO OF NUPTIALITY

### Age-specific first marriage rates

For any given cohort, a measure of the frequency of first marriage is provided by the number of first marriages in a given age group per 1000 single persons in the same age group. This measure is known as the age-specific first marriage rate (ASMR). Tables 3.1 and 3.2 set out values of these rates by five-year age groups and by single years of age respectively, for five-year birth cohorts.

If ASMRs of a given cohort are plotted on a chart with ages of women on the horizontal axis, they form a bell-shaped curve, which may be called the age curve of nuptiality (figure 3.1). For Pakistan, this curve begins with a minimum in the early teens, then sweeps upward until it attains a maximum of great intensity in the late teens and the early 20s and thereafter it declines to a low level at about age 35.

As may be seen from figure 3.1, the age curve of nuptiality has the same functional form for different cohorts, yet two dimensions of changes over time in the nuptiality curve may be underlined: (i) the early–late dimension, expressed by

**Table 3.1** Reconstructed age-specific first marriage rates per 1000 single females, by five-year age groups for five-year birth cohorts as implied by the cohort nuptiality tables based on the Pakistan Fertility Survey 1975

| Age at first marriage | Current age of cohort (as at 1975) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 |
| A Rates | | | | | | | |
| Under 15 | 30.8 | 46.5 | 52.7 | 65.7 | 84.6 | 103.2 | 89.2 |
| 15–19 | | 161.1 | 181.0 | 222.3 | 236.7 | 300.7 | 285.3 |
| 20–24 | | | 195.1 | 224.8 | 239.6 | 275.5 | 280.4 |
| 25–29 | | | | 141.0 | 163.1 | 139.0 | 165.9 |
| 30–34 | | | | | 68.4 | 35.7 | 51.2 |
| 35–39 | | | | | | 7.8 | 11.2 |
| 40–44 | | | | | | | 4.2 |
| B Ratios: Cohort aged 45 — 49 = 100 | | | | | | | |
| Under 15 | 35 | 52 | 59 | 74 | 95 | 116 | 100 |
| 15–19 | | 56 | 63 | 78 | 83 | 105 | 100 |
| 20–24 | | | 70 | 80 | 85 | 98 | 100 |
| 25–29 | | | | 85 | 98 | 83 | 100 |
| 30–34 | | | | | 134 | 70 | 100 |
| 35–39 | | | | | | 70 | 100 |
| 40–44 | | | | | | | 100 |

the age at which the nuptiality curve, for a given cohort, reaches its peak; and (ii) the rapid–slow dimension, which reflects the speed with which the age of maximum nuptiality is approached from the beginning of marriageable age, and the subsequent rate of decline until the intensity of first marriage reaches its minimum.

In table 3.3 figures are given showing the trend in maximum values of the cohort ASMRs and the related ages. The table shows a substantial decrease in the peak intensity of first marriage and an upward shift in the modal age at first marriage amounting to two years – from around age 18 for the older cohorts aged 40 and over to around 20 for the more recent cohort aged 20–24.

Examining trends in the female cohort-age-specific, first marriage rates, it may be seen from table 3.1 that over the 30 years prior to the survey date, the rates have decreased at almost all ages. Especially noteworthy is the dramatic decline in teenage marriage. Rates of over 80 per 1000 single females at ages under 15 years were shown by the cohorts of women currently aged 35 or more, ie women born before 1940. For each of the succeeding cohorts, the intensity of marriage under 15 years of age declined steadily and reached a low of around 31 per 1000 single females among the cohort currently aged 15–19. Substantial decreases in the intensity of first marriage at the crucial age groups 15–19 and 20–24 are also shown by the more recent cohorts. The net effect of these changes in the intensity of first marriage has been a fundamental shift in the age curve of nuptiality from an early peak pattern to a broader and lower peak pattern.

## Mean age at first marriage

One of the useful tools of analysing shifts in the early–late dimension of the tempo of nuptiality is provided by condensing the information contained in each given cohort nuptiality schedule into a single statistic measuring the centre or location of the schedule. One such measure, introduced by Hajnal in 1953, is termed the singulate mean age at marriage (SMAM). It is interpreted to be the mean age at first marriage of those who marry by age 50, ie SMAM measures the mean number of years spent single among those ultimately marrying.

Table 3.2 Reconstructed age-specific first marriage rates per 1000 single females by single years of age per five-year birth cohorts as implied by the cohort nuptiality tables based on the PFS 1975

| Age at first marriage | Current age of cohort (as at 1975) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 |
| 10 | 0.8 | 4.2 | 4.9 | 4.0 | 11.6 | 6.3 | 3.9 |
| 11 | 5.6 | 16.2 | 19.0 | 21.3 | 39.7 | 39.7 | 28.6 |
| 12 | 20.8 | 41.3 | 47.9 | 60.2 | 87.8 | 108.8 | 87.1 |
| 13 | 48.9 | 74.7 | 85.4 | 111.1 | 139.6 | 184.9 | 159.0 |
| 14 | 84.6 | 108.6 | 122.7 | 158.8 | 183.3 | 244.2 | 219.7 |
| 15 | 120.2 | 137.1 | 153.8 | 195.7 | 215.1 | 282.4 | 261.5 |
| 16 | 150.7 | 157.9 | 176.8 | 220.7 | 235.9 | 303.8 | 286.8 |
| 17 | 174.6 | 171.1 | 192.1 | 235.5 | 248.0 | 313.6 | 300.1 |
| 18 | 191.8 | 177.9 | 201.1 | 242.7 | 253.9 | 315.3 | 305.3 |
| 19 | | 179.3 | 204.9 | 243.8 | 255.0 | 311.0 | 304.5 |
| 20 | | 181.3 | 204.6 | 240.5 | 252.4 | 301.8 | 299.2 |
| 21 | | 180.6 | 201.1 | 233.2 | 246.5 | 287.9 | 289.8 |
| 22 | | 177.8 | 194.8 | 222.7 | 237.8 | 269.2 | 276.2 |
| 23 | | 173.2 | 186.1 | 209.2 | 226.4 | 245.9 | 258.6 |
| 24 | | | 175.4 | 193.1 | 212.3 | 218.9 | 237.2 |
| 25 | | | 167.6 | 175.0 | 195.8 | 189.4 | 212.1 |
| 26 | | | 158.7 | 155.6 | 177.3 | 158.8 | 184.7 |
| 27 | | | 148.8 | 135.3 | 157.5 | 128.9 | 156.4 |
| 28 | | | 138.1 | 115.5 | 136.9 | 101.9 | 129.0 |
| 29 | | | | 96.5 | 116.6 | 78.4 | 103.3 |
| 30 | | | | 83.3 | 97.1 | 59.1 | 80.9 |
| 31 | | | | 71.1 | 79.9 | 43.9 | 61.6 |
| 32 | | | | 36.3 | 64.1 | 32.0 | 46.2 |
| 33 | | | | 19.8 | 51.2 | 23.1 | 34.6 |
| 34 | | | | | 40.2 | 16.4 | 25.6 |
| 35 | | | | | 32.1 | 12.3 | 18.2 |
| 36 | | | | | 25.8 | 8.8 | 13.7 |
| 37 | | | | | 20.5 | 6.6 | 9.8 |
| 38 | | | | | 15.6 | 6.0 | 7.4 |
| 39 | | | | | | 5.2 | 6.6 |
| 40 | | | | | | 4.6 | 5.8 |
| 41 | | | | | | 3.9 | 5.0 |
| 42 | | | | | | 3.2 | 4.2 |
| 43 | | | | | | 2.4 | 3.4 |
| 44 | | | | | | | 2.5 |
| 45 | | | | | | | 1.7 |
| 46 | | | | | | | 0.9 |
| 47 | | | | | | | 0.9 |
| 48 | | | | | | | 0.9 |
| 49 | | | | | | | |

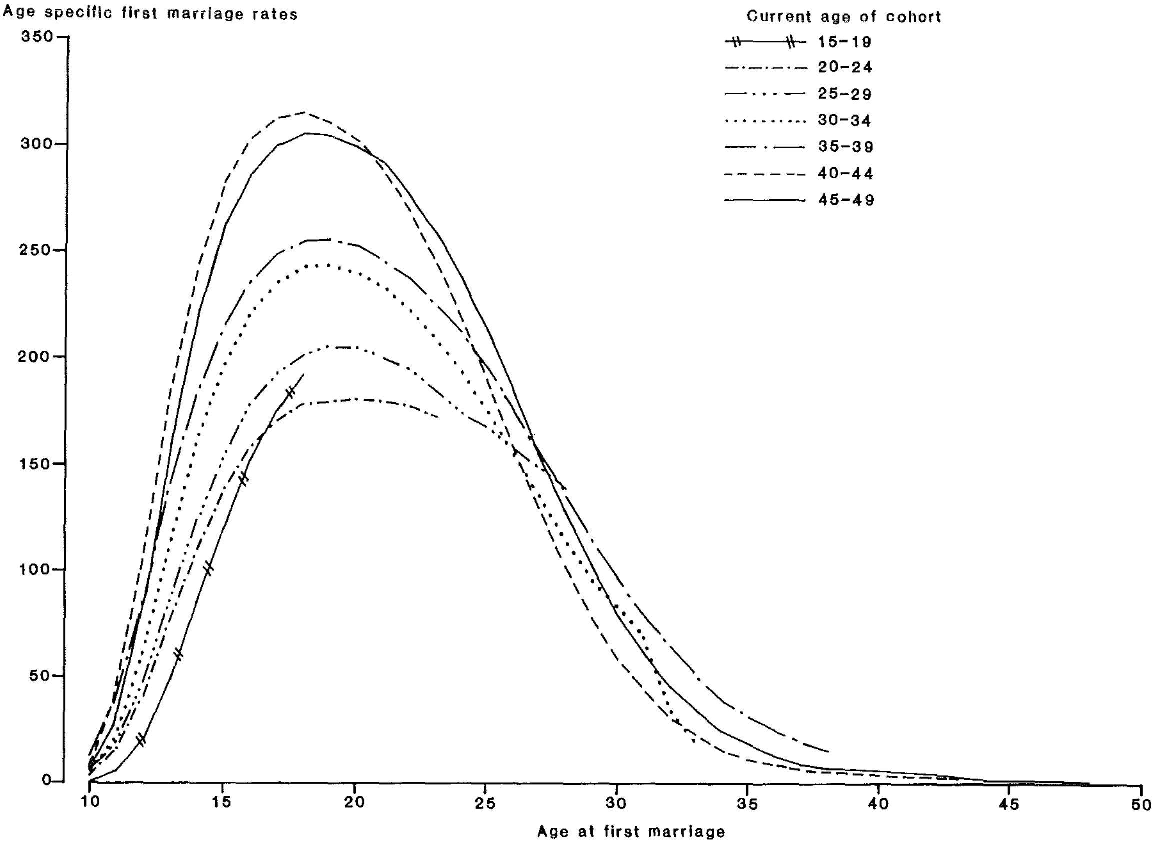


**Figure 3.1** Age-specific first marriage rates per 1000 single females, based on the PFS 1975

To cover trends in the tempo of nuptiality of recent birth cohorts, the mean age at first marriage — designated as 'MAM' hereafter — has been derived from the cohort nuptiality tables based on the 1975 Pakistan Fertility Survey for women marrying for the first time between the start of the nuptial span, that is exact age 10, and exact ages 15, 20, 25, . . . , 45. Values of MAM together with the estimated values of SMAM are shown in table 3.4 for five-year birth cohorts. The figures indicate that over a period of approximately 30 years, mean age at first marriage among females in Pakistan was subject to an increase of over three years: from 16 years for the cohorts currently 40–44 and 45–49 years to over 19 years for the cohort currently 15–19 years old.

**Table 3.3** Values of maximum intensity of first marriage and related ages for five-year birth cohorts as implied by the cohort nuptiality tables based on the PFS 1975

| Current age of cohort (as at 1975) | Maximum intensity of first marriage | Related age |
|---|---|---|
| 20–24 | 181 | 20 |
| 25–29 | 204 | 19 |
| 30–34 | 243 | 19 |
| 35–39 | 255 | 19 |
| 40–44 | 315 | 18 |
| 45–49 | 305 | 18 |

The estimated SMAMs for the very young cohorts are, however, speculative since much of their marriage experience has been constructed by model schedules. This raises the question of the relationship between the value of MAM as calculated during the early years of the nuptial span and the eventual value of SMAM or indeed MAM, as both values for a cohort of completed nuptiality will be identical. Of course, a late sustained pattern of nuptiality will *ipso facto* yield to a higher MAM, but the point in question is the relationship between the initial tempo of nuptiality and the eventual mean age at marriage.

This point may be investigated by examining

Table 3.4 Mean age at first marriage for women marrying between age 10 and selected ages and estimates of singulate mean age at marriage, for five-year birth cohorts according to cohort nuptiality tables based on the PFS 1975

| Age at time of marriage | Current age of cohort | | | | | | |
|---|---|---|---|---|---|---|---|
| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 |
| Under 15 | 13.8 | 13.5 | 13.5 | 13.3 | 13.2 | 13.2 | 13.2 |
| Under 20 | | 16.1 | 16.0 | 15.8 | 15.4 | 15.2 | 15.0 |
| Under 25 | | | 17.2 | 16.8 | 16.3 | 15.8 | 15.7 |
| Under 30 | | | | 17.2 | 16.6 | 16.0 | 15.9 |
| Under 35 | | | | | 16.8 | 16.0 | 15.9 |
| Under 40 | | | | | | 16.0 | 15.9 |
| Under 45 | | | | | | | 15.9 |
| Estimated singulate mean age at marriage | 19.4 | 18.4 | 18.2 | 17.3 | 16.8 | 16.0 | 16.0 |

the trend in MAM as calculated for women marrying under age 25. As is shown by table 3.4, this mean has risen from 15.7 years for the cohort currently 45–49 years to 17.2 for the younger cohort currently 25–29 years. As will be shown by table 3.6, 96 per cent of the former cohort but only 89 per cent of the latter had entered first marriage before reaching age 25. It is only to be expected that the cohort currently 25–29 years will – at the end of the nuptial span – show a higher mean age at marriage than that calculated for the marriages that had already taken place under age 25. This suggests that when MAM – as calculated at the early years of the nuptial span – is rising, the impact of the inital late pattern of nuptiality on the eventual value of MAM is carried through the nuptial span at an increasing rate. Therefore, the increases shown in table 3.4 in the value of MAM suggest that the rise in the eventual value of mean age at marriage for the cohorts still in the nuptial span may be as striking as that indicated by the estimates of SMAM shown in the lower panel of the table and may amount to more than three years between the oldest and the youngest cohorts studied.

## 3.4 LEVELS OF COHORT NUPTIALITY

The substantial decreases in the intensity of first marriage at young ages and the recent upward trend in the age at first marriages have led to considerable shifts in the age distribution of women by marital status. As previously mentioned, the two characteristics of nuptiality – its tempo and its level – are not necessarily interdependent. Recent studies suggest that first marriage is still almost universal in Pakistan. It is of interest, therefore, to investigate how the recent shift to later and slower pace of nuptiality has affected the age distribution of the ever-married female population.

### Proportions single

By way of general introduction, table 3.5 shows the proportions single by five-year age groups for five-year birth cohorts. The complement of the proportion single at any given age is the proportion of persons who had ever married. As may be seen, women of every age group under 45 shared in the long-term decline in the proportion ever married, but the increases in the proportions single have been substantial at ages under 25. For example, the proportion of women single at ages 20–24 increased gradually from a low of 6 per cent for the cohort currently 40–44 years to 19 per cent for the cohort currently 25–29 years. The increase in the proportion single at the crucial ages of 15–19 has also been substantial and of great significance: from 29 per cent among women aged 40–44 to 55 per cent for women currently aged 20–24.

Table 3.5 Reconstructed percentage of single women by five-year age groups per five-year birth cohorts, as implied by the cohort nuptiality tables based on the PFS 1975

| Age at first marriage | Current age (as at 1975) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 |
| Under 15 | 96.4 | 93.6 | 92.7 | 91.2 | 87.6 | 85.9 | 88.2 |
| 15–19 | | 54.6 | 50.6 | 42.9 | 37.4 | 29.1 | 32.7 |
| 20–24 | | | 18.9 | 13.3 | 10.8 | 6.4 | 7.4 |
| 25–29 | | | | 5.8 | 3.8 | 2.2 | 2.3 |
| 30–34 | | | | | 2.2 | 1.5 | 1.4 |
| 35–39 | | | | | | 1.3 | 1.2 |
| 40–44 | | | | | | | 1.2 |

## Exposure to ever-married life

Because the intensity of first marriage changes rapidly with age, trends in the tempo and level of nuptiality would be better understood if they are considered from the point of view of cumulative exposure to ever-married life, by exact single years of age rather than by five-year age groups. Table 3.6 gives the proportions ever married by exact single years of age for five-year birth cohorts. The figures show a clear trend towards later marriage, and a concomitant tendency for first-marriage to become spread over a wider age range, as evidenced by the substantial decreases in the proportions of young marriages (figure 3.2). Thus, the proportion ever married before reaching age 25 has decreased from 96 per cent among women currently in their 40s to 89 per cent among women currently at ages 25–29. Likewise, the proportion has declined, but more rapidly, for those marrying before age 20, from 86 per cent among the older cohorts of 40–45 years to only 66 per cent among the cohort aged 20–24.

In fact, the downward trend in teenage marriages has been striking. About 78 per cent of the women currently aged 40–44 had entered first marriage before reaching age 18, whereas the figure was 69 per cent for women currently 35–39, 55 per cent for women currently 25–29 and 45 per cent for those 15–19 years of age.

There has also been a very sharp decline in very early marriage. The proportion of women ever married by exact age 15 was 44 per cent among the cohort currently aged 40–44. This proportion continued to decline gradually with every succeeding cohort until it reached a low of 15 per cent among women currently aged 15–19.

## Changes in the effective nuptial span

The decline in the proportions ever married at the young ages were brought about by significant changes in the age pattern of first marriage. The net effect of these changes in pattern has been to expand the effective nuptial span into a wider age range. This may be illustrated by an examination of trends in the ages at which certain proportions of successive birth cohorts were married. In table 3.7 figures are given showing the ages at which 10, 25, 50 and 75 per cent of the initial size of each of the seven age-cohorts considered had been married for the first time. The table also shows the interquartile range which is obtained by subtracting the age at which the proportion ever married reached 25 per cent from that age at which the proportion reached 75 per cent. It should be noted that the figures in table 3.7 are not controlled for the ultimate level of nuptiality and, therefore, cannot be used as indicators of the net effect of changes in the tempo of nuptiality.

Table 3.7 brings out in sharper focus the remarkable transformation in the age pattern of nuptiality which started with the cohorts of women born in the 1930s, and shows that the two dimensions of the tempo of nuptiality – the early–late dimension and the rapid–slow dimension – have worked, with only a few exceptions, in such a way as to reinforce each other. Thus, the age at which the proportion ever married reached 25 per cent was 14 for each of the cohorts currently aged 35–39, 40–44 and 45–49. This age has risen to 15 years for the cohort aged 25–29 and to 16 for the cohort aged 15–19. A similar upward shift amounting to about three years is also shown for the ages at which 50 per

**Table 3.6** Proportions ever-married (per 1000 females) by exact single years of age for five-year birth cohorts as implied by the cohort nuptiality tables based on the PFS 1975

| Age at first marriage (exact years) | Current age (as at 1975) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 |
| 10 | | | | | | | |
| 11 | 1.0 | 4.0 | 5.0 | 4.0 | 11.8 | 6.0 | 4.0 |
| 12 | 6.0 | 20.2 | 23.8 | 25.0 | 50.0 | 45.0 | 32.0 |
| 13 | 27.0 | 59.8 | 69.2 | 82.0 | 130.0 | 143.8 | 113.0 |
| 14 | 73.2 | 127.6 | 145.6 | 178.6 | 243.6 | 288.6 | 243.6 |
| 15 | 148.4 | 217.0 | 244.4 | 299.6 | 370.4 | 443.4 | 393.0 |
| 16 | 245.0 | 317.6 | 352.4 | 424.2 | 492.6 | 581.2 | 533.8 |
| 17 | 350.7 | 417.4 | 457.4 | 538.8 | 599.8 | 691.6 | 650.8 |
| 18 | 454.5 | 509.2 | 552.4 | 636.2 | 688.0 | 775.2 | 742.0 |
| 19 | 550.0 | 589.4 | 634.2 | 714.8 | 758.4 | 836.6 | 810.0 |
| 20 | | 656.8 | 702.2 | 776.6 | 813.0 | 880.6 | 860.2 |
| 21 | | 718.8 | 757.4 | 824.8 | 855.0 | 911.8 | 896.8 |
| 22 | | 769.7 | 801.8 | 861.2 | 886.8 | 934.0 | 923.0 |
| 23 | | 811.0 | 836.8 | 889.0 | 910.8 | 949.6 | 941.6 |
| 24 | | 845.0 | 864.4 | 910.0 | 928.8 | 960.6 | 955.0 |
| 25 | | | 886.4 | 926.2 | 942.8 | 968.4 | 964.6 |
| 26 | | | 906.5 | 937.4 | 952.8 | 974.0 | 971.2 |
| 27 | | | 922.0 | 946.4 | 960.6 | 977.8 | 976.0 |
| 28 | | | 935.0 | 953.2 | 966.2 | 980.4 | 979.6 |
| 29 | | | 945.0 | 958.2 | 970.6 | 982.2 | 982.0 |
| 30 | | | | 962.0 | 973.8 | 983.6 | 984.0 |
| 31 | | | | 967.0 | 976.0 | 984.6 | 985.0 |
| 32 | | | | 970.7 | 977.8 | 985.2 | 986.0 |
| 33 | | | | 973.5 | 979.6 | 985.8 | 986.8 |
| 34 | | | | 976.0 | 980.6 | 986.2 | 987.0 |
| 35 | | | | | 981.0 | 986.2 | 987.4 |
| 36 | | | | | 982.5 | 986.4 | 987.8 |
| 37 | | | | | 983.3 | 986.6 | 987.8 |
| 38 | | | | | 984.5 | 986.6 | 988.0 |
| 39 | | | | | 985.0 | 986.8 | 988.0 |
| 40 | | | | | | 986.8 | 988.0 |
| 41 | | | | | | 987.0 | 988.0 |
| 42 | | | | | | 987.3 | 988.0 |
| 43 | | | | | | 987.5 | 988.2 |
| 44 | | | | | | 988.0 | 988.2 |
| 45 | | | | | | | 988.2 |
| 46 | | | | | | | 988.5 |
| 47 | | | | | | | 988.7 |
| 48 | | | | | | | 989.0 |
| 49 | | | | | | | 989.0 |

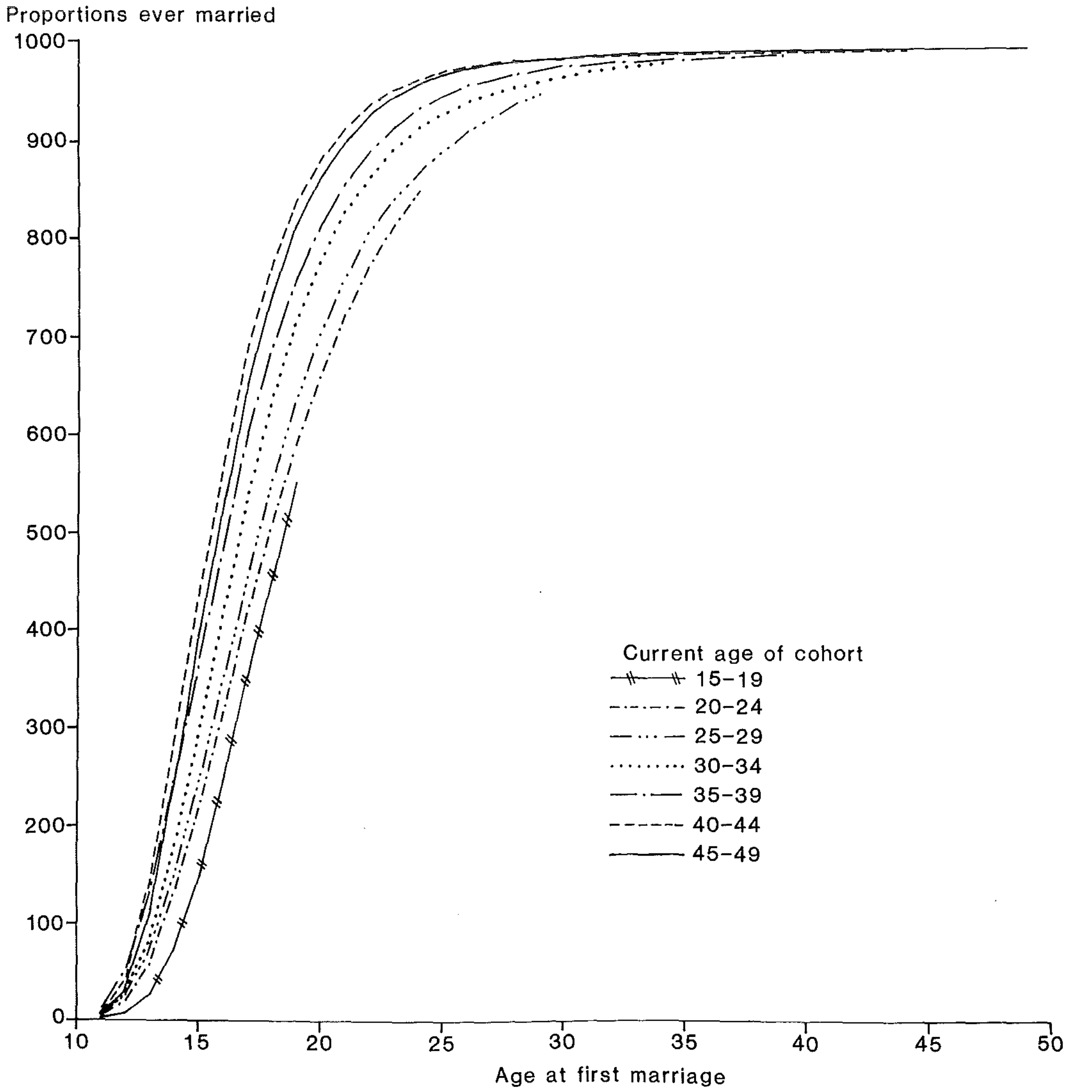


**Figure 3.2** Proportions ever married per 1000 females, based on the PFS 1975

**Table 3.7** Estimated ages at which 10, 25, 50 and 75 per cent of successive five-year birth cohorts had ever married as implied by the cohort nuptiality tables based on the PFS 1975

| Current age of cohort (as at 1975) | Percentage ever married | | | | Interquartile age range |
|---|---|---|---|---|---|
| | 10 | 25 | 50 | 75 | |
| 15–19 | 12.2 | 16.0 | 18.5 | – | – |
| 20–24 | 11.4 | 15.3 | 18.1 | 21.9 | 6.6 |
| 25–29 | 11.3 | 15.0 | 17.5 | 21.0 | 6.0 |
| 30–34 | 11.3 | 14.6 | 16.7 | 19.7 | 5.1 |
| 35–39 | 11.2 | 14.1 | 16.1 | 19.0 | 4.9 |
| 40–44 | 11.2 | 13.8 | 15.4 | 17.7 | 3.9 |
| 45–49 | 11.2 | 14.0 | 15.7 | 18.1 | 4.1 |

cent and 75 per cent of the women in each cohort had entered first marriage.

A concomitant tendency for the effective nuptial span to be expanded into a wider age range is also shown by the increase in the interquartile range: from four years for the older cohorts aged 40–49 years to five years for the cohorts currently in their 30s and 6.0 and 6.6 years for the cohorts currently aged 23–29 and 20–24, respectively.

## 3.5 CONCLUDING REMARKS

To sum up, the analysis shows substantial shifts in the age patterns of first marriage in Pakistan as we move from the oldest to the more recent birth cohorts. First marriage rates have declined at almost all ages, markedly so at ages under 25, attaining lower values with each succeeding cohort. The net effect has been a change from an early peak pattern to an early broader and lower peak pattern.

The remarkable shifts in the tempo of nuptiality reflect, of course, an upward trend in age at marriage. The results indicate that over the last 30 years or so, mean age at first marriage has risen by over three years, from about 16 years for the older cohorts to over 19 years for the youngest cohorts. Accompanying the trend towards later marriage has been a tendency for first marriages to become spread over a wider age range.

These changes have led to considerable shifts in the age composition of females by marital status, particularly among the younger cohorts. Thus, women of every age group under 45 years have shared in the long-term decline in the proportion ever married, but the decreases have been substantial at ages under 22. In fact, the decline in teenage marriages explains a large part of the recent changes in nuptiality in Pakistan. It looks, however, as if each of the birth cohorts studied had its own pattern of age at marriage, for the decreases in the proportions of women ever married at younger ages shown successively for each of the cohorts born since the early 1930s did not represent a deviation around a previously established pattern but rather a departure from it.

The changes in the age patterns of first marriage in Pakistan must have had the effect of shifting tens of thousands of first marriages that ordinarily would have occurred at somewhat younger ages to the later ages of the nuptial span. This trend has altered the age pattern of births in Pakistan, for it has had the effect of decreasing marital exposure of childbearing by reducing the proportion of women who are potential mothers as teenagers. Age at first marriage is, then, not surprisingly negatively correlated with cumulative fertility achieved at younger ages, though neither can be deduced from the other.

All these transitions arrived on the demographic scene in Pakistan along with continuing education for increasing numbers of females and an increasing participation of women in tbe labour force, at a time when changes appear to be occurring in reproductive behaviour. These changes may be indicative of movements towards differing values and aspirations. They are also expected to introduce factors of change throughout the demographic, social and economic scene in Pakistan, because the consequences of the numbers of marriages and births in a specific year extend to future years and decades.

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# 4 Differentials in Age at First Marriage

Mehtab S. Karim

## 4.1 INTRODUCTION

In the preceding chapter, we have observed that female age at marriage in Pakistan has risen over time, especially during the 1960s. This rise might be associated with the recent changes in the socio-economic conditions of the country. In the past, when joint families pooled household resources, economic independence before marriage was not a necessary precondition for marriage. While the joint family is still widely prevalent, and about 55 per cent of all households in the PFS were composed of non-nuclear families, the nuclear family is gradually becoming more prominent. In the predominantly agricultural economy of the past, material well-being was dependent primarily on the inheritance of land, or some equivalent for those not living off the land. The rapid population growth of the past few decades has, however, brought significant changes in the outlook and expectations of the masses. Young people are being driven to urban areas in search of jobs, and a society which for centuries has depended on an agricultural economy is no longer able to adhere to the old system of supporting additional family members. Land is no longer as available as it was in the past, and there is consequently a need to adjust to changing conditions. In many instances, financial independence and a separate dwelling have become necessary before a man can marry, a situation which delays marriage for both men and women. Beginning in the 1960s, Pakistan also experienced a sustained economic growth in the non-agricultural sector, which enabled the urban sector to absorb rural migrants, and this has apparently affected the marriage patterns in both urban and rural areas. The changes in marriage patterns and the factors associated with these changes are at times difficult to identify, because of the lack of data from earlier decades, and these explanations are therefore based on personal knowledge of Pakistani society.

In what follows, we have tried to identify some of the factors which are associated with the differentials in age at first marriage, and we have done the analysis at the individual level.[1] The analysis is expanded to explain variations in age at marriage by place of residence and origin; provincial and linguistic affiliations; women's educational attainment; and the pattern of their labour force participation. The main focus is an explanation of variations in the nuptiality experience only of currently married women with uninterrupted first marriage.[2]

## 4.2 URBAN–RURAL DIFFERENTIALS

Urban–rural differentials in the timing of marriage have been observed in studies conducted in Asia where early marriage among rural women has been reported (Palmore and Ariffin 1961; Smith and Karim 1978). It is generally argued that urbanization and industrialization not only transform a society from its traditional agricultural economy, but bring about a variety of social changes that pave the way for a nuptiality transition.

Estimates of SMAM (ie singulate mean age at marriage) provided by Coale's model for various age cohorts in urban and rural areas show a clearer trend in urban areas (table 4.1). Urban women have experienced marked changes in their timing of marriage, where SMAM for the youngest age

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[1] A more detailed analysis using household and individual data relating to ever-married women is presented elsewhere (see Alam and Karim 1982).

[2] Restricting the analysis to only women with uninterrupted first marriage poses some methodological problems, particularly arising from selectivity, and is likely to underestimate the trends in nuptiality. However, with nearly 90 per cent of first marriages still intact, the effect is likely to be negligible.



Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey*: 51–63. Voorburg, Netherlands: International Statistical Institute.

Table 4.1 Estimates of SMAM from Coale's model for urban and rural areas, for all ever-married women.

| Age | Urban | Rural |
|---|---|---|
| 15–19 | 19.0 | 17.4 |
| 20–24 | 18.5 | 16.9 |
| 25–29 | 18.0 | 17.4 |
| 30–34 | 17.0 | 17.1 |
| 35–39 | 16.8 | 16.5 |
| 40–44 | 15.8 | 16.1 |
| 45–49 | 16.3 | 16.4 |
| All ages | 17.7 | 16.7 |

*Source:* Pakistan Fertility Survey

cohort is about three years higher than that for the oldest cohort. No such changes are visible in the rural sector, however, where, on average, women under 35 years were married at just over 17 years and women aged 35 and over were married at just over 16 years. It is evident from figure 4.1 that it is mostly urban women below age 30 who are delaying marriage. We may also note that estimates of rural SMAM appear rather erratic, which is probably due to the age-reporting biases which occur in rural areas (in urban areas such biases are apparently of lower magnitude).

Further evidence of urban–rural differentials in age at marriage are provided in table 4.2, which indicates a widening gap in the mean age at marriage of urban and rural women. Among women of all ages in urban areas, a slightly higher percentage married at age 21 and over than women in rural areas. However, a clearer distinction is revealed when women are classified according to the year of marriage of their current age. Recently married urban women, on average, married at age 18 and over, about a year later than recently married rural women. Although women in both sectors, on average, reported similar ages at marriage, urban women have shown over three years' gain during the 1960s compared to rural women. Urban women currently aged 25–29 married, on average, a year and a half later than women in their 40s. However, younger rural women did not show a similar rise in their mean age at marriage when compared to the older rural women.

Over the past decades, the pace of urbanization in Pakistan, as in other developing countries, has been rapid. Not only do most urban residents have close ties with their rural background and show similar behaviour to their families still living in rural areas, but a great number have migrated to urban areas as adults. A third of currently married, urban women in the PFS reported that

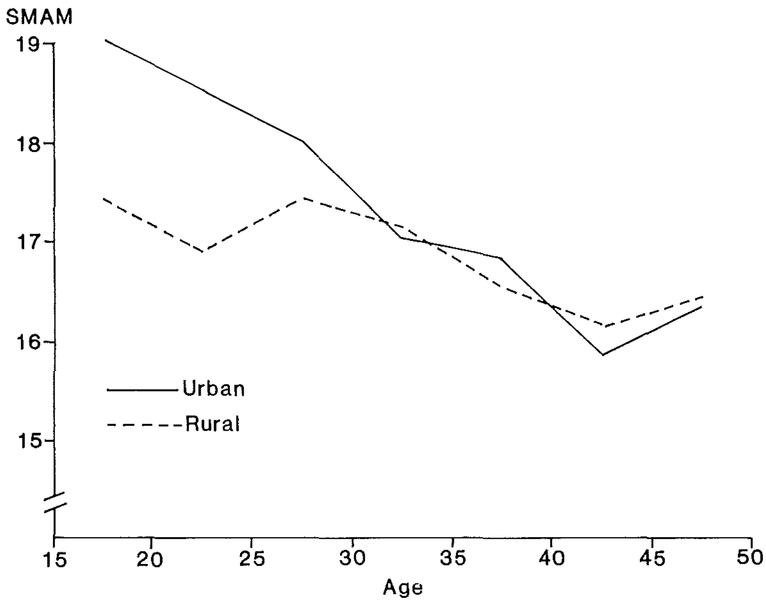


**Figure 4.1** Singulate mean age at marriage (Coale's method) by age and residence
*Source:* Table 4.1

Table 4.2 Age at marriage by current residence, year of marriage, and age for currently married women

| | Urban | | | Rural | | |
|---|---|---|---|---|---|---|
| | N | % married at age 21 or later | Mean age at marriage | N | % married at age 21 or later | Mean age at marriage |
| All women | 1705 | 11.7 | 16.8 | 2761 | 8.5 | 16.3 |
| *Year of marriage* | | | | | | |
| Before 1950 | 276 | 1.0 | 15.0 | 467 | 1.3 | 14.9 |
| 1950–54 | 157 | 7.0 | 16.1 | 253 | 5.5 | 15.7 |
| 1955–59 | 251 | 4.8 | 15.7 | 395 | 8.1 | 16.2 |
| 1960–64 | 274 | 9.5 | 16.7 | 452 | 7.5 | 16.5 |
| 1965–69 | 315 | 17.5 | 17.6 | 533 | 11.6 | 17.0 |
| 1970–75 | 432 | 21.5 | 18.1 | 661 | 13.2 | 17.1 |
| *Age* | | | | | | |
| 25–29 | 351 | 19.1 | 17.5 | 511 | 12.7 | 16.9 |
| 40–49 | 334 | 6.9 | 16.1 | 572 | 9.9 | 16.1 |

*Source:* Pakistan Fertility Survey

Table 4.3 Age at marriage by place of residence before marriage, year of marriage, and age, for currently married, urban women

| | Lifetime urban residents | | | Rural-to-urban migrants | | |
|---|---|---|---|---|---|---|
| | N | % married at 21+ | Mean age at marriage | N | % married at 21+ | Mean age at marriage |
| All women | 1142 | 13.6 | 17.0 | 563 | 8.0 | 16.2 |
| *Year of marriage* | | | | | | |
| Before 1950 | 167 | 0.6 | 15.0 | 109 | 1.8 | 15.0 |
| 1950–54 | 112 | 7.1 | 15.8 | 45 | 6.7 | 16.0 |
| 1955–59 | 152 | 3.3 | 16.2 | 99 | 7.0 | 15.7 |
| 1960–64 | 177 | 11.3 | 17.0 | 97 | 6.2 | 16.3 |
| 1965–69 | 227 | 20.3 | 17.9 | 88 | 10.3 | 16.7 |
| 1970–75 | 307 | 24.4 | 18.4 | 125 | 14.3 | 17.4 |
| *Age* | | | | | | |
| 25–29 | 247 | 23.5 | 18.0 | 104 | 8.6 | 16.5 |
| 40–49 | 209 | 7.7 | 16.9 | 125 | 5.6 | 15.7 |

*Source:* Pakistan Fertility Survey

they had lived in rural areas before marriage. It is likely that most of these women were influenced by their place of residence before marriage, at least with regard to the timing of their marriage.

The data presented in table 4.3 show clear trends in age at marriage among women with urban and rural backgrounds. A somewhat similar pattern is noted prior to 1960 for both groups of women. However, a sudden change is shown for 1965–9 and later among urban women whose childhood was spent in urban areas, about one-fifth of whom married at age 21 and over and, on average, were married at age 18. Rural-to-urban migrants, on the other hand, were still marrying early: only 10 per cent remained single at age 21 in 1965–9, and 14 per cent in 1970–5. However, during the last five years, these women report a rise of one year in the mean age at marriage. Age-specific mean age at marriage does not show a similar change, as shown in the lower panel of the table. However, younger urban residents (aged 25–29), whose childhood place of residence was urban, married a year later than the older cohorts, while the younger rural-to-urban migrants married only half a year later than older women. Although the influence of childhood residence in urban areas delays marriage somewhat among urban women, it is more pronounced among recently married women than among those married 25 years ago. In other words, urban–rural differentials in nuptiality, estimated on the basis of childhood place of residence, have widened during the last decade as may be seen in figure 4.2. Our findings suggest that somewhat similar values were maintained in both urban and rural areas as regards the timing of girls' marriages until the mid-1960s, but more recently married women who have lived in urban areas most of their lives show a change in this pattern.

## 4.3 THE ROLE OF EDUCATION

The positive effect of education on age at marriage has frequently been noted (Tietze and Lauriet 1955; Mukherjee 1973; Timur 1977), and Blake (1967) has associated delayed marriage with the completion of formal education. In Pakistan, only 11 per cent of women report having attended school and only 4 per cent completed primary education or above[3] (table 4.4). However, school attendance has a strong influence on the timing of marriage, especially for women who married after 1960. Before 1960, less than 7 per cent of women married at age 21 or later, irrespective of their level of education. In 1970–5, however, while about 12 per cent of those without any education married at age 21 or later, 45 per cent

[3] Six or more years of schooling.

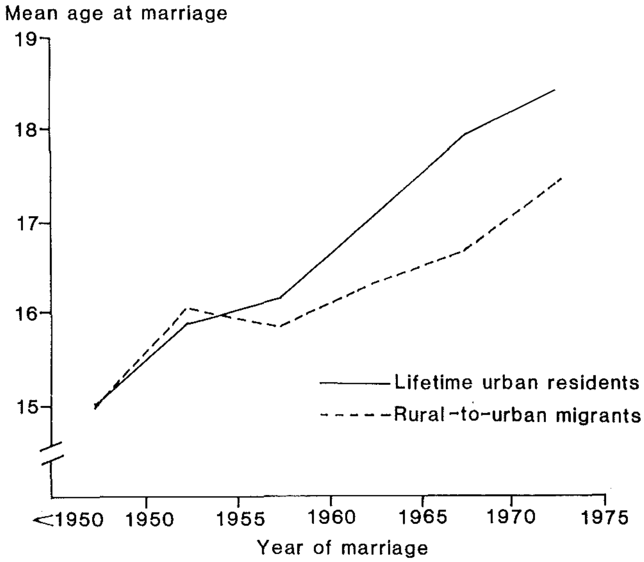


Figure 4.2 Mean age at marriage by year of marriage and place of residence before marriage
*Source:* Table 4.3.

Table 4.4 Age at marriage by level of education, year of marriage and age for currently married women

| | No education | | | Incomplete primary | | | Primary and more | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | % married at 21+ | Mean age at marriage | N | % married at 21+ | Mean age at marriage | N | % married at 21+ | Mean age at marriage |
| A All areas (N = 4466[a]) | | | | | | | | | |
| All women | 3975 | 7.9 | 16.2 | 306 | 13.9 | 17.5 | 184 | 32.3 | 19.4 |
| % of total | 89.0 | – | – | 6.9 | – | – | 4.1 | – | – |
| *Year of marriage* | | | | | | | | | |
| Before 1960 | 1677 | 4.4 | 15.5 | 83 | 4.7 | 16.1 | 40 | 6.7 | 16.7 |
| 1960–64 | 664 | 6.8 | 16.3 | 42 | 15.2 | 17.5 | 22 | 30.0 | 19.3 |
| 1965–69 | 739 | 11.4 | 16.8 | 69 | 18.5 | 18.4 | 44 | 33.3 | 19.5 |
| 1970–75 | 895 | 12.4 | 17.0 | 113 | 17.4 | 17.8 | 78 | 45.6 | 20.8 |
| *Age* | | | | | | | | | |
| 25–29 | 738 | 16.8 | 16.7 | 63 | 17.0 | 18.0 | 49 | 52.3 | 20.9 |
| 40–49 | 857 | 8.7 | 16.0 | 38 | 17.1 | 17.2 | 17 | 16.0 | 18.7 |
| B Lifetime urban residents (N = 1142[a]) | | | | | | | | | |
| All women | 741 | 7.8 | 16.2 | 179 | 12.3 | 17.6 | 222 | 33.8 | 19.4 |
| % of total | 64.9 | – | – | 15.7 | – | – | 19.4 | – | – |
| *Year of marriage* | | | | | | | | | |
| Before 1960 | 325 | 2.1 | 15.2 | 56 | 5.4 | 16.5 | 50 | 8.0 | 16.6 |
| 1960–64 | 122 | 9.0 | 16.4 | 30 | 6.7 | 17.6 | 25 | 28.0 | 19.3 |
| 1965–69 | 141 | 13.5 | 17.0 | 34 | 20.6 | 18.8 | 52 | 38.5 | 19.6 |
| 1970–75 | 153 | 13.7 | 17.2 | 59 | 17.0 | 17.9 | 95 | 46.3 | 20.8 |
| *Age* | | | | | | | | | |
| 25–29 | 150 | 13.3 | 16.8 | 37 | 13.5 | 18.1 | 60 | 55.0 | 20.8 |
| 40–49 | 162 | 4.3 | 15.7 | 25 | 20.0 | 18.6 | 22 | 18.2 | 18.7 |

[a] Weighted.
*Source:* Pakistan Fertility Survey

of women with completed primary education married at age 21 or later. Similarly, while there has been an increase of only a year and a half in the mean age at marriage between 1960 and 1970–5 among women with no education, women with primary or more education gained over four years in their age at marriage during the period. Interestingly, women with incomplete primary education do not show any significant change in the timing of their marriage, as compared to those with no education. Among women married in 1970–5, those with no education married on average at age 17, while those with incomplete primary education married only a year later. However, women who completed primary education or more married about four years later than women with no education. Women aged 25–29 show a similar pattern. Only one-twelfth of women with no education married at age 21 or later, as compared to over half of those with primary or more education. Similarly, the latter group married, on average, at age 20.8, ie four years later than those with no education. While younger women with primary or more education married two years later than their older counterparts, younger women with no education or incomplete primary education show very little change in the timing of marriage as compared to older women. It appears that it is not simply school attendance, but completion of at least primary education, that is important in delaying marriage. It is clear that most of the women with primary education delay marriage for several years after leaving school, which is reflected in a substantially higher age at marriage than the age at graduation from primary school (about 12 or 13). Education clearly has a direct influence on the timing of marriage, and seems to lead to certain attitudes or activities that are conducive to a higher age at marriage.

It is plausible that the small percentage of women who receive education are those with easy access to schools. Urban residents have had better opportunities to attend school; about one-third had attended school and about one-fifth had completed primary or more education. It is clear that women with primary or more education have a distinctively higher mean age at marriage, although lifetime urban residents do not behave differently from other women, as shown in the lower panel of table 4.4. It is likely that the small percentage of women who attend school are from families where delayed marriage has become the norm.

## 4.4 PATTERN OF WORK AND WORK STATUS

The traditional nature of Pakistani society means that employment of women outside the home, particularly before marriage, is discouraged. Women who work generally do so out of economic necessity, although in some cases, particularly in urban areas, women work while waiting to get married. Thus, female labour force participation before marriage serves as an important, although indirect, link with the timing of marriage. We should note, however, that the estimated effect of employment on age at marriage could be upwardly biased. Only one-tenth of women interviewed in the PFS reported working before marriage, and another one-tenth joined the labour force only after marriage (table 4.5). The mean age at marriage of women who worked only before marriage is reported to be about a year and a half higher than those who never worked or have always worked and more than two years higher than those entering the labour force after marriage. It seems that women who have always worked are from lower-income families and worked before marriage for economic reasons.

**Table 4.5** Age at marriage by pattern of work, year of marriage, and age for currently married women

| | Never worked | | Worked only before marriage | | Always worked | | Worked only after marriage | |
|---|---|---|---|---|---|---|---|---|
| | N | Mean age at marriage | N | Mean age at marriage | N | Mean age at marriage | N | Mean age at marriage |
| All women | 3559 | 16.6 | 106 | 17.9 | 320 | 16.6 | 481 | 15.7 |
| % of total | 79.7 | – | 2.4 | – | 7.2 | – | 10.7 | – |
| *Year of marriage* | | | | | | | | |
| Before 1960 | 1394 | 15.6 | 29 | 16.3 | 109 | 15.5 | 268 | 15.1 |
| 1960–64 | 550 | 16.5 | 17 | 17.8 | 72 | 17.0 | 88 | 16.2 |
| 1965–69 | 709 | 17.2 | 16 | 18.4 | 51 | 16.6 | 77 | 16.6 |
| 1970–75 | 905 | 17.4 | 45 | 18.8 | 87 | 17.5 | 48 | 16.1 |
| *Age* | | | | | | | | |
| 25–29 | 678 | 17.2 | 27 | 18.9 | 61 | 17.0 | 82 | 15.8 |
| 40–49 | 700 | 16.2 | 11 | 19.1 | 56 | 16.5 | 145 | 15.5 |

*Source*: Pakistan Fertility Survey

Table 4.6 Age at marriage by work status, year of marriage, and age for currently married women who worked before marriage

| | Paid in cash | | Self-employed | | Unpaid | |
|---|---|---|---|---|---|---|
| | N | Mean age at marriage | N | Mean age at marriage | N | Mean age at marriage |
| All women | 103 | 17.6 | 239 | 16.9 | 84 | 16.1 |
| *Year of marriage* | | | | | | |
| Before 1960 | 28 | 16.3 | 78 | 15.5 | 32 | 15.5 |
| 1960–64 | 26 | 18.0 | 47 | 16.0 | 16 | 16.6 |
| 1965–69 | 15 | 16.2 | 40 | 17.3 | 12 | 16.0 |
| 1970–75 | 34 | 19.0 | 74 | 18.1 | 24 | 17.0 |
| *Age* | | | | | | |
| 25–29 | 24 | 18.5 | 51 | 17.4 | 13 | 16.7 |
| 40–49 | 17 | 18.3 | 34 | 16.8 | 16 | 16.3 |

*Source*: Pakistan Fertility Survey

However, they married about a year later than those who started working after their marriage, who may also be from lower-income families. On the other hand, those who did not continue working after marriage apparently had different motivations and therefore experienced a higher age at marriage. Thus working before marriage is associated with a delay in marriage of between one and two years.

Dixon (1971) has suggested that female employment may have a negative influence on age at marriage, since it may facilitate earlier marriage through women contributing to their own dowries. Her argument is not supported by the findings from Pakistan, as shown in table 4.6. Navett's (1967) argument that the parents of working girls may be less keen on early marriage for their daughters seems more plausible, particularly when they are bringing extra income into the family. Economic activity before marriage may become an important aspect of marriage postponement among the small proportion of single working women who are paid in cash. Although employment before marriage delays marriage to some extent, the nature of work itself is more influential. Women who were paid in cash married about three years later than those who worked without pay. Even self-employed women with a cash income married fairly late, as compared to unpaid workers.

Opportunities for employment before marriage may not be available to all women. Those who are younger and have a higher level of education and an urban background may have better employment opportunities before marriage. Since such a small number of women in the PFS worked before marriage, further cross-tabulation is not feasible. At this stage, a multivariate analysis seems more appropriate, taking into account the effects of each of the variables on age at marriage. The results of multiple classification analysis (MCA) are presented in table 4.7. It is evident that the year of marriage, years of education and residential background, each affect work before marriage and thus contribute to the postponement of marriage. Among the total sample, year of marriage is the strongest predictor of delayed marriage, followed by education, increasing the variance to 8.0 and 4.5 per cent, respectively. After controlling simultaneously for year of marriage, years of education, and residential background, the difference in the mean age at marriage between the highest and the lowest categories is reduced from about two years to about one year. The effect of year of marriage and education on the relationship between the pattern of work and age at marriage is more pronounced when the analysis is confined to urban women, as shown in the lower panel of the table. This is indicative of the fact, suggested above, that better employment opportunities are available to urban women, a higher proportion of whom have attended school and who have

Table 4.7 Multiple classification ananlysis of the effects of pattern of work on age at marriage after taking into account age, year of marriage, years of education and residential background for currently married women

| Pattern of work | N | Category mean | Unadjusted deviation from grand mean | Deviation adjusted for | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Age (single year) (A) | Year of marriage (single year) (B) | Years of education (single year) (C) | Residential background (urban –rural) (D) | Combined Effects of (B)(C) and (D) |
| A All women (N = 4466[a] | | Grand mean = 16.5) | | | | | | |
| Never worked | 3559 | 16.6 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 |
| Worked only before marriage | 106 | 17.9 | 1.4 | 1.4 | 1.0 | 1.0 | 0.8 | 0.8 |
| Always worked | 320 | 16.6 | 0.1 | 0.1 | 0.0 | − 0.1 | 0.1 | 0.1 |
| Worked only after marriage | 481 | 15.7 | − 0.8 | − 0.9 | − 0.5 | − 0.9 | − 0.4 | − 0.4 |
| *Beta* | | | 0.11 | 0.12 | 0.07 | 0.06 | 0.10 | 0.06 |
| $R^2$ | | | 0.011 | 0.016 | 0.079 | 0.045 | 0.015 | 0.102 |
| B Urban residents only (N = 1705 | | | Grand mean = 16.8) | | | | | |
| Never worked | 1350 | 16.8 | 0.0 | 0.0 | − 0.1 | 0.0 | 0.0 | − 0.1 |
| Worked only before marriage | 63 | 18.8 | 2.0 | 2.1 | 1.5 | 1.4 | 1.9 | 1.0 |
| Always worked | 103 | 17.4 | 0.6 | 0.5 | 0.6 | 0.5 | 0.6 | 0.5 |
| Worked only after marriage | 189 | 15.9 | − 0.9 | − 0.9 | − 0.3 | − 0.7 | − 0.9 | − 0.2 |
| *Beta* | | | 0.16 | 0.15 | 0.10 | 0.12 | 0.15 | 0.08 |
| $R^2$ | | | 0.025 | 0.023 | 0.133 | 0.115 | 0.035 | 0.192 |

[a] Weighted.
*Source:* Pakistan Fertility Survey

experienced greater changes in nuptiality in the recent past. Year of marriage, years of education and residential background together account for 19 per cent of the variance, where the difference between the extreme categories is reduced from about three years to less than one year.

School attendance emerges as the major predictor in explaining the variations in age at marriage for each of the categories of work status before marriage, suggesting a strong link between years of education and employment outside the home (table 4.8). The difference in the mean between paid and unpaid workers is reduced from one and a half years to only half a year when the effect of education is controlled. A greater variation in nuptiality is found when the analysis is confined to women who have worked before but not since marriage, as shown in the lower panel of table 4.8. As the sample base is thus substantially reduced, the results are to be interpreted with caution. Although women paid in cash marry fairly late, education alone accounts for major variations in age at marriage. Similarly, the effect of residential background becomes more pronounced for women who worked only before marriage.

Working before marriage in general and working for cash in particular appear to be important factors in delaying marriage. Unfortunately, only a very small proportion of the currently married women interviewed had ever been employed, especially before marriage, and single women who were actively participating in the labour force were excluded from the sample due to the

Table 4.8 Multiple classification analysis of the effects of work status on age at marriage after taking into account age, year of marriage, years of education and residential background, for women who ever worked

| Work status | N | Category mean | Unadjusted deviation from grand mean | Deviation adjusted for | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Age (single year) (A) | Year of marriage (single year) (B) | Years of education (single year) (C) | Residential background (urban–rural) (D) | Combined effect of (B)(C) and (D) |
| A Women, who always worked, or worked only before marriage (Grand mean = 16.9) | | | | | | | | |
| | 426 | | | | | | | |
| Paid in cash | 103 | 17.6 | 0.7 | 0.8 | 0.7 | 0.3 | 0.5 | 0.4 |
| Self-employed | 239 | 16.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Unpaid | 84 | 16.1 | − 0.8 | − 0.0 | − 0.7 | − 0.3 | − 0.5 | − 0.4 |
| *Beta* | | | 0.13 | 0.17 | 0.12 | 0.06 | 0.10 | 0.07 |
| $R^2$ | | | 0.018 | 0.047 | 0.077 | 0.131 | 0.034 | 0.170 |
| B Women who worked only before marriage (Grand mean = 17.9) | | | | | | | | |
| | 106 | | | | | | | |
| Paid in cash | 27 | 19.2 | 1.4 | 1.5 | 1.3 | 1.1 | 1.2 | 1.1 |
| Self-employed | 58 | 18.0 | 0.1 | 0.1 | 0.2 | 0.0 | 0.1 | 0.1 |
| Unpaid | 21 | 15.7 | − 2.1 | − 2.0 | − 2.1 | − 1.5 | − 1.7 | − 1.4 |
| *Beta* | | | 0.31 | 0.30 | 0.30 | 0.23 | 0.25 | 0.22 |
| $R^2$ | | | 0.099 | 0.100 | 0.143 | 0.207 | 0.129 | 0.225 |

*Source:* Pakistan Fertility Survey

general exclusion of the single women from the PFS. The nuptiality behaviour of these women is an important aspect of the study of delayed marriage, but an analysis could not be carried out because of lack of data.

## 4.5 GEOGRAPHIC AND LINGUISTIC AFFILIATION

Given the association of socio-economic and demographic factors with age at marriage discussed earlier, we would expect nuptiality to vary by geographic area and between ethnic groups. The four administrative provinces of Pakistan, Baluchistan, North-West Frontier Province (NWFP), Punjab and Sind comprise roughly 4, 17, 58, and 21 per cent of the nation's population, respectively. Although Pakistan is basically dependent on agriculture, the pattern of development of the four provinces has been uneven. Table 4.9 con-

Table 4.9 Selected socio-economic and demographic characteristics of provinces in Pakistan

| Province | Population in thousands[a] | % urban[b] | % women literate (age 15–19)[b] | % women in labour force[b] |
|---|---|---|---|---|
| Baluchistan | 2 409 | 15.8 | 6.6 | 9.6 |
| NWFP | 10 909 | 17.9 | 6.3 | 8.7 |
| Punjab | 37 609 | 24.3 | 13.7 | 9.2 |
| Sind | 13 965 | 43.0 | 28.3 | 9.3 |
| Pakistan | 64 892 | 27.7 | 23.1 | 9.1 |

[a] Population Census of Pakistan 1972
[b] Housing, Economic and Demographic Survey 1973

trasts a few characteristics of the provinces. A low proportion of urban women and a low literacy rate among women is observed in Baluchistan and NWFP, while Sind appears to be the most developed in these respects. The percentage of women employed, however, is very similar in all the provinces. Sind is the area of urban growth in Pakistan, where a large proportion of Muslims have settled, having migrated from central and northern India after Independence in 1947. They have settled in mainly urban areas and have contributed to the large increase in the urban population. Karachi, the capital of Pakistan until 1961 and the largest city in the country, is also part of Sind province and is the major industrial and commercial centre of the country. Over the past 25 years, it has attracted rural migrants, many of them first generation city-dwellers.

Women in Punjab marry on average about a year later than those in Sind and Baluchistan–NWFP[4] (table 4.10). Although Baluchistan and NWFP have shown a gain of a year and a half in the mean age at marriage over two decades, women in Punjab report an increase of over two years during the period. Sind, although more urbanized and industrialized than Punjab, has a lower mean age at marriage for each five-year period, which has widened more recently. This finding warrants further consideration of cultural aspects of variations in nuptiality. Pakistani society consists of five linguistic groups: Baluchi, Pushto, Punjabi, Sindhi and Urdu. The first four languages are spoken mainly in the four provinces of Baluchistan, NWFP, Punjab and Sind, respectively. Urdu, the national language, is mainly spoken by the Muslim immigrants from central and northern India, who are concentrated in the urban centres of Sind and parts of Punjab. Each linguistic group maintains its cultural identity, including endogamous marriage and its own marriage customs. Urdu- and Punjabi-speaking groups have also been influenced by Hindu customs through their close association for centuries with the Hindu culture in undivided India. Consequently, many of their marriage customs are either derived from or influenced by the Hindu culture. On the other hand, Baluchi-, Pushto-, and Sindhi-speaking populations are more tribal in character and are somewhat influenced by the Middle Eastern culture. The custom of bride price, similar to that of Arab countries, is also practised by these groups. According to this custom, the bridegroom's family offers a sum of money (or dowry) to the prospective bride's family both as a security and a compensation for the loss of a daughter. Dowry, or payment by the bride's family to the bridegroom, is widely practised by the Punjabi- and Urdu-speaking groups. This difference in marriage customs may affect age at marriage. When a bride

[4] Baluchistan and NWFP have been grouped together, because of the small number of interviews conducted in the former.

**Table 4.10** Age at marriage by province of residence, year of marriage and age for currently married women

| | Baluchistan–NWFP | | Punjab | | Sind | |
|---|---|---|---|---|---|---|
| | N | Mean age at marriage | N | Mean age at marriage | N | Mean age at marriage |
| All women | 501 | 16.1 | 2982 | 16.9 | 983 | 15.9 |
| *Year of marriage* | | | | | | |
| Before 1960 | 182 | 15.2 | 1256 | 15.7 | 362 | 15.3 |
| 1960–64 | 85 | 16.5 | 463 | 16.9 | 179 | 15.7 |
| 1965–69 | 89 | 16.3 | 576 | 17.5 | 188 | 16.3 |
| 1970–74 | 145 | 16.8 | 686 | 17.8 | 254 | 16.8 |
| *Age* | | | | | | |
| 25–29 | 76 | 16.6 | 582 | 17.5 | 192 | 16.1 |
| 40–49 | 83 | 16.1 | 644 | 17.3 | 186 | 16.0 |

*Source:* Pakistan Fertility Survey

**Table 4.11** Age at marriage by linguistic affiliation, province, year of marriage and age for currently married women

| | Baluchi–Pushto | | Punjabi | | | | Sindhi | | Urdu | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All provinces | | Punjab | | Other provinces | | All provinces | | Sind | | Other provinces | |
| | N | Mean age at marriage | N | Mean age at marriage | N | Mean age at marriage | N | Mean age at marriage | N | Mean age at marriage | N | Mean age at marriage |
| All women | 322 | 16.1 | 2919 | 16.8 | 182 | 15.8 | 641 | 15.6 | 318 | 16.6 | 80 | 17.4 |
| *Year of marriage* | | | | | | | | | | | | |
| Before 1960 | 112 | 15.6 | 1228 | 15.7 | 74 | 14.4 | 228 | 15.6 | 125 | 15.6 | 31 | 15.8 |
| 1960–64 | 54 | 16.0 | 458 | 16.9 | 34 | 16.9 | 125 | 15.1 | 48 | 16.5 | 10 | 18.2 |
| 1965–69 | 60 | 16.1 | 561 | 17.5 | 24 | 17.0 | 126 | 15.7 | 60 | 17.2 | 20 | 18.1 |
| 1970–75 | 96 | 16.8 | 672 | 17.7 | 51 | 16.5 | 162 | 16.2 | 85 | 17.7 | 19 | 18.9 |
| *Age* | | | | | | | | | | | | |
| 25–29 | 51 | 16.6 | 569 | 17.5 | 27 | 15.8 | 126 | 15.4 | 60 | 17.6 | 17 | 18.5 |
| 40–49 | 53 | 16.2 | 632 | 16.2 | 23 | 14.8 | 119 | 15.7 | 68 | 16.1 | 15 | 18.1 |

*Source:* Pakistan Fertility Survey

**Table 4.12** Multiple classification analysis of the effect of linguistic affiliation and province of residence after taking into account age, year of marriage, years of education and residential background for currently married women

| Language and province | N | Category mean | Unadjusted deviation from grand mean | Deviation adjusted for | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Age (single year) (A) | Year of marriage (single year) (B) | Years of education (single year) (C) | Residential background (urban–rural) (D) | Combined effect of (B)(C) and (D) |
| N = 4454 | Grand mean = 16.5 | | | | | | | |
| *Baluchi–Pushto* | 322 | 16.1 | −0.4 | −0.5 | −0.5 | −0.2 | −0.3 | −0.4 |
| *Punjabi* | | | | | | | | |
| Punjabi | 2919 | 16.8 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Other provinces | 182 | 15.8 | −0.7 | −0.6 | −0.8 | −0.7 | −0.7 | −0.7 |
| *Sindhi* | 641 | 15.6 | −1.1 | −1.0 | −1.1 | −0.9 | −1.0 | −1.0 |
| *Urdu* | | | | | | | | |
| Sind | 318 | 16.6 | −0.1 | 0.1 | −0.1 | −0.5 | −0.4 | −0.4 |
| Other provinces | 80 | 17.4 | 1.1 | 1.0 | 1.0 | 0.6 | 0.9 | 0.7 |
| *Beta* | | | 0.16 | 0.15 | 0.17 | 0.15 | 0.16 | 0.16 |
| $R^2$ | | | 0.026 | 0.024 | 0.104 | 0.065 | 0.030 | 0.129 |

*Source:* Pakistan Fertility Survey

price is paid, a younger and more attractive wife will be expected; similarly, when a dowry is paid by the bride's family, a younger girl with smaller dowry may often be preferred to an older woman with a larger dowry. Both dowry or bride price may therefore influence the age at marriage of women in the same direction. However, in other societies where the custom of dowries is practised, girls may have to delay marriage in order to amass an adequate dowry. This is the situation among urban families with fixed incomes in the Punjabi- and Urdu-speaking groups.

Although the PFS did not collect information on the linguistic affiliations of the respondents, interviews were conducted in each of the five languages. In most cases, respondents could choose the language in which they would be interviewed. The nuptiality experience of women according to their linguistic affiliation[5] and province of residence is shown in table 4.11. Urdu-speaking women who are generally concentrated in Sind marry a year later than Sindhi-speaking women, while Punjabi-speaking women in Punjab marry a year later than those in other provinces. Urdu-speaking women show the maximum increase in their mean age at marriage between 1960 and 1970, which is apparently the result of their concentration in urban areas. Baluchi-, Pushto- and Sindhi-speaking women, on the other hand, who mainly reside in rural areas and have less access to schools, marry earlier.

The effects of linguistic affiliation and province of residence on age at marriage are presented in table 4.12, after taking into account some social and demographic variables, using multiple classification analysis. The regional and linguistic differences in age at marriage persist even after taking all the variables into account. However, it is important to note that years of education, along with the year of marriage, show a moderate effect on the relationship. Geographic as well as cultural effects on nuptiality are evident in the PFS data. It is the Punjabi- and Urdu-speaking women who live in more prosperous areas and who with their somewhat higher level of education and greater exposure to the urban way of life are the groups most affected by the nuptiality transition in Pakistan.

[5]Only a small number of respondents were interviewed in Baluchi, and because of their similarities to Pushto-speaking respondents, the two are grouped together.

## 4.6 CONCLUSIONS

The variations in female age at marriage have been explained using PFS data. The analysis has been confined to the effects on age at marriage of such variables as current place of residence, exposure to urban living, education, work history, and geographic and linguistic affiliations. Our findings suggest a general trend towards later marriage and show that urban residence, especially in childhood, education beyond the primary level, and work before marriage, particularly for cash, are important factors in delaying marriage. These findings are consistent with results from other developing countries (Duza and Baldwin 1977). Our results also suggest that areas that are more urbanized and inhabited by Punjabi- and Urdu-speaking women are experiencing a greater upward trend in female age at marriage. It appears that the socio-economic changes which are taking place will lead to a further increase in female age at marriage and may serve as an important factor in reducing marital fertility in the near future.

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# 5 Fertility Levels and Trends

Iqbal Alam

## 5.1 INTRODUCTION

We have observed in chapter 1 that Pakistan has one of the most rapidly growing populations in south-east Asia. While the rates of population growth have declined in a number of east and south-east Asian countries (Mauldin 1976), the most recent indication, based on the 1981 population census, is that in Pakistan the population is growing at a rate of around three per cent per annum. In the absence of an adequate vital registration system the debate concerning the precise roles of mortality and fertility in producing this rate of growth has remained inconclusive.

In this chapter we attempt to find out more about fertility levels and trends by posing two major questions: (1) what are the fertility levels and have they undergone any changes in recent years? and (2) if any changes are occurring, are these confined to any specific subgroup of the population? A satisfactory answer to these two questions will further our understanding of the fertility behaviour of the population.

Before describing the fertility levels and trends obtained through the PFS we discuss briefly some of the methodological considerations in using these data for this type of analysis.

## 5.2 METHODOLOGICAL CONSIDERATIONS

Birth and marriage history data collected from a cross-sectional sample of ever-married women under 50 years of age poses some methodological problems, due to truncation effects, in establishing the existence of any fertility trends and differentials. One important reason for truncation is the exclusion of women who had never married by the survey date. Another reason is the restriction of the sample to women below the age of 50; this means that only one cohort, aged 45–49 at the time of the survey, have completed their fertility, with the rest still at different stages of their reproductive life. A further complication is introduced by within-cohort selectivity: women who experience an event, such as marriage, early in life are more likely to be represented in the sample than those who experience the same event at a later age.

One way to reduce the effects of truncation is to restrict the analysis to ever-married women and look for the trends within the segments of experience which are available for all the cohorts. For example, data for the first 15 or 20 years of marriage may be analysed for the purpose of studying changes in the tempo of fertility. Such use of data reduces considerably the historical period for which analysis can be undertaken, and means that data for older women with longer durations is wasted. Nevertheless, this is still the most efficient way of using birth history data to study the changing tempo of fertility, and much of the analysis presented below is based on duration-specific fertility rates in the first 20 years of marriage.

Another problem in using birth history data to analyse fertility trends is the possible effect of mortality on the fertility estimates. If female mortality at ages 15–49 is high, and if the fertility behaviour of women who die is different from that of women who survive, then the fertility estimates based on surviving women only are biased. In Pakistan, not much is known about adult mortality before 1960, but after 1960 it is estimated to be quite low (Farooqui and Alam 1974). The bias is therefore unlikely to affect fertility estimates since 1960.

Besides these methodological limitations, retrospective survey data also suffer from reporting errors, as pointed out in chapter 2. Of these, errors in reported age and omission and misplacement of



Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey*: 65–80. Voorburg, Netherlands: International Statistical Institute.

live births are the most obvious. The detailed evaluation of the data has shown that, for the distant past, there is a tendency for older women either to omit births or to misplace them in time. However, negligible detectable errors are observed for the more recent past in birth history data and the age-specific fertility rates, with the exception of the age group 15–19, agree well with those obtained by the Population Growth Experiment (PGE). Furthermore the observed fertility trend does not indicate any serious misplacement of births. In summary, the analysis has shown that the estimated fertility levels for the past 15–20 years are likely to reflect reasonably well the prevailing fertility conditions in that period.

The quality of nuptiality data seems to be quite reasonable. No specific type of under or over-reporting of age at marriage is indicated by evaluation of the data reliability. Urban women appear to marry nearly one and a half years later than rural women, a pattern consistent with the 1972 population census estimates of singulate mean age at marriage (Karim 1980).

Retrospectively collected birth history data can be classified according to (1) age or marital duration of women when the birth occurred, or (2) the period or calendar date when the birth occurred, or (3) the birth (current age) or marriage cohort of the mother. As these three classifications overlap, one classification is automatically defined in terms of the other two and a choice has to be made regarding the appropriate classification – age–period, age–cohort, or period–cohort – for presenting the findings. Each type of classification has its own use; in our analysis we have chosen to present the results in terms of age–period and duration–period rates.

Though the PFS data are available for single years of age and for single-year periods, the following analysis is based on fertility rates for five-year age groups averaged over five-year periods, in order to reduce the size of sampling errors, though they must still be borne in mind. Even though the non-sampling errors in the data are not serious, irregularities do exist. For these reasons, small variations in the reported rates must be interpreted with caution.

## 5.3 FERTILITY LEVELS AND TRENDS

The analysis at the national level confirms previous evidence from demographic surveys that fertility has been very high during the 1960s (table 5.1). Truncation does not allow for the reconstruction of a complete age-specific fertility schedule in the past, but if one assumes that the missing rates were similar to those observed for the more recent periods, then the total fertility rate (TFR) has declined in recent years by nearly 12 per cent, from 7.1 during 1960–5 to 6.3 during 1970–5. During the same period, the general fertility rate (GFR) has declined from 229 to 205.[1] The first reaction might be that this is an artifact of data quality caused by systematic shifting of births into the past, ie a shifting of 1970–5 births to 1965–

[1]The GRR for 1960–5 was estimated on the assumption that fertility for women 40 years and over has not changed during the 1960–5 and 1970–5 periods.

Table 5.1 Age-specific fertility rates, 1940–75

| Age at birth | Period | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1970–75 | 1965–70 | 1960–65 | 1955–60 | 1950–55 | 1945–50 | 1940–45 |
| 15–19 | 131 | 159 | 171 | 176 | 198 | 220 | 146[a] |
| 20–24 | 275 | 318 | 303 | 304 | 237 | 296[a] | |
| 25–29 | 315 | 329 | 326 | 314 | 297[a] | | |
| 30–34 | 259 | 288 | 282 | 294[a] | | | |
| 35–39 | 188 | 197 | 222[a] | | | | |
| 40–44 | 77 | 112[a] | | | | | |
| 45–49 | 11[a] | | | | | | |
| TFR | 6.3 | 7.1[b] | 7.1[b] | | | | |

[a]Truncated exposure.
[b]The TFRs have been calculated on the assumption that missing age-specific rates are the same as corresponding rates for more recent periods.

70, 1965–70 births to 1960–5 and so on. However, our evaluation of the data did not suggest any such shifting.

In Pakistan where procreation outside marriage is insignificant, the overall level of fertility is determined by two factors: the fertility of married women and the proportion married among women of childbearing ages. The relative contribution of these two factors to the changes in the TFR can be estimated by decomposing the changes in total fertility.[2] Because of the problem of truncation, the relative changes during the 1960–5 and 1970–5 periods was estimated by restricting the analysis to ages 15–40. This decomposition shows that nearly three-quarters of the decline in fertility can be attributed to changes in marriage patterns and the remaining quarter to the changes in marital fertility.

The age-specific fertility rates (ASFRs) shown in table 5.1 reveal an irregular pattern. Fertility has declined considerably for the age group 15–19, where it has changed from 220 in the 1945–50 period to 131 in 1970–5. For the age group 20–24, it shows an increase over time until 1965–70 and then a decline. For ages 25 and over, it has generally shown a decline. The rise in fertility for the age group 20–24 can be attributed mainly to rising age at marriage.

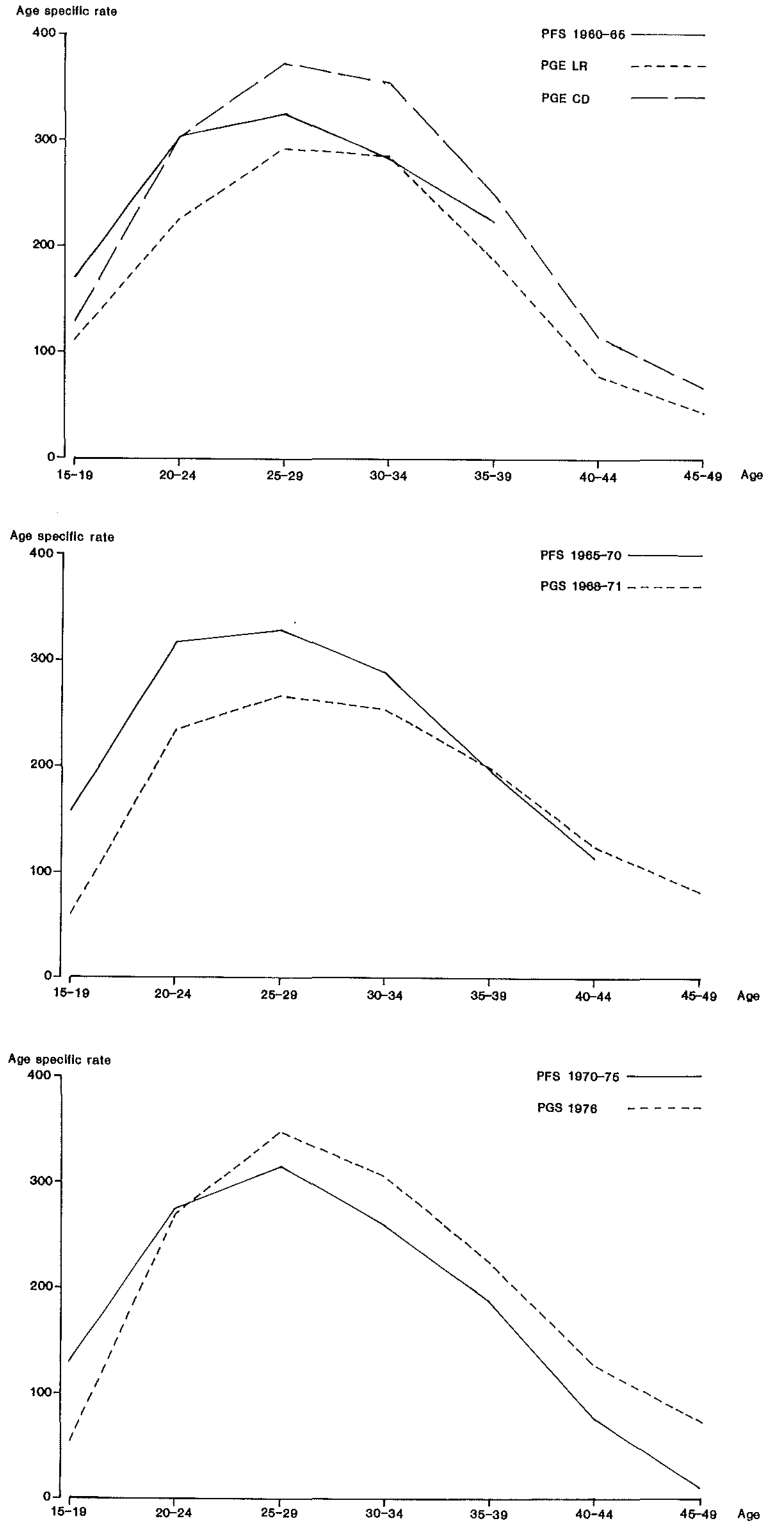
A comparison of the age-specific pattern obtained in the PFS with those obtained through the PGE and PGS (Population Growth Survey) show some very interesting features. For the period 1960–5, the PFS rates are generally higher than PGE (LR) and lower than PGE (CD). The substantially lower rates for the age group 15–19 in the PGE are puzzling. Whether this is due to biases in age reporting in the PFS or PGE or due to under-reporting of births in the PGE needs further probing. In our view, in a society where the age at marriage is historically very low, the PGE rate seems to be on the low side, despite the fact that, while LR and CD estimates differ substantially for ages 20 and over, the 15–19 estimates are relatively close. This agreement in the PGE between the two data collection methods is surprising. In a country where the majority of women return to their mother's house for the first baby, the chances of missing these births in the LR system should be substantially higher than in the CD system. Apart from this discrepancy at ages 15–19, the overall similarity of the fertility pattern between the two surveys is apparent (figure 5.1a) and the closeness of PFS age-pattern to that of PGE (LR-CD) average is consistent with our earlier assertion that fertility levels during 1960–5 were very high and were close to seven births per woman.

A comparison of PFS 1965–70 period age-specific fertility rates with those obtained by PGS, 1968–71 (table 5.2 and figure 5.1b), suggests either a gross under-reporting of births for younger women in the PGS or a systematic over-reporting of births in the PFS. As no systematic errors in reporting of births was observed in the PFS (for details see chapter 2), it is more plausible to conclude that the PGS system of data collection suffers from some in-built defects. This view is supported by previous analyses which suggested that the PGS (CS) system of data collection was substantially missing births (for a detailed discussion, see Krotki 1976 and Farooqui and Farooq 1971).

Unexpectedly, the recently released results for the PGS of 1976 show exactly the opposite tendency. The TFR of 7.0 births is appreciably higher than the PFS rates for the period 1970–5, which indicate a TFR of 6.3. As shown in figure 5.1c, the divergencies between the two surveys occur at ages 15–19 where the PFS rate is much higher and at older ages where the PFS rates are markedly lower. A straightforward comparison of PGE and PFS 1976 results suggests a fertility decline at ages 15–19 (which is plausible) but an increase at older ages, which is both unlikely and counter to the detailed evaluation of PFS data in chapter 2. Clearly these recent PGS data require urgent and careful appraisal; pending such an appraisal, however, we accept the PFS rates for 1970–5 as more reliable than the PGS 1976 rates.

The age-specific marital fertility rates are calculated for two exposure bases, (1) since first marriage and (2) within marriage only, that is, excluding periods of divorce, separation or widowhood. In a country like Pakistan, where nearly 90 per cent of first marriages are undissolved by age 50 and women spend 86 per cent of their married life (since first marriage) within a marital union, such a distinction is likely to have very little, if any, effect on the rates. This is confirmed by results presented in appendix table A1. The two sets of rates are very similar. However, for subgroups, even in countries with such low dissolution rates, some differences in marital stability exist, and therefore it is more meaningful to

[2] For details of decomposition procedures, see Kitagawa (1964).




5.1a

5.1b

5.1c

**Figure 5.1** Comparison of PFS age-specific fertility rates with other sources

Table 5.2 Age-specific fertility rates by source of estimates, 1963–75

| Age at birth | PGE (1963–65 average) | | | PGS 1968–71 average | PGS 1976 |
|---|---|---|---|---|---|
| | LR | CD | LR–CD average | | |
| 15–19 | 110 | 130 | 120 | 60 | 56 |
| 20–24 | 226 | 303 | 264 | 233 | 271 |
| 25–29 | 291 | 373 | 332 | 267 | 348 |
| 30–34 | 283 | 353 | 318 | 252 | 305 |
| 35–39 | 187 | 250 | 218 | 199 | 226 |
| 40–44 | 79 | 114 | 96 | 125 | 128 |
| 45–49 | 42 | 67 | 54 | 72 | 73 |
| TFR | 6.1 | 8.0 | 7.0 | 6.0 | 7.0 |

restrict the subgroup analysis to within marriage exposure. Thus, all but one of the marital fertility rates reported are for within marriage exposure. The exception was made to enable comparison with other surveys: the PGE, PGS and NIS surveys all report rates calculated by using all exposure since first marriage as the denominator.

Age-specific marital fertility rates (ASMFRs) are shown in table 5.3. As for the age-specific fertility rates, the PFS marital rates for both the 1960–5 and 1965–70 periods are generally higher than PGE (LR), NIS and PGS 1968–71 and considerably lower than PGE (CD). It is interesting to note that even the PGS and NIS rates are quite different, the NIS rates being higher than those of the PGS.

Marital fertility, as evidenced by the PFS, has shown a gradual change since 1960–5. The ASMFRs have remained unchanged for the age group 15–19 and have registered a slight rise and then a fall for the 20–34 group, and have declined for higher age groups. This pattern is consistent with rising age at marriage; the age-specific fertility for the 20–24 age group registers a rise, as more and more early fertility is shifted from the youngest group (15–19) to this age group.

We have observed that the most important factor in the transition of fertility in Pakistan is change in age at marriage. In recent years, the Sri Lanka transition has become the classical example of the relationship between fertility and rising age at marriage (Alam and Cleland 1981). However, the underlying causes of nuptiality trends are little understood. Whether the rise in age at marriage is the result of overall change in the social norms of the society (such as the emancipation of women, urbanization, and the relationship between parents and children) or the

Table 5.3 Age-specific marital fertility rates by source of estimate, 1960–75 (based on ever-married exposure)

| Age at birth | PGE 1963–65 | | | NIS 1968–69 | PGS 1968–71 | PGS 1976 | PFS | | |
|---|---|---|---|---|---|---|---|---|---|
| | LR | CD | LR–CD average | | | | 1960–65 | 1965–70 | 1970–75 |
| 15–19 | 367[a] | 433[a] | 400 | 251 | 187[a] | 192[a] | 316 | 315 | 313 |
| 20–24 | 276 | 370 | 323 | 310 | 275 | 353 | 339 | 369 | 344 |
| 25–29 | 306 | 393 | 349 | 333 | 284 | 380 | 339 | 340 | 331 |
| 30–34 | 295 | 368 | 331 | 293 | 265 | 323 | 274 | 285 | 260 |
| 35–39 | 199 | 266 | 233 | 173 | 213 | 239 | 209[b] | 192 | 182 |
| 40–44 | 90 | 130 | 110 | 90 | 138 | 140 | – | 108[b] | 64 |
| 45–49 | 51[a] | 82[a] | 66[a] | 5 | 105[a] | 82[a] | – | – | 10[b] |

[a]All births reported to women < 15 years of age and 50 + were included in 15–19 and 45–49 age groups, respectively.
[b]Based on truncated exposure.

Table 5.4 Duration-specific fertility rates, 1955–75 and relative change since 1960–65

| Duration at birth | 1955–60 | 1960–65 | 1965–70 | 1970–75 | Per cent change |
|---|---|---|---|---|---|
| 0–4 | 278 | 296 | 317 | 305 | + 3.0 |
| 5–9 | 329 | 351 | 363 | 344 | – 2.0 |
| 10–14 | 321 | 323 | 327 | 315 | – 2.5 |
| 15–19 | 293 | 277 | 284 | 250 | – 9.7 |
| 20–24 | | 218 | 200 | 175 | –19.7 |
| 25–29 | | 96 | 91+ | 70+ | –27.1 |
| Children born in first 20 years since marriage | 6.0 | 6.2 | 6.5 | 6.1 | –1.6 |

*Source*: Appendix table A2

desire to control fertility is a question that remains unanswered. In Pakistan, where marriage precedes the onset of sexual activity and reported contraceptive use is negligible, logically any postponement will reduce the period for which women are exposed to the risk of conception and hence is expected to lead to a reduction in total achieved fertility. It is generally observed, however, that the fertility of women marrying at very young ages (under 15 years) is affected by the higher incidence of adolescent sterility which is associated with age at menarche. Such effects are usually more obvious when the fertility levels are observed by duration since marriage.

The duration-specific marital fertility rates (DSMFRs) are presented in table 5.4. Fertility at duration 0–4 shows an increase until 1970. Fertility at durations 5–9 and 10–14 has remained more or less unchanged at least since the 1960–5 period. However, for durations 15 years and over, it has declined. The decline increases with the rise in duration,[3] though its impact on the number of children born in the first 20 years of marriage[4] since 1960–65 is negligible (less than two per cent). A further refinement to the analysis of duration-specific fertility is provided in table 5.5, by controlling for age at marriage. Fertility in the first five years is positively related to age at marriage. The ideal age for marriage for achieving the maximum fertility seems to be 18–19. Fertility in the first 15 years of marriage is highest for this group.

The changes in duration-specific fertility rates since 1960–5 show the greatest decline for those marrying at ages 20–24 but an increase for those marrying at 18–19. The number of children born in the first 20 years of marriage varies between 5.7 (for those marrying at 20–24) and 6.8 (for those marrying at 18–19 years). Even within each marriage category, changes in duration-specific fertility follow roughly the same pattern.

Though this analysis has suggested a negative relationship between late age at marriage and fertility, the results need to be interpreted with caution. It should be mentioned that in the past women marrying at later ages belong to a very special social group and therefore do not constitute a sound basis for drawing any general conclusion regarding the probable impact of age at marriage on fertility.

In summary, our analysis has shown that fertility in Pakistan has declined since the early 1960s. A comparison of retrospectively reconstructed fertility rates with those obtained directly through various national surveys, which were obtained by a range of methodologies and which refer to different time periods, shows that the PFS rates are generally higher. One can attribute this either to an error in PFS data or to the under-estimation of fertility levels by other sources. The reasonably close agreement of PFS data for the 1960–5 period with the PGE (LR-CD average) to a greater extent rules out the first possibility.

[3] The truncation of the sample to ever-married women up to age 49 affects DSMFRs by progressively restricting rates to younger marrying women as the period before survey lengthens. For example, in the period 1960–5, fertility rates at duration 15–19 are totally confined to women marrying before the age of 25 and under-represent the women marrying between 15–25. The corresponding rates for 1970–5 period are restricted to women marrying before age 35 and under-represent women marrying between the age of 25 and 35, less than one per cent of women in Pakistan.

[4] The number of children born in the first 20 years of marriage is analogous to the total fertility rate and is calculated by summing the duration-specific rates from duration 0–4 to 15–19.

Table 5.5 Duration-specific marital fertility rates for the period 1970–75 and relative change since 1960–65 by age at marriage categories

| Duration since first marriage | Married at <15 | | Married at 15–17 | | Married at 18–19 | | Married at 20–24 | |
|---|---|---|---|---|---|---|---|---|
| | DSMFRs | Per cent change | DSMFRs | Per cent change | DSMFRs | Per cent change | DSMFRs | Per cent change |
| 0–4 | 279 | − 0.3 | 305 | − 1.6 | 329 | +17.0 | 332 | + 9.5 |
| 5–9 | 321 | − 8.7 | 355 | − 3.3 | 372 | + 7.3 | 340 | − 7.0 |
| 10–14 | 315 | − 2.8 | 333 | − 3.9 | 329 | + 3.1 | 244 | −33.6 |
| 15–19 | 256 | − 7.1 | 258 | −10.3 | 336 | −12.8 | (231) | −30.9 |
| 20–24 | 198 | − 0.5 | 175 | −24.1 | (132) | −41.9 | ( 90) | −52.7 |
| 25–29 | 96 | −42.5 | 45 | −66.0 | – | – | – | – |
| Children born in first 20 years since marriage | 6.0 | − 4.8 | 6.3 | − 1.6 | 6.8 | + 3.1 | 5.7 | −15.9 |

NOTE: Brackets indicate small sample sizes.

## 5.4 LEVELS AND TRENDS AT THE SUB-NATIONAL LEVEL

An inherent drawback of retrospective cross-sectional surveys is that data for previous years can only be analysed according to socio-economic characteristics at the time of the survey. Even in countries where socio-economic change is not rapid, this problem still exists because the meaning of social indicators changes over time. In Pakistan, internal migration has changed considerably the regional composition of the population. Urban growth has been uneven in the various regions: Sind's urban population has grown very rapidly while the North-West Frontier Province and Baluchistan have shown very slow growth. Similarly, the population composition and characteristics of urban areas have changed since the late 40s. For example, the proportion completing primary education has increased considerably. We hope to minimize the impact of this by restricting our analysis to the last 20 years, but readers are cautioned to keep this in mind in interpreting these results.

### Region of residence

Pakistan is divided into four provinces which serve as major administrative units and show considerable regional variation in population characteristics. They vary greatly in population and land area size. Punjab alone has 65 per cent of the total population. Baluchistan is the biggest in land area, though smallest in population size (4 per cent). Sind and NWFP have 19 and 12 per cent of the population, respectively. The sample sizes for each region are proportionate to population size so that the number of women interviewed in Baluchistan is very small. For this reason we have excluded Baluchistan from our analysis.

As pointed out earlier, truncation does not allow reconstruction of complete fertility histories. However, if one assumes the same ASFRs as observed for the periods unaffected by truncation, the TFRs have declined in all regions since the period 1960–5 (table 5.6). The decline has been more pronounced in NWFP (18 per cent). Sind and Punjab show declines of 12 per cent and 11 per cent respectively. The current fertility level is the highest for Sind. This is consistent with the changing nuptiality pattern in the provinces. Rural Sind has a tradition of early marriage and recent changes in nuptiality patterns have been the slowest (see Karim, chapter 4). Since nearly 40 per cent of the Sind population live in urban areas (the majority in metropolitan areas, Karachi, Hyderabad and Sukkur), rural fertility is likely to be much higher than the regional level reported here.

The age-specific fertility pattern in 1970–5 for NWFP and Punjab is close to the national average, with peak fertility at ages 25–29. However, the Sind pattern is quite different with similar rates at ages 20–24 and 25–29. Regional differences in age-specific marital fertility are shown in figure 5.2. The rates diverge widely at ages 15–19 but confident interpretation is precluded by the

Table 5.6 Age-specific fertility rates by region of residence, 1960–75

| Age at birth | Sind | | | Punjab | | | NWFP | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1960–65 | 1965–70 | 1970–75 | 1960–65 | 1965–70 | 1970–75 | 1960–65 | 1965–70 | 1970–75 |
| 15–19 | 207 | 192 | 167 | 153 | 142 | 112 | 198 | 190 | 170 |
| 20–24 | 286 | 330 | 291 | 308 | 316 | 274 | 288 | 292 | 243 |
| 25–29 | 327 | 321 | 310 | 321 | 335 | 319 | 357 | 300 | 298 |
| 30–34 | 275 | 283 | 255 | 284 | 286 | 267 | (291) | 313 | 209 |
| 35–39 | (258)[a] | 221 | 204 | (214)[a] | 190 | 179 | (241)[a] | (220) | 208 |
| 40–44 | — | (147)[a] | 94 | — | (100)[a] | 68 | — | (160)[a] | 132 |
| 45–49 | | — | (17)[a] | — | — | (−8)[a] | — | — | (16)[a] |
| Total fertility rate[b] | 7.6 | 7.6 | 6.7 | 6.9 | 6.9 | 6.1 | 7.8 | 7.5 | 6.2 |

[a]Based on truncated exposure.
[b]The TFRs have been calculated on the assumption that missing age-specific rates are the same as corresponding rates for more recent periods.

Table 5.7 Duration-specific marital fertility rates by region of residence, 1960–75 and relative change since 1960–65

| Duration at birth | Sind | | | | Punjab | | | | NWFP | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1960–65 | 1965–70 | 1970–75 | Percent change | 1960–65 | 1965–70 | 1970–75 | Percent change | 1960–65 | 1965–70 | 1970–75 | Percent change |
| 0–4 | 285 | 308 | 314 | +10.2 | 294 | 319 | 289 | 1.4 | 336 | 333 | 343 | + 2.1 |
| 5–9 | 320 | 343 | 325 | + 1.0 | 360 | 370 | 349 | − 3.1 | 332 | 351 | 363 | + 9.3 |
| 10–14 | 326 | 300 | 302 | − 7.4 | 320 | 337 | 322 | + 0.6 | (330) | 304 | 299 | − 9.4 |
| 15–19 | 294 | 304 | 245 | −16.7 | 264 | 272 | 257 | − 2.7 | (355) | (336) | (200) | −43.7 |
| 20–24 | (204) | 237 | 191 | − 6.4 | 230 | 185 | 165 | −28.3 | (171) | (242) | (205) | +19.9 |
| 25–29 | | (97) | 98 | — | | 86 | 53 | −64.1 | — | (160) | (150) | — |
| Children born in first 20 years of marriage | 6.1 | 6.3 | 5.9 | −3.3 | 6.2 | 6.5 | 6.1 | −1.6 | 6.8 | 6.6 | 6.0 | −11.8 |

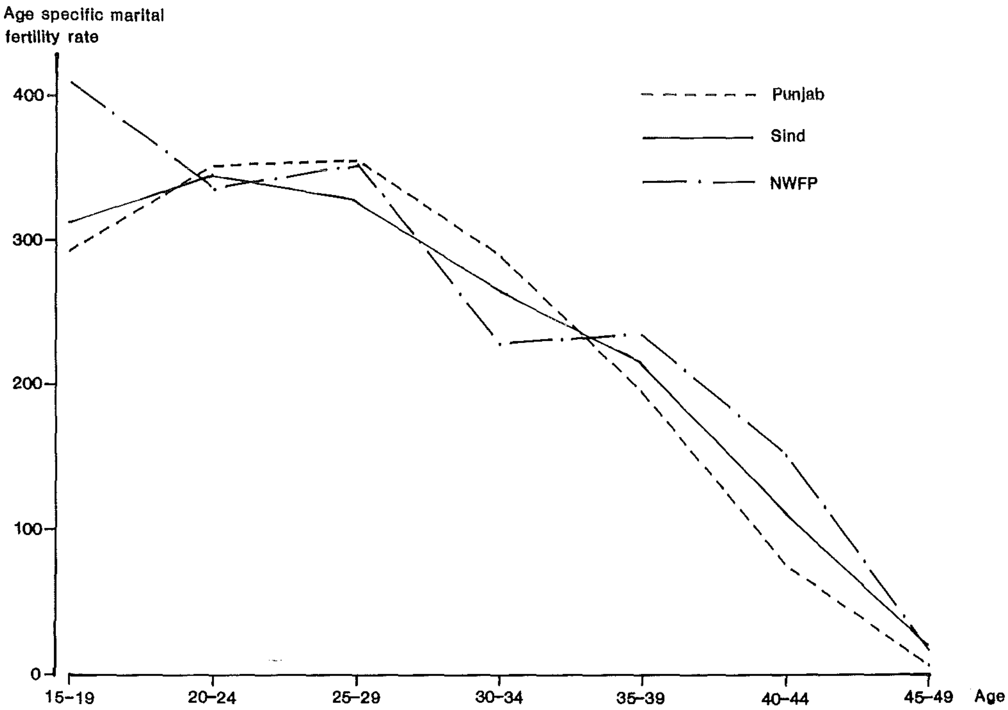



Figure 5.2 Age-specific marital fertility rates by region of residence, 1970–75

possibility of age misreporting, particularly the tendency for teenage mothers to be reported as aged 20 or more. From ages 20–24 upwards, the pattern of fertility is more or less the same for all three regions.

Duration-specific rates since 1960 are shown in table 5.7. At duration 0–4 years, fertility has risen in all regions, no doubt a reflection of increasing age at marriage and consequent attenuation of the effect of adolescent subfecundity. The rate and percentage change at this duration are highest for Sind, where historically age at marriage has been lowest. At longer durations, the rates have generally declined in all regions though there are a few erratic fluctuations, caused by sampling error or defects in the data. The synthetic summary of marital fertility (births in the first 20 years of marriage) indicates a small net decline of 3.3 and 1.6 per cent for Sind and Punjab. For NWFP the percentage decline is larger, at 11.8 per cent. Thus it appears that the decline in total fertility for this region, as shown in table 5.6, stems largely from a decline in marital fertility rather than in age at marriage.

In summary, though fertility has declined in all the provinces, the level and tempo vary somewhat. Sind, with a high proportion of urban population, still has the highest level of fertility, while NWFP, with a small proportion of its population living in urban areas, has the fastest decline and its current fertility level is similar to that of Punjab. The high fertility levels in Sind are probably a reflection of its residential structure, as will be evident from the following section. The consistency of the decline both by age and by duration and the similarity of the changes between the provinces suggest that the changes are real and need further examination.[5]

## Place of residence

Place of residence was classified as urban or rural in accordance with the definition used in the 1972 population census. In this classification, no absolute fixed criterion regarding the size of locality was used. Instead, classification is based on a number of socio-economic characteristics, the most important being the availability of social amenities such as educational facilities, hospitals or health clinics. According to the 1972 population census, nearly 25 per cent of the population

[5] A more detailed examination is undertaken in chapter 6 by John Casterline.

**Table 5.8** Age-specific fertility rates and total fertility rates by place of residence, 1960–75

| Age at birth | Urban | | | | | | | Rural | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1940–45 | 45–50 | 50–55 | 55–60 | 60–65 | 65–70 | 70–75 | 40–45 | 45–50 | 50–55 | 55–60 | 60–65 | 65–70 | 70–75 |
| 15–19 | 181[a] | 255 | 234 | 226 | 216 | 178 | 135 | 155[a] | 226 | 215 | 187 | 185 | 183 | 168 |
| 20–24 | | 311[a] | 308 | 317 | 326 | 343 | 295 | | 297[a] | 278 | 302 | 302 | 316 | 284 |
| 25–29 | | | 323[a] | 298 | 317 | 317 | 328 | | | 291[a] | 313 | 334 | 328 | 307 |
| 30–34 | | | | 280[a] | 278 | 265 | 257 | | | | 290[a] | 269 | 285 | 251 |
| 35–39 | | | | | 178[a] | 185 | 167 | | | | | 218[a] | 192 | 184 |
| 40–44 | | | | | | 79[a] | 59 | | | | | | 119[a] | 65 |
| 45–49 | | | | | | | 6[a] | | | | | | | 12[a] |
| TFR[b] | | | | | | 6.9 | 6.2 | | | | | | 7.2 | 6.4 |

[a]Based on truncated exposure.

[b]For the incomplete periods the TFRs have been obtained by assuming that the missing age-specific rates are the same as corresponding rates for more recent periods.

were classified as living in urban areas. For the survey, the urban areas were over-sampled with a fixed urban–rural ratio of 40:60, resulting in 1881 women being interviewed in urban areas and 3670 in rural areas.

Little is known about residential differentials in fertility. Davis (1951), basing his analysis on child–woman ratios from population census data from 1921–1941, found a negative association between urbanization and fertility in India and Pakistan. Duza (1967), using a similar methodology on 1961 population census data, found a very weak and negative relationship. Karim (1974) found no urban–rural fertility differentials in the NIS data in marital fertility levels. However, and more recently, Sathar (1979), using PFS data, has observed slightly higher marital fertility in urban areas. This suggests that since 1921–41 the nature of the association has changed and that, in present-day Pakistan, urbanization has a positive effect on fertility.

Whether the changing direction of the relationship between urbanization and fertility is due to the different approaches or to a real trend needs to be examined. In the following paragraphs we present further analysis of the PFS data regarding the relationships between fertility and place of residence.

Table 5.8 shows age-specific fertility rates for urban and rural place of residence. It is interesting to note that in the 1970–5 period the urban TFR is lower (6.2) than the rural TFR (6.4). However, the rate of decline in urban and rural fertility is surprising. Contrary to the generally observed pattern where fertility starts declining in urban areas and then gradually spreads to rural areas, fertility in Pakistan has changed at nearly the same pace, both in urban and rural areas, between 1960–5 and 1970–5.

The age-specific patterns of urban and rural fertility are quite different. In the 1970–5 period, for the age group 15–19, urban fertility is lower (135) than rural fertility (168); for the 20–29 age group, the urban rate is higher and after 35, the rural rate is higher. This is consistent with urban–rural age at marriage differentials. Age at marriage is higher in urban areas than in rural areas, with the result that childbearing starts later in urban areas. In both urban and rural areas, the 15–19 age group has registered a systematic decline since 1945–50; in the 20–29 age group fertility has shown a rise and then a decline, and at ages 30 and over, a gradual decline. The decline at ages 15–19 is mainly due to changes in age at marriage, while the decline at older ages is presumably due to some form of fertility control, although the reported contraceptive use rates in Pakistan are only 3 per cent in rural areas and 12 per cent in urban areas.

Marital fertility differentials in urban and rural areas are opposite to those observed for age-specific fertility. Marital fertility rates in 1970–5 are higher in urban areas at ages 15–34 and after that the rates are more or less the same (table 5.9). While rural marital fertility has remained nearly unchanged since 1960–5 for the 15–19 age group, urban fertility has declined gradually. Urban fertility at ages 20–24 is higher than rural fertility, reflecting the later age at marriage in urban areas. The changes in urban and rural marital fertility since 1960–5 suggests a gradual decline. The decline is evenly spread for all ages in urban areas and for age 25 and over in rural areas.

The effect of age at marriage becomes more obvious when one looks at the duration-specific fertility rates by residence (table 5.10). Urban fertility in the first five years of marriage is much higher than rural fertility, though small and similar

Table 5.9 Age-specific marital fertility rates by place of residence, 1960–65

| Age at birth | Urban | | | Rural | | |
|---|---|---|---|---|---|---|
| | 1960–65 | 1965–70 | 1970–75 | 1960–65 | 1965–70 | 1970–75 |
| 15–19 | 367 | 361 | 349 | 300 | 304 | 306 |
| 20–24 | 373 | 402 | 379 | 336 | 367 | 340 |
| 25–29 | 344 | 341 | 359 | 351 | 352 | 334 |
| 30–34 | 299 | 288 | 274 | 282 | 301 | 270 |
| 35–39 | 198[a] | 205 | 184 | 236[a] | 208 | 199 |
| 40–44 | | 89[a] | 66 | | 134[a] | 74 |
| 45–49 | | | 7[a] | | | |

[a]Based on truncated exposure.

Table 5.10 Duration-specific marital fertility rates by place of residence for the period 1970–75 and relative change since 1960–65

| Duration by birth | Urban | | | | Rural | | | |
|---|---|---|---|---|---|---|---|---|
| | 1960–65 | 1965–70 | 1970–75 | Per cent change | 1960–65 | 1965–70 | 1970–75 | Per cent change |
| 0–4 | 337 | 342 | 349 | + 3.6 | 282 | 308 | 289 | + 2.5 |
| 5–9 | 373 | 366 | 346 | – 7.2 | 342 | 361 | 344 | + 0.6 |
| 10–14 | 324 | 334 | 334 | + 3.1 | 322 | 324 | 307 | – 4.7 |
| 15–19 | 279 | 249 | 251 | –10.0 | 276 | 296 | 249 | – 9.8 |
| 20–24 | 175 | 195 | 159 | – 9.1 | 220 | 202 | 177 | –18.6 |
| 25–29 | 150+ | 85 | 76 | –49.3 | 75 | 92 | 68 | – 9.3 |
| Children born in first 20 years since marriage | 6.6 | 6.5 | 6.4 | – 2.6 | 6.1 | 6.5 | 6.5 | – 2.6 |

increases are registered for both sectors since 1960–5. At durations 15 and over, both urban and rural fertility register a decline. The number of births in the first 20 years of marriage is lower in rural areas (6.0) than in urban areas (6.4), though the decline in both areas is of the same magnitude (3.0 per cent). The data suggest that in urban areas, though the age at marriage is higher, the intensity of fertility in the first 20 years of marriage is also higher. This is further examined by controlling for age at marriage in tables 5.11 and 5.12.

A very interesting pattern of ASMFRs by age at marriage is observed. For those marrying at under 15 years of age, urban fertility is generally higher, while for those marrying between 15–17, there is no differential, and for those marrying at ages 18–19 or 20 and over, urban fertility is marginally higher. The duration-specific rates confirm that urban marital fertility tends to be higher than rural fertility, even after controlling for age at marriage (table 5.12). Differences are most pronounced at short durations. By duration 15–19 and 20–24, urban marital fertility tends to be similar to or less than rural fertility. The most plausible explanation for this pattern is the breakdown of traditional birth-spacing mechanisms, such as prolonged lactation, in urban areas.[6] This would account for the distinctly higher urban rate of reproduction in the first 15 years of marriage. At later stages of family formation, urban women are more likely to adopt birth control than rural women and hence urban fertility at longer durations tends to fall more rapidly than in rural areas.

If our hypothesis about the breaking down of traditional restraints on fertility is correct, then one would expect migrants from rural to urban areas to have fertility rates somewhere between

[6] Shah's analysis in chapter 8 confirms that breast-feeding is shorter in urban areas.

Table 5.11 Age-specific marital fertility rates by place of residence and age at first marriage, 1970–75

| At at birth | Urban | | | | Rural | | | |
|---|---|---|---|---|---|---|---|---|
| | Married at <15 | Married at 15–17 | Married at 18–19 | Married at 20+ | Married at <15 | Married at 15–17 | Married at 18–19 | Married at 20+ |
| 15–19 | 368 | 336 | 261 | – | 378 | 290 | (244) | – |
| 20–24 | 369 | 337 | 421 | 378 | 321 | 371 | 331 | 301 |
| 25–29 | 361 | 363 | 344 | 405 | 303 | 341 | 403 | 337 |
| 30–34 | 229 | 297 | 374 | 291 | 239 | 294 | 303 | 297 |
| 35–39 | 196 | (180) | 285 | 190 | 186 | 217 | 228 | 237 |
| 40–44 | 67 | (86) | 52 | 145 | 72 | 74 | (145) | 155 |
| 45–49 | (8) | (7) | – | 35 | (11) | (9) | (13) | (26) |

NOTE: Brackets denote small sample sizes.

Table 5.12 Duration-specific marital fertility rates, by place of residence and age at first marriage, Pakistan 1970–75

| Duration since first marriage | Urban | | | | Rural | | | |
|---|---|---|---|---|---|---|---|---|
| | Married at <15 | Married at 15–17 | Married at 18–19 | Married at 20+ | Married at <15 | Married at 15–17 | Married at 18–19 | Married at 20+ |
| 0–4 | 307 | 340 | 383 | 369 | 272 | 295 | 302 | 294 |
| 5–9 | 370 | 332 | 348 | 342 | 307 | 364 | 382 | 321 |
| 10–14 | 348 | 343 | 354 | 242 | 304 | 329 | 322 | 226 |
| 15–19 | 259 | 259 | 277 | 131 | 255 | 257 | 222 | 228 |
| 20–24 | 193 | (153) | 102 | 87 | 199 | 181 | 146 | 85 |
| 25–29 | 109 | (48) | – | – | 92 | 44 | (47) | – |
| Children born in first 20 years of marriage | 6.4 | 6.4 | 6.8 | 5.4 | 5.7 | 6.2 | 6.1 | 5.3 |

those for women spending all of their lives in rural or urban areas. This is shown to be the case in figure 5.3.

Finally in table 5.13, the age-specific and duration-specific marital fertility rates for metropolitan areas[7] are shown. The ASMFRs for 1970–5 are similar to the total urban sector, suggesting that in recent years, there is not much difference in marital fertility behaviour between the metropolitan and non-metropolitan areas. However, the rates are lower than urban rates for the 1960–5 and 1965–70 periods.

In summary, the results show that the negative relationship between urbanization and fertility holds true, provided one looks at the conventional age-specific fertility rates. However, the relationship reverses once the fertility behaviour within marriage is observed.

[7] Areas with a population of 200 000 or more.

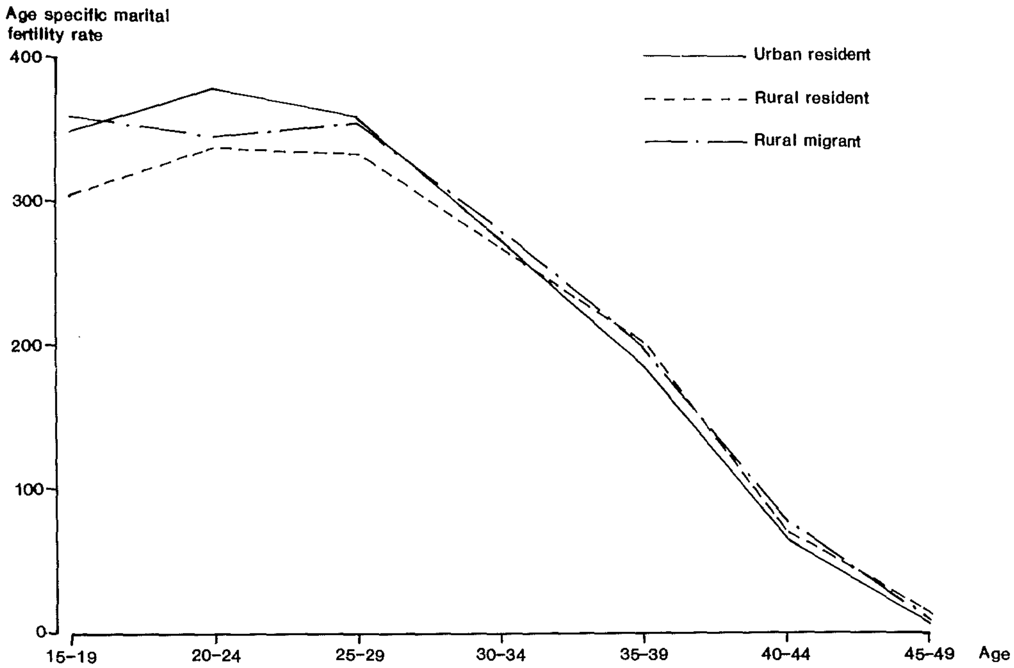



Figure 5.3 Age-specific marital fertility rates by migration status, Pakistan, 1970–75

Table 5.13 Age and duration-specific marital fertility rates for metropolitan areas, 1960–75

| Age at birth | 1960–65 | ASMFRs 1965–70 | 1970–75 | Duration at birth | 1960–65 | DSMFRs 1965–70 | 1970–75 |
|---|---|---|---|---|---|---|---|
| 15–19 | 386 | 356 | 321 | 0–4 | 340 | 362 | 337 |
| 20–24 | 348 | 405 | 388 | 5–9 | 364 | 370 | 359 |
| 25–29 | 352 | 341 | 371 | 10–14 | 325 | 332 | 337 |
| 30–34 | 261 | 275 | 272 | 15–19 | 257 | 259 | 253 |
| 35–39 | 209 | 218 | 167 | 20–24 | (163) | 211 | 152 |
| 40–44 | – | 74 | 51 | 25–29 | – | (61) | 57 |
| 45–49 | – | – | 16 | | | | |

## 5.5 SUMMARY AND CONCLUSIONS

The foregoing analysis has indicated that a modest decline in total fertility has begun in recent years, mainly in response to rising age at marriage. Nearly 9 per cent of the total 12 per cent change between 1965–70 and 1970–5 can be directly attributed to this, a typical Asian pattern of fertility decline. It is generally observed that in Asia, initial decline is caused largely by rising age at marriage, followed by a period in which the effects of nuptiality and fertility are about equal, and finally the contribution of marital fertility becomes more dominant.[8] Whether this overall pattern will be followed for Pakistan is impossible to predict. However, rising aspirations for a better material existence in conjunction with increasing unemployment and economic uncertainty are likely to force the population to follow this path.

While this analysis of fertility trends has augmented the previous evidence at the national level, its main value has been to describe the lesser known trends at the sub-national level. The decline is roughly the same in both urban and rural areas and in the Punjab and the Sind provinces. The fertility levels in Sind, even after the recent decline, are still higher than in the other provinces.

The higher marital fertility in urban areas is most probably the manifestation of the changing fertility norms, a transition from the traditional to the modern urban mentality. However, a negative association of age-specific fertility with urban residence is still valid, because in urban areas the higher marital fertility is compensated by late age at marriage.

In short, fertility continues to be high and an average married Pakistani woman still bears more than seven children during her lifetime, although the Government has had a national population planning programme since 1965. The programme is apparently making no headway in achieving its goals, with the country's population still increasing by about three million babies born each year. If this trend continues, the population of Pakistan will continue to double every 23 years, with very serious consequences for the economic and social development of a nation with limited resources.

[8] For a classical example of such a pattern, see Alam and Cleland 1981.

**Table A1** Age-specific marital fertility rate by exposure status, 1940–75

| Age at birth | Ever-married exposure | | | | | | | Within-marriage exposure | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1940–45 | 45–50 | 50–55 | 55–60 | 60–65 | 65–70 | 70–75 | 1940–45 | 45–50 | 50–55 | 55–60 | 60–65 | 65–70 | 70–75 |
| 15–19 | 245[a] | 306 | 285 | 285 | 303 | 304 | 303 | 235[a] | 309 | 290 | 291 | 309 | 306 | 310 |
| 20–24 | | 316[a] | 307 | 330 | 339 | 371 | 342 | | 343[a] | 319 | 339 | 347 | 381 | 349 |
| 25–29 | | | 301[a] | 321 | 337 | 345 | 336 | | | 325[a] | 339 | 351 | 359 | 348 |
| 30–34 | | | | 297[a] | 285 | 294 | 267 | | | | 323[a] | 304 | 308 | 279 |
| 35–39 | | | | | 224[a] | 199 | 190 | | | | | 243[a] | 215 | 205 |
| 40–44 | | | | | | 113[a] | 78 | | | | | | 125[a] | 86 |
| 45–49 | | | | | | | 11[a] | | | | | | | 11[a] |

[a]Based on truncated exposure.

**Table A2** Duration-specific marital fertility rates, 1940–75

| Duration at birth | Period | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1970–75 | 1965–70 | 1960–65 | 1955–60 | 1950–55 | 1945–50 | 1940–45 |
| 0–4 | 305 | 317 | 296 | 278 | 266 | 269 | 199 |
| 5–9 | 344 | 363 | 351 | 329 | 310 | 334 | |
| 10–14 | 315 | 327 | 323 | 321 | 288 | | |
| 15–19 | 250 | 384 | 277 | 293 | | | |
| 20–24 | 175 | 200 | 218 | | | | |
| 25–29 | 70 | 91 | | | | | |
| 30–34 | 11 | | | | | | |
| 35–39 | | | | | | | |

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# 6 Fertility Differentials

## John Casterline

### 6.1 INTRODUCTION

Research on fertility in recent years has emphasized the 'intermediate' or 'proximate' determinants (Davis and Blake 1956; Bongaarts 1978), that is, those factors by means of which observed social and economic fertility differentials must necessarily be produced. These factors include breastfeeding practices, use of contraception, frequency of intercourse, induced abortion, and patterns of sexual union and dissolution. In part, the heightened interest stems from the availability of superior data for the investigation of these factors, as demographic surveys, including the surveys in the WFS programme, have made available more detailed information on the intermediate variables. It may also be that demographers are devoting more attention to these factors simply because many of the developing societies which have come under scrutiny in recent demographic research are relatively homogeneous on those social and economic variables – for example, educational attainment, employment of males in modern industrial sectors, wage-earning employment of females – which have typically been emphasized in research on fertility differentials in developed societies. Such relative homogeneity characterizes Pakistan.

In the next chapter, Sathar explores in detail the influence of specific intermediate variables on fertility in Pakistan, as well as considering the socio-economic determinants of these variables, drawing on evidence from the Pakistan Fertility Survey (PFS) and other sources.

In the previous chapter we have observed that in recent years, fertility in Pakistan has registered some change and that this change is shared quite evenly by the urban–rural residents and to some extent by various geographic regions. The principal goal of this section is the identification of social and economic differentials in fertility *per se*, and hence the approach taken here might be regarded as a more traditional approach to the study of fertility differentials. Without for a moment denying the value of investigating the intermediate variables, the reasons for examining social and economic differentials in fertility for their own sake deserve stating. Four reasons are posited here:

1 If one of the aims of fertility research is the identification of the causes of fertility variation, such an aim requires examination of those factors which determine variation in the intermediate variables. By this view the intermediate variables should be regarded as just that: variables intermediate between the fundamental causes of fertility differences and fertility itself, that is, mechanisms for the achievement of fertility levels motivated by other social, economic, or cultural considerations. To be sure, a search for 'first causes' is not likely to reach a satisfactory conclusion. Furthermore, in those societies in which little intentional fertility control is exercised, it is clearly not reasonable to view the intermediate variables as consciously wielded mechanisms for implementing fertility aspirations, and consequently in this setting the exact nature of the causality among social and economic variables, intermediate variables, and fertility is more elusive. Even so, the identification of the sources of variation in the intermediate variables, and hence fertility, is an advance towards understanding the determinants of fertility behaviour.
2 Since variation in the intermediate variables, and hence fertility, is related to variation in social and economic variables, future changes in the latter are likely to lead to changes in fertility levels and patterns. Relationships among fertility and other variables observed at one time will themselves change over time.



Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey*: 81–111. Voorburg, Netherlands: International Statistical Institute.

**Table 6.1** Percentage distributions[a] of demographic and socio-economic variables, by woman's age at survey: PFS, 1975 (N = 4952)

| Variable and category | Age | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 | Total |
| *Number of women* | 628 | 843 | 913 | 821 | 624 | 620 | 503 | 4952 |
| *Marital status* | | | | | | | | |
| Currently married | 98.1 | 96.8 | 95.8 | 95.5 | 93.5 | 90.0 | 86.5 | 94.3 |
| Widowed | 0.2 | 0.4 | 1.6 | 1.9 | 4.4 | 8.4 | 10.6 | 3.4 |
| *Age at first marriage* | | | | | | | | |
| Less than age 15 | — | — | 35.2 | 40.1 | 44.8 | 54.2 | 44.6 | 42.9 |
| Median (yrs) | — | — | 15.6 | 15.3 | 14.9 | 14.2 | 14.8 | 15.0 |
| *Age difference between husband and respondent*[b] | | | | | | | | |
| Husband 10+ years older | 39.0 | 32.0 | 28.8 | 30.9 | 32.2 | 36.4 | 34.6 | 32.9 |
| Median (yrs) | 7.4 | 6.8 | 5.9 | 6.1 | 5.4 | 7.0 | 6.0 | 6.4 |
| *Household type*[c] | | | | | | | | |
| Nuclear | 41.5 | 55.4 | 69.3 | 76.9 | 74.0 | 70.8 | 55.7 | 64.1 |
| Extended, laterally | 7.8 | 6.0 | 6.6 | 6.0 | 5.4 | 2.2 | 2.6 | 5.5 |
| Extended, vertically | 31.1 | 22.5 | 12.8 | 8.0 | 12.0 | 15.9 | 27.1 | 17.7 |
| Extended, both | 17.6 | 14.1 | 9.3 | 6.3 | 3.8 | 5.8 | 5.9 | 9.2 |
| *Current residence* | | | | | | | | |
| Metropolitan | 10.7 | 12.8 | 13.6 | 14.2 | 14.5 | 11.6 | 12.2 | 12.9 |
| Other urban | 11.9 | 13.2 | 14.3 | 12.2 | 12.0 | 12.7 | 14.3 | 13.0 |
| Rural | 77.4 | 74.0 | 72.1 | 73.7 | 73.5 | 75.7 | 73.5 | 74.1 |
| *Current and childhood residence* | | | | | | | | |
| Urban, childhood and current | 14.9 | 18.1 | 19.6 | 17.6 | 17.1 | 15.2 | 17.2 | 17.3 |
| Urban migrant | 7.7 | 8.0 | 8.3 | 8.7 | 9.4 | 9.1 | 9.3 | 8.6 |
| Rural migrant | 4.8 | 3.8 | 3.9 | 3.9 | 4.0 | 4.2 | 3.1 | 4.0 |
| Rural, childhood and current | 72.6 | 70.1 | 68.1 | 69.7 | 69.5 | 71.4 | 70.4 | 70.1 |
| *Region* | | | | | | | | |
| Punjab | 60.4 | 63.5 | 68.5 | 68.9 | 68.5 | 69.4 | 72.3 | 67.2 |
| Sind | 24.1 | 24.1 | 22.4 | 19.6 | 20.6 | 21.0 | 20.0 | 21.8 |
| NWFP and Baluchistan | 15.5 | 12.4 | 9.2 | 11.5 | 10.9 | 9.6 | 7.7 | 11.0 |
| *Language of interview* | | | | | | | | |
| Urdu | 8.2 | 9.6 | 8.7 | 8.2 | 9.1 | 8.3 | 10.1 | 8.9 |
| Punjabi | 63.7 | 65.9 | 70.4 | 73.9 | 71.1 | 71.5 | 73.3 | 69.9 |
| Sindhi | 17.5 | 15.7 | 14.6 | 12.6 | 12.2 | 14.1 | 11.2 | 14.1 |
| Pushto and Brohi | 10.6 | 8.9 | 6.3 | 5.2 | 7.6 | 6.1 | 5.4 | 7.1 |
| *Educational attainment* | | | | | | | | |
| No schooling | 88.1 | 85.6 | 87.0 | 89.1 | 90.8 | 93.8 | 94.3 | 89.3 |
| Primary | 9.1 | 8.4 | 7.4 | 7.1 | 5.3 | 4.7 | 3.4 | 6.7 |
| Secondary and higher | 2.7 | 6.0 | 5.6 | 3.8 | 3.9 | 1.5 | 2.3 | 4.0 |

Table 6.1 (*cont*)

| Variable and category | Age | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 | Total |
| *Employment pattern* | | | | | | | | |
| Currently working | 12.9 | 14.8 | 16.2 | 17.5 | 19.3 | 22.2 | 18.1 | 17.1 |
| Worked previously | 4.0 | 3.1 | 4.4 | 5.4 | 3.8 | 3.4 | 5.6 | 4.2 |
| Never worked | 83.1 | 82.1 | 79.4 | 77.1 | 77.0 | 74.5 | 76.3 | 78.7 |
| *Nature of employment since marriage*[d] | | | | | | | | |
| Employed, paid | 4.9 | 6.5 | 6.1 | 8.0 | 8.2 | 10.0 | 11.3 | 7.6 |
| Self-employed | 7.9 | 9.2 | 11.3 | 12.0 | 12.6 | 14.6 | 10.3 | 11.1 |
| Has not worked | 86.8 | 84.3 | 82.5 | 80.0 | 78.5 | 75.0 | 77.8 | 81.0 |
| *Most recent place of work*[e] | | | | | | | | |
| Home | 5.8 | 8.2 | 10.2 | 11.2 | 11.8 | 13.4 | 9.2 | 10.0 |
| Away from home | 7.4 | 7.5 | 7.3 | 8.8 | 9.7 | 11.6 | 12.9 | 9.0 |
| Has not worked since marriage | 86.8 | 84.3 | 82.5 | 80.0 | 78.5 | 75.0 | 77.8 | 81.0 |
| *Husband's education* | | | | | | | | |
| No schooling | 51.6 | 52.3 | 51.0 | 60.0 | 64.0 | 68.6 | 72.1 | 58.8 |
| Primary | 21.3 | 17.8 | 17.6 | 17.0 | 15.9 | 16.7 | 13.7 | 17.3 |
| Secondary and higher | 27.1 | 30.0 | 31.4 | 23.0 | 21.1 | 14.7 | 14.3 | 23.9 |
| *Husband's current occupation* | | | | | | | | |
| Professional and clerical | 6.9 | 7.4 | 10.5 | 7.8 | 8.0 | 5.9 | 6.6 | 7.8 |
| Agricultural | 20.6 | 25.3 | 22.6 | 25.7 | 25.6 | 29.3 | 31.0 | 25.4 |
| Agricultural, not self-employed | 20.3 | 17.8 | 17.1 | 16.0 | 17.8 | 17.1 | 17.7 | 17.6 |
| Skilled worker | 20.4 | 17.4 | 20.5 | 17.8 | 20.0 | 16.1 | 14.8 | 18.3 |
| *Nature of husband's current employment*[f] | | | | | | | | |
| Paid in cash[g] | 41.7 | 37.0 | 36.9 | 32.9 | 31.4 | 26.7 | 25.0 | 33.7 |
| Paid in kind | 10.4 | 11.0 | 10.4 | 10.7 | 11.8 | 10.8 | 10.2 | 10.8 |
| Self-employed | 43.7 | 50.1 | 50.7 | 55.1 | 53.7 | 59.0 | 61.0 | 52.9 |
| *Ever-use contraception* | | | | | | | | |
| Ever-use | 0.6 | 3.9 | 9.9 | 13.7 | 17.4 | 13.9 | 10.8 | 9.9 |
| *Current use of contraception*[h] | | | | | | | | |
| Current use | 0.1 | 2.6 | 7.0 | 8.8 | 12.8 | 11.5 | 7.4 | 7.3 |
| *Children ever-born* | | | | | | | | |
| 0 children | 56.0 | 19.6 | 8.5 | 4.5 | 4.5 | 4.2 | 2.9 | 14.1 |
| 6 or more children | 0.0 | 1.9 | 13.8 | 44.3 | 61.5 | 71.8 | 68.9 | 66.0 |
| Mean (children) | 0.58 | 1.90 | 3.37 | 4.97 | 6.03 | 6.97 | 6.86 | 4.17 |

Table 6.1 (*cont*)

| Variable and category | Age | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 | Total |
| *Children born in five years preceding survey*[i] | | | | | | | | |
| Mean (children) | 1.28 | 1.83 | 1.72 | 1.60 | 1.20 | 0.76 | 0.17 | 1.30 |

[a] Except where otherwise noted, the figures presented are percentages referring to distributions within age groups.
[b] Husband's age is not reported for 547 women (11 per cent of the sample) and hence these women are excluded from the calculation of the percentages and the median.
[c] The household types are defined as follows:
Nuclear: Households with one couple
Extended, laterally: Households with two or more related couples of the same generation
Extended, vertically: Households with two or more related couples, representing at least two generations.
Extended, both: Households with three or more related couples, with at least one generation represented by two or more couples.
[d] Information missing for 14 women.
[e] Information missing for 1 woman.
[f] Women whose husbands' income source is reported as 'Other' are included in the base for the percentages.
[g] Includes women whose husbands are reported as being paid *both* in cash and in kind.
[h] Exposed, fecund women used as base in calculation of percentages.
[i] Means calculated only for women continuously married over the five years.

Furthermore, the intermediate variables may change over time somewhat independently of more fundamental social and economic variables. Despite these qualifications, it is sensible to take into account social and economic differentials in fertility when forecasting future fertility, especially in a society like Pakistan where enormous social and economic changes of a particular kind are likely to occur.

3 Altering present levels of fertility is an explicit goal of many governments and non-governmental organizations. Identifying social and economic sources of fertility differentials provides a basis for policies intended to influence fertility levels – for example, educational and female employment policies – which complement policies directed at the intermediate variables (the latter include family planning programmes).

4 While fertility, along with other demographic variables, is the demographer's main concern, its bearing on other aspects of society is also of interest. For example, family and kin relations, the distribution of wealth (especially land) across generations, and inequality in status and wealth may all be influenced by the level and patterns of fertility. The findings from analysis of social and economic differentials in fertility, in which fertility is treated conventionally as the dependent variable, provide a foundation for research on the role of fertility in the determination of other demographic and non-demographic aspects of a society.

In subsequent paragraphs, we examine the fertility differentials in Pakistan using the 1975 Pakistan Fertility Survey. It is organized as follows. In the next section, the demographic, social and economic variables used in the analysis are presented, with attention given to the meaning and deficiencies of the measures available from the PFS. In this section, characteristics of the sample with respect to these variables are also described. The subsequent two sections contain analysis of two separate measures of fertility: a measure of cumulative fertility (children ever born, to the survey date), and a measure of fertility in the period immediately preceding the survey (births in the five years preceding the survey date). In these two sections, differentials in the fertility measures are examined first in trivariate analysis – ie fertility differentials are examined for each variable separately, controlling merely for duration of marriage – and then in more complicated multivariate analysis. The latter requires analytic approaches which are explicitly described and evaluated. A final section provides a summary of the findings and some concluding remarks.

## 6.2 DEMOGRAPHIC, SOCIAL AND ECONOMIC VARIABLES FROM THE PFS

Measures of most of the demographic, social and economic variables desired in an overview of fertility differentials in a developing society are available from the Pakistan Fertility Survey. As the listing of variables in table 6.1 indicates, these include measures of marital status, age at first marriage, and age differences between spouses; measures of household type, type of place and region of residence, language, and education of the respondent and her husband; and measures of the employment of the respondent and her husband, and the husband's occupation.

The measures are considered in turn, with attention to their meaning and their limitations. Most of the limitations are inherent in measures obtained in a cross-sectional survey. The fertility measures employed by demographers refer almost without exception to experiences over time – one year at a minimum, and often much longer. The measures of other demographic and socio-economic variables, however, are usually static measures referring only to the respondent's circumstances or status at the survey date.

### Nuptiality: marital status, age at first marriage, age difference between spouses

The PFS provides information on the respondent's marital status at the time of the interview and her age at first marriage. For women married at the survey date, the age of their husbands was also obtained, enabling the age difference between the husband and wife to be calculated. (This measure is not available for 11 per cent of the sample, which comprised women who were widowed, divorced or separated from their husbands.) The age difference measure is hindered by the age heaping evident in the respondents' reporting of their husbands' ages.

### Household type

The investigation of the effects of family type and household structure is of great interest in this analysis. An important hypothesis in fertility research is that extended family relationships encourage high fertility and that a decline in these relationships is a facet of the transition from high to low fertility (Lorimer 1954; Davis 1955; Nag 1967). Examining the relationship between family type and fertility with the PFS data is particularly appropriate because household structures of non-nuclear-families are common in Pakistan. With the PFS data, the respondents can be classified by the characteristics of their household of residence at the time of the interview. Note that the structure of their household at the time of the survey may not be the same as the household they lived in during most of their reproductive years. For this reason, in this analysis household type is used as an explanatory variable only in the analysis of recent fertility, but this is not a complete solution because the household structure reported may only be that of final portion of the five years preceding the survey (Rodríguez 1981; Caldwell *et al* 1982).

A further limitation of the information available is that it pertains only to co-residence. The intensity of family relations not reflected in household structure – for example, interaction with kin residing nearby – are not measured (Burch and Gendall 1970; Caldwell *et al* 1982). Finally, the causal relationship between fertility and household structure can be quite complex. For example, empirical evidence suggests that rapid childbearing leads a couple to depart from their parents' or siblings' household and establish their own (ie nuclear) household, as their enlarging family strains the physical space and other resources of the initial household (Burch and Gendall 1970; Caldwell *et al* 1982). In these instances, fertility is the cause rather than the effect of an association between co-residence structure and fertility.

With information which allows classification by household structure at the survey date, there are a variety of classification schemes which may be employed. In this analysis households are classified by a simple scheme which makes use of the number, relationship to the respondent, and generation of the *couples* in the respondent's household (see footnote c to table 6.1). Because the scheme defines extension in terms of couples, some household structures classified by some analysts as extended (for example, the 'stem' family where only one parent is surviving) are here classified as nuclear. This particular classification scheme has been used in analysis of data from other WFS surveys (Kabir 1980; Rodríguez 1981).

### Type of place of residence and region

These measures are relatively unambiguous. To provide a straightforward measure of type of place of residence at the survey date, each location in the sample is classified as metropolitan, (other) urban, or rural. The six largest cities are considered metropolitan: Lahore, Lyallpur, Rawalpindi, Multan, Karachi and Hyderabad. Other places with 5000 or more inhabitants at the 1971 census are classified as 'urban'.[1] In the PFS interview, respondents were asked their type of place of residence during childhood (urban or rural), and this information, cross-classified with residence at the survey date, yields a second measure which is a simple indicator of lifetime migration consisting of four categories (the metropolitan–urban distinction is ignored in the construction of this measure): urban residents, childhood and current; urban migrants (urban at present, rural residence in childhood); and rural residents, childhood and current. There are relatively few rural migrants, and hence this category is dropped from some of the analysis.

Pakistan is divided into four administrative provinces, termed regions in the analysis: Baluchistan, North-West Frontier Province, Punjab and Sind. These four contain, respectively, approximately 5, 15, 60 and 20 per cent of the total population. In the analysis the first two provinces (Baluchistan and North-West Frontier Province) are combined. The Punjab and Sind provinces contain both the richest, densest agricultural areas of Pakistan and the major urban centres (Karachi, Lahore) of Pakistan. As is noted below, the provincial boundaries also mark off the major ethnic/linguistic groups in Pakistan.

In common with most of the variables considered in this chapter, residence and region may be dynamic characteristics not validly represented by the measures available in the PFS. The full extent of geographical migration and its association with the timing of fertility are not known from the information provided here. For example, there is no way of determining if past fertility occurred in a region or type of place different from the present location.

## Language

The PFS data include no direct measure of ethnicity of the respondent, but the language in which the interview was conducted is provided. There are five major languages in Pakistan: Brohi, Pushto, Punjabi, Sindhi and Urdu. Speakers of the first four are concentrated in Baluchistan, North-West Frontier Province, the Punjab and Sind, respectively. (Due to the small number of women in each category Brohi and Pushto-speakers are combined in the analysis.) Speakers of Urdu, which is the official national language, are located all over the country; however, their concentration is greatest in the Punjab and Sind (principally in the urban centers in both provinces), with a majority residing in Sind. The linguistic groups maintain a certain degree of cultural identity; for example, marriages tend to be endogamous within each group. Other contributors to this case study on Pakistan document linguistic group differentials in age at marriage (Karim, chapter 4) and average duration of breastfeeding (Shah, chapter 8), differentials which are not entirely accounted for by the educational attainment and size of place of residence differentials which also distinguish the groups. The apparent demographic distinctiveness of the groups reflects their differing traditions and cultural identities.

## Educational attainment, respondent and husband

These measures refer to levels of schooling completed. Individuals with several years of schooling, who have not completed primary school, for example, are placed in the 'no schooling' category. (A very small percentage of the respondents and their husbands, however, are classified both as 'literate' and as having 'no schooling'). The measures are obtained by straightforward questions in the interview. The respondent's own educational attainment may be more accurately reported than her husband's.

The effect of education on fertility has been a central focus of the study of fertility (see Cochrane 1979), and large differentials almost always emerge. There has recently been renewed interest in the role of mass schooling in fertility decline (Caldwell 1980).

## Employment and occupation

Several characteristics of the respondent's employment are provided by the PFS. The respondent was asked whether she was employed before and after her marriage, and if so, whether she was a paid or self-employed worker, whether she worked at home or away from home, and the occupation in which she was employed. Thus the PFS data contain indicators of a number of essential dimen-

[1]Sathar (1979) cautions that this classification scheme may have been outdated by 1975.

sions of female employment: its timing relative to marriage, its location relative to the home, and its location relative to traditional or modern economic sectors.

The chief omission is more detail on the timing of employment, especially with respect to the respondent's childbearing. As already noted, employment is identified only as occurring prior to or subsequent to marriage or both. For employment since marriage, the other information gathered (work status, location of work, occupation) refers only to the most recent employment. Because the relationship between female employment and fertility is complex and probably includes reciprocal effects, most analysts stress the importance of specifying as precisely as possible the relative timing of fertility and employment events (Stycos and Weller 1967; Mason 1973; McCabe and Rosenzweig 1976; Cramer 1980). However, in Pakistan, where most women report no employment, paid or otherwise, the most fundamental distinction is between having worked and not having worked. In the cross-national analysis of WFS data reported by Rodríguez and Cleland (1981), female employment, as measured by these simple indicators , proved to be one of the more powerful predictors of recent fertility among the socio-economic variables considered.

The respondent was also asked about her husband's employment: his type of employment (whether self-employed, paid in cash or paid in kind) and his occupation. While these measures refer to his current or most recent occupation, we may assume that they accurately characterize his work experience during most, if not all, of the marriage.

**Table 6.2** Cross-tabulation of nature of husband's employment by husband's occupation

| Husband's occupation | Nature of husband's employment[a] | | |
|---|---|---|---|
| | Paid in cash[b] | Paid in kind | Self-employed |
| Professional | 9.3 | 0.4 | 1.6 |
| N | 156 | 2 | 42 |
| Clerical | 10.9 | 0.4 | 0.1 |
| N | 181 | 2 | 3 |
| Sales | 2.2 | 0.0 | 18.7 |
| N | 36 | 0 | 490 |
| Agricultural | 0.2 | 0.2 | 47.8 |
| N | 3 | 1 | 1253 |
| Agricultural, not self-employed[c] | 14.2 | 94.3 | 5.0 |
| N | 238 | 502 | 132 |
| Service | 18.2 | 0.0 | 2.6 |
| N | 303 | 0 | 67 |
| Skilled | 23.8 | 1.8 | 19.1 |
| N | 397 | 10 | 501 |
| Unskilled | 21.3 | 2.7 | 5.0 |
| N | 355 | 14 | 132 |
| Total | 100.0 | 100.0 | 100.0 |
| N | 1668 | 532 | 2621 |

[a] Excludes category labelled 'others'. 131 husbands are reported in this category; all are reported as falling into occupational category 'unskilled worker'.
[b] Includes women whose husbands are reported as paid both in cash and in kind.
[c] Although the category as labelled is meant to exclude self-employed agricultural workers, 15.2 per cent (132 cases) of the husbands in this category are reported as self-employed. These are thought to be landless agricultural workers who are more naturally classified as self-employed rather than as salaried or wage workers.

In this analysis, we consider independent effects of occupation and type of employment. A subset of the husbands' occupations is selected for consideration, containing over two-thirds of the husbands and ranging from the most traditional to the least traditional occupations. The type of employment measure (nature of husband's employment) merely classifies the husbands by the type or source of income received. The cross-tabulation of this measure with a full listing of occupational categories presented in table 6.2 provides some indication of the meaning of each income-type category. Almost all husbands who are 'paid in kind' are 'agricultural workers, not self-employed'; most of these men are probably tenant farmers. Nearly half of the husbands who are 'self-employed' are classified as 'agricultural'; these men are land-owning farmers. Substantial proportions of the 'self-employed' are listed in the 'sales' and 'skilled workers' occupational categories (approximately 20 per cent in each category). These categories no doubt contain substantial diversity, but it is reasonable to assume that many of these workers are employed in modern sectors of the economy. The husbands who are 'paid in cash' similarly show an occupational distribution which suggests location in both traditional and modern economic sectors. Nearly 60 per cent of the men 'paid in cash' are found in four occupational categories – professional, clerical, service, and skilled – which, when evaluated in combination with their cash payment, implies that they are for the most part situated in the modern sectors. Another 35 per cent, however, are reported as agricultural and unskilled workers. It is obviously difficult, therefore, to generalize about the meaning of the employment categories. To simplify interpretation of the results, it will be assumed that 'self-employed' and 'paid in kind' include men largely in more traditional employment settings and that 'paid in cash' comprises men largely in the more modern sectors of the economy.

As stressed throughout the discussion, all the measures suffer from a common flaw: they are static measures of variables which are changeable. Most of these variables are persistent enough over time, however, so that it is reasonable to assume little change over the few years immediately preceding the interview. Hence the use of some of these variables in the analysis of fertility in the five-year period preceding the survey is probably on surer footing that the use of these variables in the analysis of cumulative fertility.

## Characteristics of the PFS sample

The distributions of the variables shown in table 6.1 indicate that the PFS sample is strikingly homogeneous with respect to social and economic measures which are indicators of Western modernization but somewhat heterogeneous with respect to a number of other social and demographic variables. The level of educational attainment is quite low, with approximately 90 per cent of the total sample classified as having 'no schooling', a level which drops only slightly among the younger cohorts of women in this ever-married sample. Seventy-five per cent or more of the women in every cohort report never having worked, and, among those women who have worked since marriage, less than half have been in paid employment. Over two-thirds of the women in every cohort have always been rural residents, according to the measure used here. This is a very high level, but the measure does vary more across the sample than the education and employment measures. The husbands of the respondents show more diversity on these measures, although over half of the husband's fall in the 'no schooling' category and large proportions of the husbands of most of the cohorts of women appear to work in the traditional economic sectors. The differentials across cohorts in all of the education and employment measures suggest secular trends towards more schooling and more involvement in the modern economy, a pattern of great significance to this analysis: the more educated, less traditional women (and couples) are a small minority of the sample, but there is evidence that their socio-economic characteristics will become increasingly common in Pakistani society. For this reason, the extent to which the fertility behaviour of this minority differs from the fertility of the remainder of the sample is a central issue in the analysis which follows in the next two sections.

The sample is homogeneous in the characteristics often emphasized in socio-economic theories of fertility behaviour but at the same time the women differ in other fundamental characteristics. As already noted, the women vary by type of place of residence and, additionally, by region of residence. Most of the interviews were conducted in Punjabi, but almost one-third were in other languages, an indication of the ethnic heterogeneity of the sample. The women marry at young ages and within a brief range of years (the latter fact is not evident from table 1), but the age difference between wives and husbands has a much wider range than in most societies. Finally, in most of the cohorts one-quarter to one-half of the women reside in non-nuclear households, an extremely high proportion compared to other societies where WFS surveys have been conducted (Kabir 1980).

The sample can be characterized, then, as relatively homogeneous and traditional with respect to variables pertaining to modernization and economic development, with indications that this homogeneity is declining over time, and as relatively heterogeneous with respect to several social and demographic variables which are important in the traditional social setting. It is also worth mentioning, before proceeding to the analysis of fertility variation, that the sample shows substantial variation in the fertility measures examined in the next two sections. A comparison of the fertility variation observed in the PFS with that in 14 other countries with completed WFS surveys, using the coefficient of variation as a measure of variation (results not presented here), indicates that the variation in fertility in Pakistan is comparable to or exceeds that observed in most of the other countries. This illustrates a point made recently by a number of demographers that variation in fertility within and between traditional societies appears to be no less than that within and between modern, developed societies.

## 6.3 ANALYSIS OF CHILDREN EVER BORN

The mean numbers of children ever born are presented in table 6.3. In this table the respondents are cross-classified by duration married and most of the social and economic variables described in the previous section. The means are adjusted for age at marriage differences between cells within each panel, so that two fundamental demographic sources of variation – duration of marriage and age at first marriage – are controlled. (The age at marriage adjustment in fact makes almost no difference in almost all of the comparisons; this follows from the small variation in age at marriage, noted in the previous section.)

Few noteworthy differentials are apparent in this table. Age at first marriage has anticipated effects on the cumulated number of children ever born: both early and late marriage are disadvantageous for childbearing, although in the early durations those who marry late show the highest fertility (a common finding in WFS surveys) and in later durations (eg 25–29 years of marriage) the women who married early show high fertility relative to other strata. There is indication of a similar curvilinear relationship between the age difference and cumulative fertility, although the disadvantage associated with a large age difference (and a correspondingly older age of husband for any given age of the respondent) appears to be small.

When women are classified by their present residence, those residing in metropolitan and urban areas show higher fertility than rural women, at all durations, with the fertility of metropolitan residents somewhat higher than urban residents in the early durations, and lower in the later durations of marriage. When childhood residence is taken into account in the 'childhood and present residence' variable, it is evident that higher fertility characterizes women who have resided in urban areas since childhood. A depressing effect on fertility of urban residence is not evident, as might have been expected; in fact, the opposite seems to be the case. The relationship observed here is consistent with the findings of higher urban fertility or no fertility differential by size of place of residence in previous studies of Pakistan fertility (eg Duza, 1967).

The sets of means for region and language show no discernible differentials of any magnitude.

A negative relationship between educational attainment and cumulative fertility is evident. The negative effect appears most marked for women who have completed secondary schooling or higher, but these women are a small proportion of the sample and the cell sizes for this strata are tiny. The means for the categories of husband's education suggest a similar negative relationship, but the relationship is far from monotonic and, indeed, there is some indication of higher fertility among women whose husbands have primary schooling than among those whose husbands have no schooling.

Simple patterns also fail to emerge with respect to the two female employment measures considered here. Women who report having worked previously but are not working at the time of the survey appear to have the highest fertility up to duration 20 years and thereafter the lowest cumulative fertility. At the later durations, women working at the time of the survey show the highest fertility. The 'nature of employment since marriage' means do not show any overall patterns.

Table 6.3 Mean number of children ever born by duration married and selected demographic and socio-economic variables, adjusted for age at marriage[a]

| Variable and category | Duration < 5 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 | 30+ | N |
|---|---|---|---|---|---|---|---|---|
| *Number of women* | 968 | 897 | 808 | 720 | 526 | 619 | 414 | 4952 |
| *Age at marriage*[b] | | | | | | | | |
| Less than 15 years | 0.65 | 2.35 | 3.83 | 5.32 | 6.25 | 7.08 | 7.05 | (2150) |
| 15–17 years | 0.58 | 2.54 | 4.28 | 5.57 | 6.99 | 6.89 | 7.46 | (740) |
| 18–19 years | 0.66 | 2.61 | 4.46 | 5.97 | 6.74 | 6.00 | 7.42 | (556) |
| 20 or more years | 0.69 | 2.31 | 3.67 | 5.46 | 5.74 | 6.63 | – | (491) |
| *Age difference between husband and respondent* | | | | | | | | |
| Less than 4 years | 0.59 | 2.34 | 4.05 | 5.39 | 6.28 | 6.94 | 7.09 | (1127) |
| 4–6 years | 0.65 | 2.49 | 4.12 | 5.63 | 6.68 | 7.33 | 7.40 | (1114) |
| 7–9 years | 0.74 | 2.54 | 4.10 | 6.03 | 7.14 | 7.17 | 8.53 | (714) |
| 10–14 years | 0.64 | 2.64 | 4.42 | 5.22 | 6.96 | 7.40 | 7.83 | (797) |
| 15 years or more | 0.71 | 2.42 | 4.03 | 5.55 | 7.05 | 7.17 | 6.74 | (645) |
| *Current residence* | | | | | | | | |
| Metropolitan | 0.75 | 2.70 | 4.42 | 5.64 | 6.63 | 6.90 | 6.92 | (640) |
| Other urban | 0.64 | 2.71 | 4.04 | 6.09 | 6.57 | 7.33 | 7.52 | (643) |
| Rural | 0.59 | 2.36 | 3.99 | 5.30 | 6.48 | 6.03 | 7.16 | (3669) |
| *Current and childhood residence* | | | | | | | | |
| Urban, childhood and current | 0.73 | 2.82 | 4.16 | 5.98 | 6.65 | 7.25 | 7.33 | (857) |
| Urban migrant | 0.60 | 2.39 | 4.34 | 5.67 | 6.52 | 6.92 | 7.10 | (425) |
| Rural migrant | 0.82 | 2.33 | 4.18 | 5.29 | 7.01 | 6.70 | 6.34 | (198) |
| Rural, childhood and current | 0.58 | 2.36 | 3.97 | 5.30 | 6.45 | 6.83 | 7.20 | (3473) |
| *Region* | | | | | | | | |
| Punjab | 0.60 | 2.43 | 4.11 | 5.52 | 6.63 | 6.77 | 7.16 | (3327) |
| Sind | 0.60 | 2.38 | 3.89 | 5.19 | 6.27 | 6.94 | 7.05 | (1080) |
| NWFP and Baluchistan | 0.75 | 2.71 | 4.16 | 5.42 | 6.17 | 7.93 | 7.35 | (545) |
| *Language of interview* | | | | | | | | |
| Urdu | 0.71 | 2.68 | 4.15 | 5.80 | 6.81 | 7.00 | 7.97 | (438) |
| Punjabi | 0.60 | 2.43 | 4.07 | 5.44 | 6.59 | 6.70 | 7.09 | (3462) |
| Sindhi | 0.60 | 2.28 | 3.79 | 5.11 | 5.94 | 7.17 | 7.08 | (699) |
| Pushto and Brohi | 0.71 | 2.65 | 4.43 | 5.74 | 6.43 | 8.60 | 7.06 | (354) |
| *Educational attainment* | | | | | | | | |
| No schooling | 0.60 | 2.44 | 4.07 | 5.46 | 6.57 | 6.91 | 7.22 | (4424) |
| Primary | 0.61 | 2.43 | 4.24 | 5.23 | 6.07 | 6.95 | 6.49 | (333) |
| Secondary and higher | 0.82 | 2.62 | 3.29 | 5.31 | 5.70 | 6.08 | 6.26 | (196) |
| *Employment pattern* | | | | | | | | |
| Currently working | 0.62 | 2.33 | 3.81 | 5.42 | 6.53 | 6.94 | 7.87 | (846) |
| Worked previously | 0.55 | 2.52 | 4.38 | 5.86 | 6.38 | 6.61 | 6.66 | (209) |
| Never worked | 0.62 | 2.46 | 4.10 | 5.42 | 6.52 | 6.90 | 7.05 | (3898) |

Table 6.3 (*cont*)

| Variable and category | Duration <5 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 | 30+ | N |
|---|---|---|---|---|---|---|---|---|
| *Nature of employment since marriage* | | | | | | | | |
| Employed, paid | 0.66 | 2.25 | 3.85 | 5.44 | 6.15 | 7.01 | 7.57 | (377) |
| Self-employed | 0.60 | 2.38 | 3.93 | 5.38 | 6.56 | 6.92 | 7.64 | (550) |
| Has not worked | 0.62 | 2.47 | 4.11 | 5.46 | 6.53 | 6.89 | 7.05 | (4012) |
| *Husband's education* | | | | | | | | |
| No schooling | 0.63 | 2.45 | 4.10 | 5.56 | 6.42 | 6.87 | 7.27 | (2910) |
| Primary | 0.59 | 2.34 | 4.15 | 5.38 | 6.92 | 6.92 | 7.12 | (856) |
| Secondary and higher | 0.61 | 2.50 | 3.85 | 5.15 | 6.54 | 7.07 | 6.79 | (1187) |
| *Husband's current occupation*[b] | | | | | | | | |
| Professional and clerical | 0.60 | 2.49 | 3.54 | 5.45 | 7.17 | 6.12 | 7.30 | (386) |
| Agricultural | 0.65 | 2.46 | 4.25 | 5.04 | 6.68 | 6.66 | 6.96 | (1257) |
| Agricultural, not self-employed | 0.61 | 2.36 | 3.94 | 5.49 | 6.30 | 7.31 | 7.69 | (872) |
| Skilled worker | 0.65 | 2.51 | 4.23 | 5.56 | 6.45 | 6.91 | 7.65 | (908) |
| *Nature of husband's current employment* | | | | | | | | |
| Paid in cash[c] | 0.60 | 2.32 | 3.90 | 5.49 | 6.24 | 7.06 | 6.89 | (1668) |
| Paid in kind | 0.66 | 2.57 | 3.98 | 5.37 | 6.82 | 7.17 | 8.01 | (532) |
| Self-employed | 0.63 | 2.53 | 4.17 | 5.44 | 6.57 | 6.79 | 7.19 | (2621) |

[a] Adjusted by multiple classification analysis (MCA). The distribution of means by duration cross-classified with the specific socio-economic variables are adjusted in the MCA.
[b] Unadjusted means.
[c] Includes women whose husbands are reported as being paid both in cash and in kind.

Finally, the husband's occupation and employment measures show equally confusing patterns. No consistent differentials emerge for either variable.

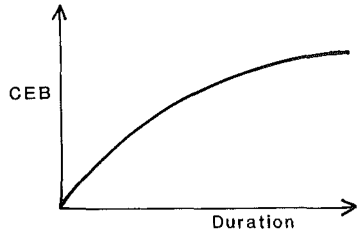
Taken altogether, the results in table 6.2 give little indication that cumulative fertility in Pakistan is significantly related to the variables under consideration here, with four exceptions: age at first marriage and perhaps also the age difference between spouses show some effects; level of educational attainment appears to be negatively related to cumulative fertility, but a very small proportion of the women have attained the levels which are associated with fertility reduction; and urban residence, especially if it has characterized both childhood and the survey date, is positively related to cumulative fertility levels. All of the differentials just noted are small, in most instances amounting to half a child or less in completed fertility levels.

The existence of these differentials, although small, justifies a more thorough multivariate analysis. Many of the variables which show no relationship with cumulative fertility are related to residence, which itself is associated with fertility. Type of employment and occupation, for example, are associated with size of place of residence. Hence, in order to evaluate the bearing of each of these variables on cumulative fertility, it is desirable to control for the effects of the other related variables, that is, to obtain a *net* effect with confounding influences eliminated to the extent possible. To implement such a multivariate approach, we require a model of how the variables are presumed to jointly determine cumulative fertility.

In formulating a multivariate model, it is immediately apparent that first consideration must be given to the role of marriage duration which is doubtlessly a principal determinant of cumulative fertility and which also is associated with the socio-economic variables which are of greater interest in this analysis. The mean children ever born to women classified by duration of marriage show a duration pattern of fertility which corresponds to the experience of no single marriage cohort. If fertility has been essentially unchanging, however, the duration pattern of a cross-section may closely resemble the actual experience of marriage cohorts. There is evidence, provided by other chapters in this case study (see especially, Booth and Shah, chapter 2), that marital fertility has been for the most part unchanging in Pakistan across recent cohorts.[2]

If it is assumed that the duration pattern from the cross-section represents essentially a profile of cohort fertility, the task is to model the duration pattern in such a manner that differentials across subgroups in the characteristics of the profile can be estimated straightforwardly.[3]

Consider a graphic representation of the duration pattern:




There are several functional forms which can reproduce a curve of this shape. One which proves to be convenient to adapt to the analysis is as follows:

$$\text{CEB} = \beta\,\text{Duration} + \gamma\,\text{Duration}^2 \qquad \text{(a)}$$

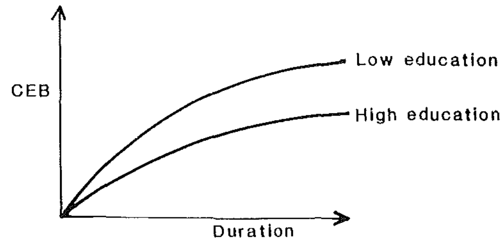
This equation would seem capable of capturing the essential features of the duration pattern: it must start at zero (ie when Duration = 0, CEB = 0, since in Pakistan there are virtually no premarital births); it initially rises relatively rapidly and then subsequently at a slower rate. The latter feature can be reproduced if $\beta$ is positive, $\gamma$ is negative, and $\beta$ is larger in absolute size than $\gamma$.[4]

Differentiating (a) yields useful interpretations of $\beta$ and $\gamma$:

$$\frac{\delta\,\text{CEB}}{\delta\,\text{Duration}} = \beta + 2\,\gamma\,\text{Duration}$$

$\beta$ may be interpreted as the rate of fertility change, or fertility tempo, at Duration = 0; that is, an initial fertility tempo. Since $\gamma$ determines the decline in this tempo at durations greater than zero, $-\gamma$ may be interpreted as the rate of decline in fertility tempo. That is, one parameter refers to initial rates of childbearing and the other to curtailment of this initial rate, a succinct summarization of the duration pattern which, as will be illustrated below, yields substantive interpretations which are both straightforward and meaningful.

To investigate fertility differentials, other variables of interest must be introduced into this model. A second graphic representation makes plain the rationale for the approach adopted. Suppose two educational strata are being compared:




The important feature of this diagram is that the educational differentials are not equal at every duration of marriage. The differential must be zero at duration zero years, and from that starting point the differential changes in magnitude (in this figure increasing in size) over the duration of marriage. That is, educational attainment and

[2] Rising age at first marriage (see Karim, chapter 4) has stimulated some changes, but this trend need not weaken analysis of cumulative fertility in which no change in duration patterns across cohorts is assumed if the analysis incorporates appropriate adjustments for changes in age at marriage. This matter is discussed further below.

[3] The following few pages rely heavily on Little 1977, and also draw on Hermalin and Mason 1980.

[4] A further feature of the duration pattern is an eventual slope of 1.0 at the later durations, a feature this equation will not reproduce. In fact, this equation will yield a predicted decline in CEB after a certain duration. It is expected, however, that fitting of (a) to the PFS data will not yield a predicted decline until very long durations of marriage, probably past the longest durations represented in the sample.

duration of marriage must be modelled as affecting cumulative fertility interactively, not additively.

If Xk are a set of independent variables of interest, it seems sensible by this reasoning to add them to (a) in the following fashion:

$$\text{CEB} = \sum_k \beta_k X_k \cdot \text{Duration} + \sum_k \gamma_k X_k \cdot \text{Duration}^2 \quad \text{(b)}$$

The $\beta_k$ and $\gamma_k$ now refer to initial fertility tempo and rate of decline in fertility tempo *with respect to the separate Xk.*[5] Equation (b) provides a satisfactory model for analysis of differentials in cumulative fertility. The implicit model expresses a simple notion of the generation of fertility differentials: since all women start childbearing with no children, observed differentials at any given duration of marriage *must* be due to differences in the *rate* of childbearing, that is, differences in *fertility tempo*.

The parameters of (b) can be estimated by least squares techniques. To ease estimation, both sides of (b) are divided by Duration, so that the dependent variable in the least squares regression is CEB/Duration:

$$\text{CEB/D} = \sum_k \beta_k Xk + \sum_k \gamma_k Xk \cdot \text{Duration} + \epsilon \quad \text{(c)}$$

In effect, the rate of childbearing becomes the object of the analysis, an approach which is consonant with the view just proposed that cumulative fertility differentials must essentially be the result of differences in the rate of childbearing.[6]

Equation (c) is the basis for our multivariate investigation of differentials in cumulative fertility. Two characteristics of the approach adopted should be explicitly noted. (1) One equation is fitted to the information for all women in the sample. In so doing, it is assumed that whatever fertility change has occurred across marriage cohorts is due to *changes in the levels of variables included in the model.* Fertility change is assumed to be due to *composition* changes with respect to variables included in the model and not due to changing *relationships* between the predictors and fertility or to composition changes in predictors not included in the model. The most evident source of recent fertility change in Pakistan is rising age at first marriage, and age at marriage will be included in all the equations estimated.[7] (2) The multivariate analysis will examine exclusively net effects of each variable on the duration pattern of fertility. No effort will be made to model relationships among the independent variables themselves. To the extent that some of these variables may be properly regarded as causally prior to other variables in the equations, the

[5] The $\beta$ and $\gamma$ are not estimated independently of each other; they are both obtained from the same fitting. Note also that the 'true' duration pattern, portrayed in the two text diagrams, approaches an asymptote which represents the level of completed cohort fertility. Taken altogether these two considerations mean that large $\beta$ values imply large $\gamma$ values, and vice versa. That is, subgroups which show faster initial fertility tempo will also be inclined to show faster rate of tempo decline, everything else being equal, simply because of the functional form chosen to represent these two aspects of the duration pattern and the method chosen to estimate the two. One feature which is *not* always equal, however, is the level of completed fertility, obviously a critical feature of the duration pattern. The estimates of $\beta$ and $\gamma$ presented below need to be evaluated together and with the implied fertility differentials at each duration kept in mind; it is the shape *and level* of the overall duration pattern which is of ultimate interest, not the two parameters alone.

[6] The disturbance in the regression equation is assumed to possess all desirable qualities (zero mean, normality) except homoskedasticity: when CEB/D is the dependent variable, the variance of the disturbance is assumed to be inversely proportional to Duration, and therefore in the least squares estimation the cases are weighted directly proportional to Duration.

Investigation of the appropriateness of this assumption indicates that it is well satisfied by the PFS data. For example, consider the following relationship of the variance of children ever born and duration:

$$\text{(i) Var CEB} = \text{aDur}^{\text{b}}$$

Taking natural logarithms:

$$\text{(ii) LnVarCEB} = \text{Ln(a)} + \text{b(Ln Dur)}$$

The assumption that the variance of CEB/D is inversely proportional to duration corresponds to an assumption that the variance of CEB is directly proportional to duration (Little 1977), which corresponds to $b = 1.0$ in equations (i) and (ii). Estimation of (ii) by ordinary least squares with the PFS data yields $b = 1.24$. A plot of LnVarCEB against LnDur similarly affirms the reasonableness of the assumption.

[7] The assumption of no changes across cohorts in the relationships between the predictors and fertility is fundamental to this analytic approach, and its violation means that the estimated coefficients are biased representations of a cohort duration-pattern of fertility. Suppose, for example, that better educated respondents in the younger cohorts bear children more rapidly initially and, in later durations, curtail their fertility more drastically than better educated respondents in the older cohorts. In this circumstance, the duration profile we estimate probably rises too slowly and levels off too slowly for the younger cohorts and rises too sharply for the older cohorts. The extent of those possible biases are not easily assessed.

Table 6.4 Metric partial regression coefficients:[a] children ever born equations (CEB/D)[b]

| Variable | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Intercept | 337.2 | 176.6 | 35.40 | 9.592 |
| Duration | −4.917* | −1.054 | −1.817 | −0.603 |
| Age at marriage | 0.486 | 35.19* | 34.04* | 34.15* |
| Age marriage* duration | 0.206* | 0.059 | 0.077 | 0.036 |
| Age at marriage$^2$ | | −0.866* | −0.834* | −0.813* |
| Age marriage$^2$* duration | | −0.0075 | −0.008 | −0.007 |
| Age difference | | | −0.233 | 4.069* |
| Age difference* duration | | | 0.051 | −0.075 |
| Age difference$^2$ | | | | −0.130* |
| Age difference$^2$* duration | | | | 0.003 |
| Unadjusted $R^2$ | 0.020 | 0.029 | 0.032 | 0.037 |
| N[c] | 4121 | 4121 | 3706 | 3706 |

* Denotes coefficient more than two times larger than its standard error.
[a] Metric coefficients multiplied by $1 \times 10^3$.
[b] Regressions with children ever born divided by duration married (CEB/D) as the dependent variable. In the regression, the cases are weighted directly proportional to the duration married. See text for further explanation.
[c] All of the regressions exclude the following women:
Women over age 44 at the time of the survey.
Women married 30 years or more at the time of the survey.
Women married 12 months or less at the time of the survey.
Regressions (3) and (4) also exclude women for whom the age of their husbands is not reported.

estimated net effects of the former will be biased estimates of their full effect on cumulative fertility. Such bias might apply to estimated education effects, for example, since education is usually viewed as causally prior to employment and age at marriage, among other variables.

Equation (c) is estimated using different combinations of socio-economic and demographic variables, and the results are presented in tables 6.4 and 6.5. When examining these results, the reader should keep in mind that the coefficients for variables entered without interaction with Duration ($\beta$ in table 6.5) refer to initial fertility tempo with respect to those variables, and the coefficients for the interactions of variables with Duration ($\gamma$ in table 6.5) refer to (the negative of) the rate of fertility tempo decline.

In equations (1) to (4) of table 6.4, the effects of basic demographic variables on cumulative fertility are examined. As anticipated, the effects of both age at marriage and the age difference are curvilinear. The estimated coefficients indicate that the initial fertility tempo rises with age at marriage until about age 19 (equation (2)) and that the effect of the age difference on initial fertility tempo is positive up to approximately 16 years (equation (4)). It is reassuring that the estimates in equations (1) to (4) suggest the general form of the relationships between age at marriage and cumulative fertility and between the age difference and cumulative fertility expected on the basis of the means in table 6.1 and, in the case of age at marriage, on the basis of the bulk of past demographic research.

Equations (2) and (4) provide basic models of the demographic determinants of cumulative fertility. To these equations the socio-economic variables are added, following the functional form of equation (c). In these more complicated equations, the basic demographic variables – duration, age at marriage, and the age difference – are treated as continuous variables, as in equations (1) to (4). The socio-economic variables are treated as categorical in the regressions, using the categories shown in tables 6.1 and 6.3. The categories are represented in the equations as dummy variables, with one category omitted; hence the coefficients for these categorical variables represent *contrasts* with the omitted categories. For example, the coefficients for primary education in table 6.5 should be interpreted relative to the no schooling category, which implicitly has a coefficient of zero.

In the course of the analysis, a large number of

Table 6.5 Metric partial regression coefficients:[a] children ever born equations (CEB/D)[b]

| Variable | (5) | | (6) | | (7) | | (8) | |
|---|---|---|---|---|---|---|---|---|
| | β | γ | β | γ | β | γ | β | γ |
| Intercept | 29.3 | – | 27.1 | – | 3.66 | – | 2.31 | – |
| Duration | −1.66 | – | −1.59 | – | −0.18 | – | −1.29 | – |
| Age at marriage | 34.65* | 0.06 | 33.34* | 0.05 | 37.28* | −0.12 | 33.43* | 0.04 |
| Age at marriage$^2$ | −0.85* | −0.01 | −0.80* | −0.01 | −0.93* | −0.00 | −0.81* | −0.01 |
| Age difference | – | – | 3.70* | −0.06 | – | – | 3.73* | −0.06 |
| Age difference$^2$ | – | – | −0.12* | 0.00 | – | – | −0.12* | 0.00 |
| Metropolitan | 84.02* | −3.21* | 72.00* | −2.81* | – | – | – | – |
| Other urban | 59.68* | −1.65 | 54.19* | −1.45 | – | – | – | – |
| Urban, childhood and current | – | – | – | – | 85.39* | −2.79* | 77.41* | −2.63* |
| Urban migrant | – | – | – | – | 58.10* | −2.23* | 50.31* | −1.82 |
| Rural migrant | – | – | – | – | 56.53 | −2.98 | 57.16 | −3.11 |
| Primary education | 16.17 | −1.08 | 17.12 | −1.42 | 9.72 | −0.88 | 10.49 | −1.19 |
| Secondary education | 36.07 | −4.08 | 23.61 | −3.73 | 30.61 | −4.14 | 15.74 | −3.58 |
| Primary education, husband | −8.33 | 0.38 | −7.85 | 0.32 | −8.53 | 0.37 | −8.04 | 0.32 |
| Secondary education, husband | −35.20* | 1.88* | −24.79 | 1.39 | −37.50* | 2.03* | −27.02 | 1.55 |
| Husband paid in cash | −44.62* | 1.96* | −43.05* | 2.10* | −42.76* | 1.84* | −41.93* | 2.03* |
| Husband paid in kind | −2.09 | 0.51 | −7.40 | 0.80 | 0.11 | 0.42 | −5.75 | 0.74 |
| $R^2$ | 0.043 | | 0.048 | | 0.045 | | 0.049 | |
| N[c] | 4120 | | 3706 | | 4120 | | 3706 | |

* Denotes coefficient more than two times larger than its standard error.
NOTE: See footnotes to table 6.4.

equations incorporating socio-economic variables were estimated. Several of the variables which showed no apparent association with cumulative fertility in table 6.3 also failed to emerge as significant predictors in this regression analysis: region, language, employment pattern, and husband's occupation. The use of additional controls, and the more efficient estimation provided by this analytic approach, disclosed no significant relationship between these variables and cumulative fertility.

Those variables which show some explanatory power are incorporated in the equations presented in table 6.5. Residence persists as the dominant socio-economic variable, even with controls for education (of the respondent and her husband) and for the nature of the husband's employment (paid in cash, paid in kind, or self-employed). Equations (5) and (6) show the effects of residence at the survey date. Coefficients for metropolitan centre and (other) urban areas are presented, each representing contrasts with rural areas. The positive β's and negative γ's indicate that in metropolitan and urban areas the initial tempo of fertility is greater than in rural areas (the positive β's) but that the rate of decline in the tempo of fertility is also greater than in rural areas (the negative γ's). The latter suggests more active curtailment of fertility in metropolitan and urban areas. The size of the estimated coefficients indicates that this pattern – greater initial tempo and sharper decline in tempo – is most accentuated in metropolitan areas. In equations (7) and (8) the cross-classification of childhood and present residence is used in place of the metropolitan–urban–rural trichotomy, with respondents living in rural areas both at the survey date and in childhood serving as the reference group. Again, the urban residents show higher initial fertility and more rapid curtailment of fertility, and this duration profile is especially characteristic of those women who have always resided in urban areas. The regression coefficients of equations (5) to (8), then, reveal that the fertility of women residing in metropolitan areas and of women who have always resided in urban (including metropolitan) areas contrasts with the fertility of the rural women who comprise the majority of the sample. Interestingly, those women who have migrated to urban areas (the 'urban migrants' in table 6.5) show childbearing experiences which appear to resemble more closely the experiences of urban rather than rural women.

The education of the respondent and her husband are both included in the equations of table 6.5, despite the lack of significance of the respondent's education coefficients. The coefficients are large, and, under other specifications, attain statistical significance. It should be recalled that the educated respondents comprise a small portion of the total sample (see table 6.1), and hence very large coefficients are required for significant effects to be achieved. The respondent's education coefficients present patterns similar to those just observed for residence: relative to women with no schooling (the comparison group), women with primary or secondary education show more rapid initial fertility (the $\beta$'s) and more rapid decline in fertility tempo (the $\gamma$'s) as marriage proceeds. It is the more rapid decline in tempo which is most marked, especially for the best educated women, and it is these coefficients (the $\gamma$'s) which most often attain significance in other regressions not shown here. This is a very plausible outcome: the better educated women curtail their fertility more rapidly as their reproductive career proceeds, according to these estimates.

Quite a different pattern emerges for the husband's education. Whereas the effect of the respondent's education is positive on initial fertility tempo and also positive on the rate of fertility tempo decline, the net effect of the husband's education is to depress the initial tempo and also the rate of tempo decline. Implicit in these coefficients are estimated net effects on completed fertility which are negative for the respondent's educational attainment and positive for the husband's educational attainment, as well as a flatter duration profile of fertility for the more educated husbands as compared to the more educated respondents. These conclusions are illustrated in table 6.6, discussed below.[8]

One moderately strong differential emerges from the regressions shown in table 6.5 which was not apparent previously. Respondents whose husbands are reported as 'paid in cash' show a lower initial fertility tempo and less rapid fertility tempo decline, relative to wives of 'self-employed' men (the reference category). As will be evident in table 6.6, the coefficients imply lower cumulative fertility for those wives whose husbands are 'paid in cash' through most durations but eventual completed fertility which is higher. We noted earlier that the exact meaning of being paid in cash, with respect to type of work, industrial sector, economic status, and other relevant factors, is not clear. But if cash payment is indicative of fuller integration in the modern sectors of the economy and generally higher status, the positive net effect on completed fertility is consistent with the positive net effect observed for husband's education. Both suggest that higher status of the husband or the opportunities offered by modernization and economic development encourage higher net levels of completed fertility.

It was emphasized when discussing the analytic approach employed here that fertility differentials must emerge as the result of differing intensities of childbearing during specific periods of marriage, that is, differing duration patterns of fertility. The coefficients estimated in the regressions presented

[8]The estimated impact of the husband's education and the respondent's education is much smaller in the equations which includes the age difference between spouses (equations (6) and (8)). This is *not* due to weakening of the effects of these two education measures upon addition of the age difference; rather, it is a characteristic of the regressions with this subsample of women (which excludes those women for which information on husband's age is not provided). The consequent reduction of the educational effects essentially reflects a control for differentials in marital dissolution.

Table 6.6 Predicted differentials in children ever born, at specified durations: selected socio-economic variables

| Variable, category or contrast | Duration (years) 5 | 10 | 15 | 20 | 25 | Source |
|---|---|---|---|---|---|---|
| *Age at marriage* | | | | | | |
| Contrast: 15 years | | | | | | |
| 13 years | −0.10 | −0.19 | −0.27 | −0.33 | −0.38 | Equation (8) |
| 17 years | 0.07 | 0.12 | 0.16 | 0.18 | 0.19 | |
| 20 years | 0.11 | 0.17 | 0.20 | 0.18 | 0.11 | |
| *Age difference* | | | | | | |
| Contrast: 3 years | | | | | | |
| 6 years | 0.04 | 0.07 | 0.10 | 0.12 | 0.14 | Equation (8) |
| 12 years | 0.08 | 0.16 | 0.23 | 0.29 | 0.35 | |
| 20 years | 0.09 | 0.18 | 0.28 | 0.39 | 0.50 | |
| *Residence* | | | | | | |
| Contrast: rural childhood and current | | | | | | |
| Urban, childhood and current | 0.32 | 0.51 | 0.57 | 0.50 | 0.29 | Equation (8) |
| Urban migrant | 0.20 | 0.32 | 0.34 | 0.28 | 0.12 | |
| Rural migrant | 0.21 | 0.26 | 0.16 | −0.10 | −0.52 | |
| *Educational attainment* | | | | | | |
| Contrast: no schooling | | | | | | |
| Primary | 0.02 | −0.01 | −0.11 | −0.27 | −0.48 | Equation (8) |
| Secondary and higher | −0.01 | −0.20 | −0.57 | −1.12 | −1.84 | |
| *Husband's educational attainment* | | | | | | |
| Contrast: no schooling | | | | | | |
| Primary | −0.03 | −0.05 | −0.05 | −0.03 | −0.00 | Equation (8) |
| Secondary and higher | −0.10 | −0.11 | −0.06 | −0.08 | 0.30 | |
| *Husband's employment* | | | | | | |
| Contrast: self-employed | | | | | | |
| Paid in cash | −0.16 | −0.22 | −0.17 | −0.03 | 0.22 | Equation (8) |
| Paid in kind | −0.01 | 0.02 | 0.08 | 0.18 | 0.32 | |

in table 6.5 imply certain duration patterns of fertility, and it is appropriate to conclude the analysis of cumulative fertility differentials with a consideration of these patterns, as presented in table 6.6. The figures are based on the estimates of equation (8). The differentials apparent here are not stable over the durations, illustrating the utility of examining differentials in *duration patterns* rather than differentials 'averaged' over all durations. For example, the effect of urban residence rises and then falls, reflecting the higher initial tempo and higher rate of tempo decline estimated for women in these locations. The effect of both husband's educational attainment and of husband's being 'paid in cash' are initially negative but eventually slightly positive. The effect of the respondent's education, on the other hand, is negative except at the very shortest durations, and the estimated size of the net differential grows enormously over the duration of marriage.

The predicted differentials presented in table 6.6 also provide perspective on the substantive importance of the statistically significant effects identified in the regression analysis. With the exception of the differential in completed fertility between the women with no schooling and those with secondary and higher education, most of the estimated differentials are small, amounting to a half a child or less after 15 or more years of marriage. These differentials hardly suggest that changes in the distribution of Pakistani women across categories of the variables examined here could be expected to have large effects on overall levels of fertility in Pakistan. The educational differential is an important exception to this general conclusion because it is reasonable to anticipate increasing levels of educational attainment among Pakistani women. And, in fact, the figures in table 6.1, which show higher levels of education among the younger cohorts of women, suggest that such a secular increase in education is already under way, although clearly there is room for considerably more change. The educational differential estimated here must be regarded sceptically, however, because the highly educated women in the PFS sample are so few, especially at the later durations of marriage. It cannot be assumed that as educational levels rise and larger proportions of cohorts of women attain secondary and higher education that the fertility differentials among the educational strata will retain the size and the pattern observed here.

## 6.4 ANALYSIS OF BIRTHS IN THE FIVE YEARS PRECEDING THE SURVEY

I turn now to the examination of differentials in fertility over the five years immediately preceding the survey, that is, fertility during the period 1970–75. The temporal specificity of this fertility measure strengthens the analysis in at least one important respect: since many of the social and economic measures refer to current status at the survey date, it is more reasonable to employ them in analysis of fertility proximate to the survey date.

The analysis of births in the five years preceding the survey is limited to women married continuously over the five years.

The mean number of children born in this recent period to women cross-classified by duration married (at the survey date) and a set of demographic, social and economic variables are presented in table 6.7. The means are adjusted for age at marriage differences between cells within panels of the table, but in fact the adjustment has little impact on the differentials observed.

The differentials are small and, for the most part, consistent with those which emerged in the analysis of cumulative fertility. The effect of age at first marriage is again moderately complex: at early durations, late marriage (up to at least age 20) is associated with higher fertility, but after ten years of marriage (ie for women with durations 15 years and above, at the time of the survey), the effect of late age at marriage on recent fertility is strictly negative. The effect of the age difference between spouses appears to be curvilinear at most durations, with wives of husbands 4–14 years older than themselves showing higher fertility than wives with husbands either more equal in age or considerably older. This relationship resembles the one which emerged in the analysis of cumulative fertility, with the negative impact of the husband's age a bit more evident in table 6.7 at most durations.

The adjusted means for women classified by residence indicate that urban women (including metropolitan residents) have higher fertility in the early durations of marriage and lower fertility thereafter. This *pattern* of differentials is consistent with the results of the regression analysis of cumulative fertility: higher initial fertility tempo and more rapid fertility tempo decline were estimated for urban women.

There are no noteworthy differentials evident in the sets of means for region and language.

Education and husband's education show the same negative relationships with fertility apparent in the previous analysis (except the positive husband's education effect on completed fertility which emerged in the multivariate analysis). The most educated women appear to have higher fertility early in marriage. There is some suggestion that the husband's education effect is not monotonically negative: at the early durations, wives of the most educated husbands report the highest fertility; at several other durations the wives of primary graduates show fertility equal to or higher than that of wives of husbands with no schooling.

The differentials by employment are, as before, intriguing but provide no definite patterns. At the early durations, women who are classified as 'worked previously' (most of these women worked before marriage) have the highest recent fertility, while at the longer durations, women who are classified as 'currently working' have the highest

**Table 6.7** Mean number of births in five years preceding survey, by duration married and selected demographic and socio-economic variables, adjusted for age at marriage:[a] woman currently married five years or more

| Variable and category | Duration <5 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 | 30+ | N |
|---|---|---|---|---|---|---|---|---|
| *Number of women* | – | 856 | 760 | 674 | 485 | 552 | 354 | 3681 |
| *Age at marriage*[b] | | | | | | | | |
| Less than 15 years | – | 1.75 | 1.61 | 1.53 | 1.20 | 0.79 | 0.22 | (1730) |
| 15–17 years | – | 1.83 | 1.69 | 1.52 | 1.16 | 0.49 | 0.16 | (1250) |
| 18–19 years | – | 1.89 | 1.83 | 1.46 | 1.03 | 0.23 | 0.00 | (404) |
| 20 years or more | – | 1.74 | 1.43 | 1.30 | 0.56 | 0.23 | – | (296) |
| *Age difference between husband and respondent* | | | | | | | | |
| Less than 4 years | – | 1.74 | 1.63 | 1.57 | 1.09 | 0.66 | 0.18 | (898) |
| 4–6 years | – | 1.86 | 1.65 | 1.53 | 1.19 | 0.62 | 0.17 | (914) |
| 7–9 years | – | 1.88 | 1.74 | 1.62 | 1.15 | 0.55 | 0.28 | (568) |
| 10–14 years | – | 1.83 | 1.81 | 1.30 | 1.03 | 0.64 | 0.19 | (626) |
| 15 years or more | – | 1.87 | 1.53 | 1.42 | 1.29 | 0.66 | 0.09 | (509) |
| *Household type* | | | | | | | | |
| No couples | – | 1.87 | 0.76 | 1.69 | 0.31 | 0.59 | 0.00 | (33) |
| Nuclear | – | 1.87 | 1.68 | 1.53 | 1.16 | 0.61 | 0.21 | (2627) |
| Extended | – | 1.74 | 1.63 | 1.35 | 1.06 | 0.63 | 0.13 | (1021) |
| *Current residence* | | | | | | | | |
| Metropolitan | – | 1.97 | 1.82 | 1.46 | 1.06 | 0.57 | 0.13 | (472) |
| Other urban | – | 2.06 | 1.60 | 1.66 | 1.07 | 0.67 | 0.19 | (475) |
| Rural | – | 1.76 | 1.64 | 1.47 | 1.16 | 0.62 | 0.18 | (2734) |
| *Current and childhood residence* | | | | | | | | |
| Urban, childhood and current | – | 2.08 | 1.65 | 1.58 | 0.99 | 0.65 | 0.13 | (672) |
| Urban migrant | – | 1.83 | 1.81 | 1.54 | 1.20 | 0.57 | 0.22 | (324) |
| Rural migrant | – | 1.83 | 1.59 | 1.53 | 1.57 | 0.79 | 0.22 | (146) |
| Rural, childhood and current | – | 1.83 | 1.81 | 1.54 | 1.20 | 0.57 | 0.22 | (2588) |
| *Most recent place of work* | | | | | | | | |
| Home | – | 1.72 | 1.70 | 1.40 | 1.11 | 0.61 | 0.21 | (393) |
| Away | – | 1.73 | 1.59 | 1.62 | 1.67 | 0.66 | 0.21 | (331) |
| Has not worked | – | 1.84 | 1.67 | 1.50 | 1.09 | 0.61 | 0.17 | (2956) |
| *Husband's education* | | | | | | | | |
| No schooling | – | 1.82 | 1.69 | 1.52 | 1.14 | 0.64 | 0.18 | (2264) |
| Primary | – | 1.77 | 1.68 | 1.40 | 1.24 | 0.60 | 0.17 | (621) |
| Secondary and higher | – | 1.86 | 1.56 | 1.50 | 1.05 | 0.54 | 0.14 | (795) |
| *Husband's current occupation* | | | | | | | | |
| Professional and clerical | – | 1.85 | 1.53 | 1.39 | 1.24 | 0.46 | 0.18 | (277) |
| Agricultural | – | 1.82 | 1.65 | 1.39 | 1.09 | 0.55 | 0.18 | (960) |
| Agricultural, not self-employed | – | 1.70 | 1.67 | 1.49 | 1.17 | 0.77 | 0.16 | (667) |
| Skilled worker | – | 1.86 | 1.66 | 1.50 | 1.24 | 0.63 | 0.24 | (665) |

Table 6.7 (*cont*)

| Variable and category | Duration | | | | | | | N |
|---|---|---|---|---|---|---|---|---|
| | <5 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 | 30+ | |
| *Nature of husband's current employment* | | | | | | | | |
| Paid in cash[c] | – | 1.76 | 1.68 | 1.49 | 1.03 | 0.72 | 0.20 | (1162) |
| Paid in kind | – | 1.74 | 1.67 | 1.42 | 1.32 | 0.81 | 0.15 | (428) |
| Self-employed | – | 1.88 | 1.66 | 1.53 | 1.15 | 0.54 | 0.17 | (2000) |
| *Region* | | | | | | | | |
| Punjab | – | 1.78 | 1.66 | 1.55 | 1.16 | 0.57 | 0.16 | (2491) |
| Sind | – | 1.83 | 1.62 | 1.44 | 1.17 | 0.76 | 0.21 | (813) |
| NWFP and Baluchistan | – | 1.91 | 1.71 | 1.35 | 0.94 | 0.93 | 0.50 | (377) |
| *Language of interview* | | | | | | | | |
| Urdu | – | 2.0 | 1.65 | 1.53 | 1.03 | 0.57 | 0.24 | (323) |
| Punjabi | – | 1.81 | 1.66 | 1.50 | 1.14 | 0.55 | 0.14 | (2579) |
| Sindhi | – | 1.70 | 1.58 | 1.44 | 1.22 | 0.89 | 0.18 | (537) |
| Pushto and Brohi | – | 1.89 | 1.96 | 1.56 | 1.03 | 0.86 | 0.57 | (241) |
| *Educational attainment* | | | | | | | | |
| No schooling | – | 1.80 | 1.67 | 1.52 | 1.18 | 0.65 | 0.20 | (3344) |
| Primary | – | 1.84 | 1.76 | 1.29 | 0.84 | 0.68 | 0.32 | (213) |
| Secondary and higher | – | 1.87 | 0.97 | 1.12 | 0.40 | 0.14 | 0.09 | (119) |
| *Employment pattern* | | | | | | | | |
| Currently working | – | 1.74 | 1.62 | 1.51 | 1.37 | 0.67 | 0.26 | (642) |
| Worked previously | – | 2.03 | 1.80 | 1.50 | 1.00 | 0.47 | 0.00 | (154) |
| Never worked | – | 1.83 | 1.66 | 1.49 | 1.09 | 0.61 | 0.17 | (2884) |
| *Nature of employment since marriage* | | | | | | | | |
| Employed, paid | – | 1.75 | 1.66 | 1.59 | 1.35 | 0.53 | 0.21 | (284) |
| Self-employed | – | 1.71 | 1.64 | 1.43 | 1.28 | 0.74 | 0.17 | (431) |
| Has not worked | – | 1.84 | 1.67 | 1.50 | 1.09 | 0.61 | 0.17 | (2956) |

[a] Adjusted by multiple classification analysis (MCA). The distribution of means by duration cross-classified with the specific socio-economic variables are adjusted in the MCA.
[b] Unadjusted means.
[c] Includes women whose husbands are reported as being paid both in cash and in kind.

fertility. There is no evidence of a depressing effect of employment on fertility; in fact, those who have never worked tend to show lower fertility. Nor is there evidence in table 6.7, in the panel for nature of employment since marriage, that paid employment has a depressing effect on fertility. These factors also seem, if anything, to be associated with higher recent fertility.

The sets of means for husband's occupation and nature of husband's employment do not lend themselves to any generalization apart from the simple observation that no marked differentials are apparent.

The third panel of table 6.7 presents means for women classified by household type. At every duration women residing in nuclear households show higher mean fertility than women residing in extended households. This has been a common finding in studies in south Asia (see the literature review in Caldwell *et al* 1983; for Pakistan, see Karim 1975). The causality underlying this association of fertility and household structure is far from obvious, however, as noted in section 6.2. It is quite possible that recent fertility has prompted the formation of the nuclear households of the higher fertility women. On the other hand, the increased privacy which nuclear households provide may allow for greater coital frequency and hence higher fertility, as some have suggested.

Limiting the analysis to a specified period of time – the five years preceding the survey – enables analysis of the fertility effect of the sex composition of previous children. Sons are highly preferred to daughters in Pakistani society: in the PFS, among women asked whether they preferred the next child to be a son or a daughter, 71 per cent expressed preference for a son and only 5 per cent expressed preference for a daughter (24 per cent expressed no preference). Son preference of equivalent intensity surfaces in other surveys in Pakistan (see, for example, Khan and Sirageldin 1977).

Investigation of the effect of sex preference on fertility behaviour is fraught with difficulty (Williamson 1976, McClelland 1979). The approach taken here side-steps many of the difficulties by avoiding altogether the issue of the extent to which sex preferences are implemented. Instead, we investigate the straightforward question of whether the sex composition of surviving children at the beginning of the five-year period preceding the survey affects fertility over that period.

In table 6.8 the mean number of births and the proportion of women with no births are presented for women classified by number of children and number of sons at the beginning of the period. (To eliminate possible effects of sex differentials in infant mortality on the results, the analysis is limited to women suffering no loss over the five-year period of the surviving children five years earlier.) A striking pattern is immediately evident: among women with one to three surviving children at the start of the period, the mean number of births declines and the proportion with no births increases with the number of sons.[9] The means

[9] The pattern is not evident among women at parity four or higher. DeTray (1980), in an analysis of the same general topic with the PFS data, limits his analysis to women at older ages and higher parities and concludes that fertility behaviour is *not* influenced by the sex composition of surviving children. Table 8, however, documents, a substantial effect among women at lower parities.

**Table 6.8** Mean number of births in five years preceding survey and mean proportion of women with no births in five years preceding survey, by number of children and number of boys five years prior to survey: women currently married five years or more[a]

| Number of children | Number of boys | Mean number of births | Proportion with no births | N |
|---|---|---|---|---|
| 0 | 0 | 1.41 | 0.28 | 627 |
| 1 | 0 | 1.51 | 0.18 | 222 |
| | 1 | 1.46 | 0.21 | 252 |
| 2 | 0 | 1.56 | 0.18 | 99 |
| | 1 | 1.53 | 0.19 | 263 |
| | 2 | 1.33 | 0.29 | 150 |
| 3 | 0 | 1.42 | 0.12 | 49 |
| | 1 | 1.38 | 0.26 | 170 |
| | 2 | 1.15 | 0.31 | 160 |
| | 3 | 1.04 | 0.37 | 61 |
| 4 | 0 | 1.15 | 0.26 | 14 |
| | 1 | 1.21 | 0.28 | 82 |
| | 2 | 1.19 | 0.32 | 169 |
| | 3 | 1.18 | 0.28 | 113 |
| | 4 | 1.40 | 0.31 | 28 |
| Total | 0 to 10 | 1.26 | 0.30 | 3271 |

[a] Limited to women whose surviving children five years prior to the survey survived to the survey date.

Table 6.9 Parity progression ratios,[a] by number of surviving sons:[b] women aged 35 and over

| Cohort and progression | Number of surviving sons | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| *Women aged 35+* | | | | | | | | |
| 4 to 5+ | 96.2 | 95.0 | 89.7 | 89.6 | (80.4) | — | — | — |
| N | 227 | 512 | 481 | 201 | (35) | | | |
| 5 to 6+ | 92.2 | 91.2 | 87.5 | 84.2 | 75.6 | (80.0) | — | — |
| N | 140 | 345 | 447 | 304 | 91 | (18) | | |
| 6 to 7+ | 91.8 | 88.0 | 86.0 | 78.5 | 79.0 | (62.9) | (69.3) | — |
| N | 75 | 238 | 358 | 306 | 152 | (40) | (4) | |
| 7 to 8+ | (69.4) | 75.3 | 73.1 | 71.5 | 68.8 | 72.4 | (69.9) | (100.0) |
| N | (42) | 152 | 258 | 275 | 166 | 69 | (12) | (2) |
| *Women aged 40+* | | | | | | | | |
| 5 to 5+ | 95.7 | 95.1 | 91.9 | 90.3 | (80.8) | — | — | — |
| N | 160 | 341 | 315 | 121 | (16) | | | |
| 5 to 6+ | 94.7 | 93.6 | 88.9 | 82.9 | (81.5) | (75.4) | — | — |
| N | 104 | 240 | 290 | 201 | (46) | (10) | | |
| 6 to 7+ | 89.5 | 90.3 | 88.1 | 81.5 | 83.8 | (78.7) | (100.0) | — |
| N | 59 | 174 | 231 | 211 | 94 | (21) | (2) | |
| 7 to 8 + | (71.6) | 76.8 | 76.6 | 76.5 | 69.4 | (81.5) | (74.6) | (100.0) |
| N | (30) | 119 | 172 | 196 | 117 | (37) | (10) | (1) |

NOTE: Cells with less than 50 cases denoted by parentheses.
[a] Percentage of women at parity i or greater who are at parity i + 1 or greater.
[b] Number of sons surviving at the survey date among the first i children (see footnote a).

suggest that, among women with two or three children, two sons is a critical number: fertility drops off sharply after two sons.

The existence of these differentials encourages further investigation. For a variety of reasons such an investigation is not conveniently incorporated in the analysis of other demographic and socioeconomic differentials, and therefore we briefly digress to pursue this matter further. The differentials apparent in table 6.8 pertain to women younger than 35 years of age and with fewer than four children. The possible impact of the sex composition of surviving children on the fertility of older, higher parity women can be examined by calculating parity progression ratios for older women classified by the number of surviving sons. (The parity progression ratio is the proportion of women at parity i and above who are at parity i + 1 and above.) These ratios, presented as percentages, are shown in table 6.9. The ratios generally show a monotonic decline with increasing number of sons, with the few violations of the monotonic trend at either extreme (women with no sons or with no daughters) where the extreme circumstances might plausibly over-rule considerations motivated by simple son preference. The magnitude of the differentials across number of surviving sons are not in all instances large, but are worth noting, and the general consistency of the direction of the differentials is persuasive evidence of the operation of a sex composition effect among these older, higher parity women.

Having demonstrated the effect of sex composition on recent period fertility of younger women and on parity progression ratios of older women, an effect on completed fertility levels remains to be considered. Does the sex composition of the first births (the first three, for example) show an impact on the cumulative fertility of women at older ages? The means presented in table 6.10 suggest that it does. The mean number of children ever born varies with the sex composition of the lower order births in a manner fully consistent with the findings of tables 6.8 and 6.9: women with *more sons* among the first three births show *lower* cumulative fertility above the age of 30.

Table 6.10 Mean number of children ever born, by cohort and by sex composition of first three births

| Sex composition[a] | Cohort 30–39 | | | | Cohort 40–49 | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | N | Mean[b] | N | Mean | N | Mean[b] | N |
| *First birth*[c] | | | | | | | | |
| Boy | 5.56 (2.48) | 736 | 5.97 (2.39) | 568 | 7.01 (2.84) | 581 | 7.43 (2.71) | 426 |
| Girl | 5.83 (2.32) | 643 | 6.15 (2.23) | 497 | 7.37 (2.85) | 494 | 7.83 (2.70) | 381 |
| *Second birth*[d] | | | | | | | | |
| 2 Boys | 5.51 (2.28) | 367 | 6.18 (2.18) | 201 | 6.75 (2.80) | 322 | 7.82 (2.72) | 144 |
| 1 Boy, 1 Girl | 5.95 (2.23) | 652 | 6.58 (2.13) | 363 | 7.53 (2.56) | 476 | 8.30 (2.48) | 242 |
| 2 Girls | 6.10 (2.17) | 292 | 6.55 (2.11) | 174 | 7.75 (2.66) | 227 | 8.29 (2.55) | 120 |
| *Third birth*[e] | | | | | | | | |
| 3 Boys | 5.39 (2.07) | 221 | 6.50 (2.14) | 83 | 6.54 (2.69) | 173 | 7.60 (2.92) | 43 |
| 2 Boys, 1 Girl | 6.17 (2.05) | 418 | 6.71 (2.02) | 174 | 7.51 (2.51) | 351 | 8.51 (2.62) | 113 |
| 2 Girls, 1 Boy | 6.38 (1.89) | 423 | 7.00 (1.84) | 197 | 7.87 (2.28) | 312 | 8.81 (2.21) | 106 |
| 3 Girls | 6.18 (1.73) | 110 | 6.57 (1.76) | 54 | 7.74 (2.54) | 92 | 9.08 (2.35) | 23 |

NOTE: Standard deviations in parentheses.
[a] Sex composition based on births which survive at least 60 months, and on births among the first six births only.
[b] Means calculated only for women whose first birth interval is less than 48 months and whose second and third interval is less than 36 months.
[c] Limited to women with one or more births.
[d] Limited to women with two or more births.
[e] Limited to women with three or more births.

There are only a few violations of this basic relationship. The differences between women with sons only and other women are especially large.

Two sets of means are shown for each age cohort in table 6.11. Suppose that some women classified as having more sons than daughters have not reported all of their births, with the omitted births disproportionately female. The bias introduced by these omissions in the maternity histories may account in part for the sex composition effect observed. One piece of evidence that such omissions bias the classification of women by sex composition is that the distributions of women by sex composition (note the values of N in table 6.10) do not resemble the simple binomial distribution expected if male births and female births are, essentially, equally probable outcomes. The second column of means pertains to a subgroup of women which excludes women more likely to have omitted births (women with unusually long intervals). The distributions by sex composition more nearly resemble the binomial, but a skew in favour of males remains (indicating that selection by interval length is an ineffective way to control for omissions in the fertility histories). The magnitude of the differentials in the means observed in the first column are reduced in the second column, but the differentials nevertheless remain, showing the same direction of association with sex composition and still impressively large differences in children ever born.

Each of the fertility measures examined in tables 6.8, 6.9 and 6.10, then, show similar associations with the sex composition of surviving children. The size of this sex composition effect on the recent period fertility of younger woman and the completed fertility of older women are both large. Indeed, the effect is substantially larger than the effects of most other socio-economic variables examined.

In order to examine the effect of each of the variables examined in table 6.7 with controls for other demographic, social, and economic variables, I again employ least squares regression analysis. Controls for basic demographic variables are of course essential. With respect to recent fertility, it is both reasonable and in harmony with previous demographic research to posit two principal effects on the fertility level observed: an age effect, which is curvilinear, resulting from the increase and then decrease of fecundity with age; and a duration effect, which is monotonically negative, fertility falling off with the duration of marriage. A model of age, age$^2$, and duration should capture the joint effects of age and duration:

$$\text{Birth last 5 years} = f(\text{Age}, \text{Age}^2\ \text{Duration})$$

Page (1977) develops a model of age and duration effects on *period* fertility. Page posits a multiplicative relationship between age and duration. To ease the analysis, I assume additivity and, hence, employ the following regression equation:

$$\text{Birth last 5 years} = \alpha + \beta_1 \text{Age} + \beta_2 \text{Age}^2 + \gamma \text{Duration} + \epsilon \qquad \text{(d)}$$

Notice that in this equation the duration effect is conceptually different from that in equations (b) and (c) of the previous section. In those earlier equations duration represented the amount of exposure, the length of time over which the cumulation of fertility may have occurred. In equation (d), the fertility measure refers to a specified period of exposure (five years) and the sample used in the estimations is limited to women experiencing the full period at risk. Therefore differentials in amount of exposure to risk do not enter into consideration here. Rather, duration in this instance is an attribute of the women that, for a variety of reasons (Page 1977), can be expected to have a strong bearing on their recent fertility behaviour.

Other variables are incorporated in equation (d) as additional predictors. The assumption of additivity is maintained, ie the other predictors do not intereact with the basic demographic variables (age, age$^2$, duration) or each other in affecting recent fertility.[10]

Regression estimates of the effects of the demographic characteristics are presented in equations (10), (11) and (12) in table 6.11. Curvilinear effects of age and the age difference and a negative effect of duration emerge, as anticipated. The coefficients of age and age$^2$ indicate that, net of duration, age has a positive effect on fertility until age 22, a plausible estimate. The coefficients on age difference indicate that, net of duration and age, the age difference positively affects fertility up to 25 years difference, an estimate consistent with the means shown in table 6.7 and with what might be expected on the basis of most reasoning about the physiological effect of husband's age on fertility. Equation (11) includes the number of children surviving at the beginning of the period as a predictor. In common with age and the age difference, its effect is curvilinear. The coefficients indicate that within the range of zero to seven children, the effect of the number of surviving children is positive *net* of age and duration. That is, at any given age and duration, women who have shown higher fertility in the past are more likely to show higher fertility over a short period in the future, unless the women have had more than seven children. This result is quite acceptable in the context of a society where there is little active control of fertility.

As in the analysis of cumulative fertility, extensive exploratory analysis of the effects of various combinations of socio-economic variables, when added to equations (10) to (12), was carried out.

The variables which demonstrated explanatory power are incorporated in the regression equations presented in table 6.12. For the most part the

[10] Since fertility is higher at the shorter durations, it follows that differentials might be correspondingly greater at shorter durations, and hence the effects of social and economic predictors should be modelled as interacting with duration, perhaps following the approach of Rodríguez and Cleland (1981). Analysis of the PFS data does not consistently confirm this reasoning, however (see, for example, the means in table 6.7). All of the additional variables show additive effects on recent fertility, with the exception of residence: both the means in table 6.7 and regression estimates indicate that the effect of urban (including metropolitan) residence in contrast to rural residence differs in magnitude and sign over marriage duration. To simplify the analysis, however, I specify the residence effect as additive, as this captures the substantively important features of the effect. Furthermore, experimentation with many different regression equation specifications suggests that the addition of interactions with duration introduces multicollinearity problems which hamper interpretation of the results.

Table 6.11 Metric partial regression coefficients: equations for births in five years preceding survey

| Variable | (10) | (11) | (12) |
|---|---|---|---|
| Intercept | 0.216 | 1.316 | 0.199 |
| Age | 0.135* | 0.049 | 0.136 |
| $Age^2$ | − 0.003* | − 0.001* | − 0.003* |
| Duration married | − 0.030* | − 0.056* | − 0.031* |
| Number children surviving, five years ago | | 0.257[a] | |
| (Number children surviving, five years ago)$^2$ | | − 0.018[a] | |
| Age difference | | | 0.006 |
| Age difference$^2$ | | | − 0.003[a] |
| Unadjusted $R^2$ | 0.280 | 0.321 | 0.284 |
| N[a] | 3681 | 3681 | 3515 |

* Denotes coefficient more than two times larger than its standard error.

[a] Regressions are limited to women currently married five years or more. Regression (12) excludes women whose husband's age is not reported.

variables are the same as those comprising the final equations for children ever born (table 6.5), with the exception of the exclusion here of nature of husband's employment and the addition of household type (nuclear, and other).

Once again residence remains among the more powerful socio-economic variables, with the estimates showing an overall net positive effect of urban residence on recent fertility. Equations (13) to (15) indicate that fertility is higher in (other) urban places than in metropolitan centres. In the previous analysis of cumulative fertility, the results showed higher initial fertility tempo for metropolitan residents but lower eventual completed fertility. Similarly, the results here suggest that overall fertility levels are lower in metropolitan areas than in (other) urban areas. Nevertheless, fertility is higher in both areas than in rural areas, according to these estimates. Equations (16) to (18) reaffirm a conclusion from the analysis of cumulative fertility: it is the fertility of those women who have lived in urban areas in childhood and as adults which is especially high.

The education effects shown in table 6.12 differ in some respects from those uncovered in the analysis of cumulative fertility. Whereas previously the husband's education effect seemed stronger than the respondent's education effect and positive in direction, in this analysis of recent fertility the husband's education effect is not significant and negative in sign. The most strikingly powerful effect is observed for respondent's education at secondary level, which shows a definite depressing effect on recent fertility. The fertility of this small group of educated women diverges from that of the remainder of the sample.

The positive effect of residence in a nuclear household which was evident in table 6.7 re-emerges in these regression estimates, net of controls for several socio-economic variables (residence, education) which might be thought to confound the relationship. In fact, the coefficient for nuclear household is essentially unaffected by these controls. The introduction as a control of the number of children surviving at the beginning of the five-year period does dampen the nuclear household effect (equations (14) and (17)). This results from the moderate correlation of these two variables, which itself implies that the association between fertility level and household structure extends back to the beginning of the five-year period and beyond. This might be interpreted as evidence that nuclear households are selective of higher fertility couples; from this analysis, however, nothing can be said about the causal relations underlying that initial correlation of surviving children and household type.

To sum up this section: the estimates in equations (13) to (18) indicate that, apart from the demographic controls, the variables which show the largest impact on recent fertility are

Table 6.12 Metric partial regression coefficients: equations for births in five years preceding the survey

| Variable | (13) | (14) | (15)[a] | (16) | (17) | (18)[a] |
|---|---|---|---|---|---|---|
| Intercept | 0.23 | 1.30 | 1.37 | 0.23 | 1.30 | 1.38 |
| Age | 0.13* | 0.05* | 0.05* | 0.13* | 0.05* | 0.05* |
| Age$^2$ | — 0.003* | — 0.01* | — 0.001* | — 0.003* | — 0.01* | — 0.001* |
| Duration married | — 0.03* | — 0.06* | — 0.06* | — 0.03* | — 0.06* | — 0.06* |
| Number children surviving, 5 years ago | — | 0.25* | 0.25* | — | 0.25* | 0.25* |
| (Number children surviving, 5 years ago)$^2$ | | — 0.02* | — 0.02* | — | — 0.02* | — 0.02* |
| Age difference | — | — | 0.00 | — | — | 0.00 |
| Age difference$^2$ | — | — | — 0.00 | — | — | — 0.00 |
| Nuclear household | 0.07* | 0.04 | 0.05 | 0.07* | 0.04 | 0.05 |
| Metropolitan | 0.10* | 0.06 | 0.05 | — | — | — |
| Other urban | 0.14* | 0.11* | 0.10* | — | — | — |
| Urban, childhood and present | — | — | — | 0.15* | 0.10* | 0.10* |
| Urban migrant | — | — | — | 0.09 | 0.07 | 0.07 |
| Rural migrant | — | — | — | 0.08 | 0.09 | 0.10 |
| Primary education | — 0.01 | 0.00 | — 0.02 | — 0.03 | — 0.02 | — 0.04 |
| Secondary education | — 0.24* | — 0.24* | — 0.26* | — 0.27* | — 0.26* | — 0.28* |
| Primary education, husband | — 0.03 | — 0.04 | — 0.05 | — 0.03 | — 0.04 | — 0.06 |
| Secondary education, husband | — 0.04 | — 0.05 | — 0.05 | — 0.04 | — 0.05 | — 0.05 |
| Unadjusted $R^2$ | 0.284 | 0.325 | 0.328 | 0.285 | 0.325 | 0.328 |
| N[b] | 3679 | 3679 | 3515 | 3679 | 3679 | 3515 |

* Denotes coefficient more than two times larger than its standard error.
[a] These regressions exclude women whose husband's age is not reported.
[b] All regressions are limited to women currently married five years or more.

urban (including metropolitan) residence and secondary education. A summary comparison of these findings with those of the analysis of cumulative fertility will be provided in the final section of this paper, along with some remarks about the significance of the findings.

## 6.5 SOURCES OF THE OBSERVED DIFFERENTIALS

The differentials described in the previous sections may result from two quite distinct processes. On the one hand, the observed differentials may be due to differential reporting errors. On the other hand, the reported differentials may result from subgroup differences in levels of the intermediate variables. A thorough effort to uncover the source of the differentials will not be attempted here — especially as these matters are explored elsewhere in this volume — but a brief consideration of the alternate explanations seems in order.

### Differential reporting error

The data quality evaluation performed by Booth and Shah (chapter 2) gives some attention to the variables used in the analysis here. Their paper does suggest that both omission of births and reference period error in the dating of births are present in the PFS maternity history data. To what extent might these explain the observed fertility differentials?

The large education differentials are not readily explained by reporting errors, since more highly educated women show lower cumulative and recent fertility, and one might expect the reporting of these women to be, if anything, more complete and accurate. The residence pattern observed – higher initial fertility among urban women and lower later fertility – suggests differentials in reference period by residence. Certainly this possibility deserves investigation. A related explanation might account for the husband's employment differentials in cumulative fertility patterns; the fact that differentials in recent fertility did not emerge for this variable makes the finding of cumulative fertility differentials suspect, in any case. The higher fertility of women in nuclear households could result from fuller reporting or a longer reference period for these women, although it is not obvious why these reporting differentials would be associated with household type. Finally, the differentials by sex composition may result from a combination of misclassification of women by sex composition and under-reporting of fertility, both due to omission of births from the maternity history, especially female births: women who omit female births will be classified with a sex composition incorrectly weighted towards males and will evidence lower fertility levels (due to the omission of births). The differentials by sex composition could also be explained by a tendency for women to displace births of sons further back in time (ie a tendency to err towards sons being older), which could cause women with male births in the recent five years to show fewer births during that period and to show a more male sex composition at the beginning of the period.

Investigation of these explanations for the estimated sex composition effects is clearly necessary before any firm conclusions can be confidently maintained concerning the true size of such effects. Such an investigation might appropriately rely in part on mathematical simulation – simple simulations may be quite adequate – of the potential impact of reporting errors in this instance.

Investigation of these possible response errors effects is beyond the province of this paper. However, with the exception of the role hypothesized for reporting error in producing the observed sex composition effects, none of the explanations just proposed seem to account satisfactorily for the observed differentials. Consequently it seems more reasonable to seek explanations in differentials in levels of the intermediate variables.

## Differentials in the intermediate variables

Other chapters in this volume examine in great detail the socio-economic determinants of the intermediate variables. The approach taken here differs from that of the other authors, and is intended to complement their analyses.

1 *Marital dissolution.* The analysis of recent fertility (tables 6.7 to 6.12) is limited to women married continuously over the period, and thus marital dissolution cannot influence the fertility levels directly. To examine the possibility that dissolution differentials explain the differentials in cumulative fertility, equations (7) and (8) were re-estimated limiting the sample to women once and currently married (N = 3764 and 3591, respectively). The coefficients are essentially the same as those shown for equations (7) and (8). The exclusion of women reporting marital dissolution results in some attenuation of the respondent's education effect and some increase in the urban residence effect, however.

2 *Contraceptive use.* Differentials in ever-use and current use of contraception do not follow the fertility differentials precisely. Reported use is higher for better educated women, wives of better educated husbands, and women with a more male sex composition of surviving children five years prior to the survey. Use is also higher, however, among urban women and among women in nuclear households, subgroups which show higher fertility in this analysis. The relationship between residence and contraceptive use is especially strong. (On differentials in contraceptive use, see Shah 1979.)

To examine the possibility that contraceptive use differentials explain the observed differentials in cumulative fertility, equations (7) and (8) were re-estimated excluding ever-users of contraception (the subsamples contain 3580 and 3298 women, respectively, after exclusion of ever-users). The coefficients remain for the most part the same in sign and magnitude. The effects of urban residence on initial fertility tempo and fertility tempo decline are reduced substantially (by about one-quarter) but maintain statistical significance. The effects of education on tempo decline (not statistically significant in final equations (7) and (8)) are also reduced in magnitude in this subsample. A similar control for contraceptive use effects on differentials in recent fertility was obtained by re-estimating equations (16) and (18) with ever-users excluded. The exclusion results in only trivial changes in the estimated coefficients, with two exceptions: the effect of urban residence, childhood and present, is reduced by about one-third; and the effect of being an urban migrant increases by about one-half. Surprisingly, the negative effect of secondary education is essentially unaltered by the exclusion of ever-users, suggesting that contraceptive use (at least as it is reported) does not account for this negative effect.

These re-estimations with contraceptive users excluded indicate that some, but apparently far from all, of the fertility differentials by residence and education are associated with differentials in contraceptive use. The fact that the fertility differentials are not entirely explained by contraceptive use differentials implies that (if it is assumed that reporting errors do not fully explain the fertility differentials) either the reporting of contraceptive use is not complete, or fertility control techniques (eg abortion) not inquired about are used by the PFS women, or differentials in other intermediate variables operate to cause the fertility differentials observed. Another intermediate variable with potential for substantial fertility impact is breastfeeding practices (Bongaarts 1978), to which I now turn.

3 *Breastfeeding practices.* Another paper commissioned for this case study on Pakistan ably documents significant socio-economic differentials in duration of breastfeeding among the PFS women (Shah, chapter 8). Shah's findings are of great relevance to this study. He reports, for example, a differential of over four months in the mean duration of breastfeeding (obtained from life-table analysis of data on current breastfeeding status) among categories of current residence, with urban women breastfeeding for shorter durations. The residence differential is the largest Shah reports. This finding provides a plausible (partial) explanation for the higher fertility of the urban women observed throughout this analysis. Shah also reports a negative relationship between duration of breastfeeding and educational attainments of the respondent (and her husband), a finding which runs counter to the gross and net fertility differentials by education observed in the PFS.

Shah provides no estimates of duration of breastfeeding by sex of the child, a matter relevant to the sex composition differentials in fertility reported here. Estimates of the median duration of breastfeeding (in months) and the proportion breastfed by sex are presented in table 6.13. These estimates are obtained through life-table analysis of information on current breastfeeding status (that is, whether a recently born child is being breastfed or not at the survey date). The medians show longer breastfeeding of male children at every duration and parity examined. The differential for all women is about two and a half months, a difference substantial enough to have a fertility impact. The differentials in *proportion* breastfed by sex are not consistently in favour of males; but all of the proportions are .96 or higher, so that the impact of differentials in proportion breastfed will be trivial. The sex differential in duration of breastfeeding evident in table 6.13 provides one mechanism for the realization of the fertility differentials by sex composition in tables 6.8–6.10, although the largest differentials emerging in those tables would not seem to be readily explained by the magnitude of the differences in the median months of breastfeeding presented here.[11]

This summary of socio-economic differentials in the intermediate variables is much less complete than Sather's analysis in the next chapter, and the conclusions drawn here are therefore tentative. The observed fertility differentials by residence are only explained by differentials in duration of breastfeeding (among the intermediate variables examined); in fact, differentials in marital status composition and contraceptive use work against the positive urban residence fertility effect observed. Fertility differentials by education are partially but not fully explained by higher rates of contraceptive use by better educated women; lower rates of marital dissolution and shorter durations of breastfeeding act against the observed differentials, however. Neither levels of marital dissolution nor levels of contraceptive use directly explain the positive association between residence in a nuclear family household and fertility. The same generalization holds with respect to the effect of the nature of husband's employment on fertility. Fertility differentials by sex composition of surviving children may be partially due to differentials in breastfeeding by sex of a child, but it is not clear how much of the differential can

[11] Life-table analysis of the duration of breastfeeding of women classified by sex composition of surviving children was attempted in the course of the work for this paper. Unfortunately, the sample sizes in the sex composition groups were too small to permit sound estimates.

Table 6.13 Median duration of breastfeeding and proportion breastfeeding by sex of child: estimates from life-table analysis of current status[a]

| Duration of marriage or birth order | Median (months) | | Proportion breastfed | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| 0–9 years married | 20.19 | 17.00 | 0.976 | 0.992 |
| 10–19 years married | 22.50 | 20.24 | 0.995 | 0.988 |
| 20+ years married | 30.52 | 23.94 | 0.988 | 1.000 |
| First birth | 21.10 | 18.66 | 0.963 | 1.000 |
| Second birth | 19.71 | 16.53 | 0.968 | 1.000 |
| Third birth | 21.30 | 17.54 | 1.000 | 0.989 |
| First to fourth births | 21.11 | 17.80 | 0.979 | 0.994 |
| Fifth and higher births | 22.61 | 21.37 | 0.992 | 0.989 |
| All | 21.89 | 19.55 | 0.985 | 0.991 |

[a] Life table estimates using births in three years preceding the survey that survived to the survey date.

reasonably be explained by this particular intermediate variable.

Obviously the sources of the fertility differentials in the intermediate variables are as yet far from fully identified. Sather's analysis in the next chapter, utilizing the Bongaart's approach, carries this discussion much further. She investigates more rigorously the role of each of the major intermediate variables in the generation of the differentials observed by residence, education, and region. It is interesting to note that in her analysis the positive effect of urban residence on fertility remains something of a mystery. The positive education effect, on the contrary, is explained for the most part by differentials in contraceptive use. In the approach taken here, however, contraceptive use differentials do not seem a full explanation. In short, the full story about the nature of the observed fertility differentials in Pakistan has yet to emerge, and further work beyond the PFS analysis presented in this volume may well be required to resolve many of the outstanding questions.

## 6.6 SUMMARY AND CONCLUSIONS

The findings can be succinctly summarized.

1 Both cumulative and recent fertility are higher for urban women (especially women currently residing in urban areas whose childhood residence was in urban areas) than for rural women. The differential is greatest in the early durations of marriage.
2 Educational attainment of women is associated with lower cumulative and recent fertility. The negative effect is much larger for those who proceed beyond primary education. The dfferentials among the educational strata are substantial for both fertility measures.
3 Wives of better educated men show lower recent fertility but, net of residence and their own education, higher cumulative fertility at the later durations of marriage.
4 Female employment seems to bear no distinct relationship with cumulative or recent fertility.
5 Wives of husbands who are 'paid in cash' show lower cumulative fertility in early durations of marriage but higher cumulative fertility at the later durations, net of other demographic and socio-economic variables. The same women do not report higher levels of recent fertility, however.
6 Fertility differentials by region and language are slight and not statistically significant.
7 Women residing in nuclear households at the survey date report higher recent fertility.
8 Women with a sex composition of surviving children five years prior to the survey which favours boys show lower recent fertility. The sex composition of lower order births also affects parity progression ratios among older, higher parity women and the number of children ever born to older women.

Most of these differentials are apparent in bivariate analysis and hold up with multivariate controls. Most of the differentials are also small in magnitude. Moreover, as is typically the case in analysis of individual-level fertility data, the social and economic variables explain relatively little of the total variation in fertility observed among the women in the PFS sample.

The negative effect on fertility of education at the secondary level or higher is, in the magnitude of the implied mean fertility differences, the largest effect emerging from the analysis. The effect applies to a small proportion of the sample of women but the implications for future fertility levels in Pakistan are obviously large. No other differentials provide clear implications about the future course of Pakistani fertility. Urban residence and male employment in the modern sector seem to be, if anything, associated with higher fertility levels. It is difficult to imagine, however, that these positive effects would persist indefinitely and they are perhaps best viewed as the consequence of temporary disruption of traditional fertility-depressing mechanisms which are yet to be replaced with modern controls.

The estimated effects of the sex composition of surviving children and of household type emphasize the importance of examining, in fertility analysis, variables which are meaningful in the social setting of the traditional society. Most of the women in the PFS sample do not have the educational and employment experiences which are fundamental components of modernization and economic development. As a consequence, it is not surprising that social considerations grounded in the traditional society, such as a strong preference for sons, are the source of the most sizeable differentials in fertility.

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# 7 Intervening Variables

Zeba Sathar

## 7.1 INTRODUCTION

In the previous chapter, Casterline explored fertility differentials with a number of social and economic variables such as education, residence, paid employment and family type. Another approach to the study of fertility determinants is through a model combining both socio-economic variables and the 'intermediate variables' in one comprehensive framework. Such a model is being evolved and tested currently (Hobcraft and Little 1982) but at the time this volume was commissioned the best strategy available was to analyse the socio-economic variables and the intermediate variables separately. Thus this chapter takes up the task from the point at which Casterline leaves it, and proceeds one step further in identifying the role of some of the factors operating to produce fertility differentials already observed.

This chapter restricts itself to exploring the effect of three major intermediate variables (nuptiality, contraception and lactation) on the fertility of major subgroups of ever-married women in Pakistan. The choice of the subgroups was largely based on the findings of the previous chapter: Casterline found education and residence to be the most interesting of the explanatory variables considered and these constitute the classification by subgroups used here.

The outline of this paper is based on the intermediate fertility variables framework, first expounded by Kingsley Davis and Judith Blake in 1956. Davis and Blake defined the intermediate fertility variables as those factors which were direct determinants of fertility. These in turn were influenced by socio-economic, cultural and geographical factors. Recently much attention has been given to the effect on fertility of various factors associated with development, such as education and urbanization. It is found that these factors do not necessarily have a fertility-depressing effect on the intermediate variables and in fact may often act in a way leading to rises in fertility. Nag (1980) notes in his study of the fertility-increasing effects of modernization:

> The cumulative experience from a number of less developed countries during the last few decades leads us, however, to hypothesize that industrialization, urbanization and other associated processes of modernization have some fertility increasing effects in their initial stage. The net fertility change in a modernizing society at any particular point of time is positive or negative, depending on the relative strengths of conditions for inhibiting fertility at that time.

The final choice of these three intermediate variables was determined by data constraints. Data on frequency of intercourse, post-partum abstinence and spousal separation are not available in the PFS. A question on the number of spontaneous and induced abortions was included in the survey, but a negligible number of respondents reported any abortions. Hence we exclude this variable from the analysis but we later speculate that some of the puzzling results might be resolved, were accurate data on spontaneous and induced abortions available.

The three intermediate variables which are to be included in this analysis have themselves been extensively examined by others in this volume using PFS data (Farid, chapter 3; Karim, chapter 4; Shah, chapter 8; and Shah and Shah, chapter 9). Karim and Farid found in their studies of nuptiality in Pakistan that age at marriage has been rising since the mid-1960s and that the urban–rural differential in nuptiality has grown in the last ten years. They also find that a higher level education is conducive to marriage postponement beyond the actual years spent in school, and that employment, especially when paid in cash, delays marriage. Lastly they also note some regional and linguistic differences in age at marriage in Pakistan.



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Shah, in his detailed study on breastfeeding in Pakistan (chapter 8), also finds variation by residence, education and ethnic affiliation. The study also observes a trend of reduced breastfeeding among younger women, which was more pronounced in 'traditional' groups. He found, using multivariate analysis, that 'breastfeeding was the single most powerful variable in explaining fertility'. The proportion of variance explained by breastfeeding was more than that of all the selected demographic and socio-economic variables combined.

Lastly, a study on contraception (chapter 9), using the PFS, indicates that while contraceptive use had increased in urban areas, it had declined in rural areas in recent years. A significant positive relationship was found between education and contraceptive use.

Using a model proposed by Bongaarts, we assess how the differences in the separate intermediate variables identified in these previous studies contribute to the overall subgroup differentials in fertility.

## 7.2 THE MODEL

The Bongaarts model, which was developed to assess the effects of the major intermediate variables on fertility, will be the main tool for analysing differences among selected subgroups in Pakistan. The model will only be touched upon very briefly as it has been elaborately described elsewhere (Bongaarts 1978, 1980). Bongaarts singles out the following four intermediate variables as the most important ones at the aggregate level: (1) proportions married among females; (2) contraceptive use effectiveness; (3) prevalence of induced abortions; and (4) duration of post-partum infecundability. This conclusion was derived on the basis of observed sensitivity of national fertility levels to variability in these intermediate variables. Three other variables according to Bongaarts appear to be less important at the aggregate level, ie fecundability or frequency of intercourse; spontaneous intra-uterine mortality rate; and prevalence of permanent sterility. Thus the first four variables are emphasized in Bongaarts's framework.

The effect on fertility of each of the four intermediate variables is indicated by an index which takes a value between zero and one. When the particular intermediate variable has no inhibiting effect on fertility, its index acquires a value of 1 and if inhibition is complete then it has a value of zero. The four indices are defined as follows:[1]

$C_m$ = index of proportion married (equals 1 if all women of reproductive ages are married and 0 in the absence of marriage)

$C_c$ = index of contraception (equals 1 in the absence of contraception and 0 if all fecund women use 100 per cent effective contraception)

$C_i$ = index of induced abortion (equals 1 in the absence of induced abortion and 0 if all pregnancies are aborted

$C_c$ = index of post-partum infecundability (equals 1 in the absence of lactation and post-partum abstinence and 0 if the duration of infecundability is infinite).

Thus

$$C_m = \frac{\text{Total fertility rate (TFR)}}{\text{Total marital fertility rate (TMFR)}} \quad (1)$$

$$C_c \times C_a = \frac{\text{Total marital fertility rate (TMFR)}}{\text{Total natural fertility rate(TN)}} \quad (2)$$

$$C_i = \frac{\text{Total natural fertility rate (TN)}}{\text{Total fecundity (TF)}} \quad (3)$$

$$\text{TFR} = C_m \times C_c \times C_a \times C_i \times \text{TF} \quad (4)$$

TF is the level of total fecundity which is estimated by Bongaarts to be on average 15.3 and subject to a standard deviation of 5 per cent. He claims that this estimate is acceptable for most populations, except in the case of high prevalence of diseases causing sterility or in cases of prolonged spousal separation. However Bongaarts points out that TF lies in the range of 13.5 and 17.0 for most populations (Bongaarts 1978). The value of TF of 15.3 was initially used to estimate fertility for subgroups in Pakistan but in most cases it appeared to be too high.

There are several bio-social factors in operation in Pakistani society which lead us to expect fecundity to be lower than the average level prescribed by Bongaarts. Migration from rural to urban areas often means that the male head of household spends much of the year away from home, while his family remains in the village. Due to the weak data base on migration, an estimate of

[1] Details of computation are available in the guide by Hill and Shorter.

the number of such couples is not known, but the phenomenon itself is frequently observed. Also wives often return to their parental homes for the delivery of their children and may stay away from their husbands for several months. In any case, in Islam a period of at least 40 days post-partum abstinence is prescribed, which may slightly affect frequency of intercourse. Lastly, effective termination of intercourse between older couples may be self imposed by the couples' efforts not to have additional children when they have marriageable children and especially grandchildren living with them. Some evidence for this exists: marital fertility rates fall sharply after the age of 35 although physiologically women have a good many years of potential childbearing ahead (Shah, chapter 8). Although no study has been done for Pakistan to investigate post-partum and other forms of abstinence, Caldwell (1977) finds that abstinence among the Yoruba tribe in Nigeria is practised more widely by those living in rural areas and by the less educated or uneducated women. Similar reasons may apply in Pakistan where rural and uneducated women may be adhering to practices that inhibit their average fecundity and those women who break away from traditions may actually be raising their fecundity levels. An example of such behaviour is observing a state of cleanliness or purity which is a prerequisite for prayers, which would lessen the frequency of sexual intercourse. There are also certain religious times of the year, such as the fasting period of Ramadan, during which intercourse is prohibited, and this would be a factor influencing fecundity downwards.

Although fecundity has not been estimated directly, two ways of trying to measure infecundity may be utilized. One estimate of the percentage of women infecund relies on responses to the direct question in the PFS on whether the respondent felt that she and her husband could have another child. Eleven per cent felt they could not, which provides a subjective estimate of the proportion of women of reproductive ages who were infecund. A second estimate was obtained by computing the proportion of ever-married women who had never used contraception and who had an open interval of more than five years. This was found to be 27.1 per cent but the percentage differs across subgroups so the rather low estimate of 11 per cent by the first method and the higher estimate of 27.1 per cent by the second indicate that probably the truth lies somewhere in between.

Table 7.1 Indices for the whole of Pakistan

| $C_c$ | $C_i$ | $C_m$ | TFR | TMFR | TF |
|---|---|---|---|---|---|
| 0.930 | 0.607 | 0.855 | 7.0 | 8.18 | 14.5 |

The method finally adopted for estimating the TF for Pakistan was to use national level data to compute indices of $C_c$, $C_i$ and $C_m$. Dividing the TFR by their product yields the TF.[2] The result is an estimate of TF of 14.5 (see table 7.1).

Household data from the PFS were used to extract the proportions of women married for each of the subgroups and $C_m$ was derived by use of equation 1 TFR ÷ TMFR. This presented some problems as it is not always possible to compute proportions married for each of the subgroups and the analysis for women by husbands' education and their migration status could not be extended to include $C_m$.

Although all ever-married women were asked in detail about their use of contraception, the index $C_c$ is still thought to be subject to considerable error.[3] Reasons for this may be understatement of use due to the social stigma associated with family planning. Also there may be traditional methods of birth control which were not reported. Abstinence was stated as one of the most popular methods of birth control and its relatively high reported use, as compared to modern methods, among rural women especially, suggests that an omission of any traditional methods may be of great consequence to the estimation of overall levels of use.

Although questions were specifically asked about whether women had had any induced abortions, not one respondent reported having one. Even in a conservative society like Pakistan, some abortions are bound to be performed, if only for medical reasons. The fact that none are reported reflects the social pressure against abortion in an Islamic society. It is possible that induced abortions were classified under spontaneous abortions, but because there is no proof of this no index $C_a$ has been computed. This is highly unfortunate, as it is very likely that the incidence of abortion differs across subgroups.

Pakistan was one of the countries in the World Fertility Survey programme to collect a complete

[2] This is derived using equation 4, but instead of using TF to compute TFR, the opposite process is followed.

[3] $C_c = 1 - 1.1\ u \cdot e$ where e is assumed to be 0.83, and u is level of use effectiveness.

breastfeeding history for each birth. Thus estimates for breastfeeding in each birth interval are available. For the purpose of computing $C_i$, estimates of the median length of lactation were derived using life-table techniques on all births in the three years preceding the survey (excluding births which ended in deaths). The median length of breastfeeding was used rather than the mean because of the skewed nature of breastfeeding distributions. Then the index of lactational infecundability was derived using the formula

$$i = e^{.56126 + .1396L - .00872L^2}$$

where L is the median length of lactation.
$C_i$, the index for post-partum infecundability was derived as

$$\frac{20}{18.5 + i}$$

This is not an ideal way of measuring post-partum infecundability but it will suffice for our needs here which are essentially to explore differentials. (Ideally, use would be made of information on resumption of menses or on the respondent's amenorrhoea to calculate direct estimates.) Moreover, the PFS did not ask questions about the intensity and frequency of breastfeeding which might have helped to refine estimates of infecundability.

## 7.3 RESULTS

Before discussing the results of the analysis of differentials in terms of the intermediate variables, we have presented in table 7.1 the indexes computed for the whole of Pakistan and which were used to derive an estimate of TF. The differentials are now discussed by subgroup.

### Residence

The most interesting differentials found in the Pakistan Fertility Survey were those by residence, where urban marital fertility was found to be higher than rural marital fertility (Sathar 1979), a pattern contrary to that of most developed countries. However it is possible that the pattern observed in Pakistan may be characteristic of many developing countries before the onset of any major fertility decline. But why should urban marital fertility be higher? The most obvious reason is that the effect of urbanization on the intermediate variables reduces their combined inhibiting effect and thus leads to higher levels of fertility.

*Post-partum infecundability*

There is a four-month difference in the median period of lactation between urban and rural areas, which should be producing a higher curtailment effect on fertility in rural areas. It is worth pointing out that the use of the median to estimate the post-partum amenorrhoeic effect is not altogether satisfactory, since women reporting long periods of breastfeeding may have begun to rely at least partially on supplementary feeding. The Micro-Nutrient Survey of Pakistan (Government of Pakistan 1978) conducted in 1976–7 reports that although only 5.4 per cent of all children were breastfed for less than 21 months, most children had begun on other milk. Thus by the age of 21 months, 85 per cent of mothers had started using other milk. Although this figure has not been broken down by urban and rural residence, Khan and Baker (1979) state that 'fortunately in the countryside in Pakistan, women traditionally still breastfeed their babies with few exceptions. Artificial feeding is used primarily in the cities, where mothers have been influenced by the effects of advertising and the media, as well as the "well-off class"'. Thus it may be the case that use of supplementary foods is more likely to take place in urban areas where such items are more readily available, and more popular because of the advice of clinics and doctors. Thus $C_i$ for urban areas may be overestimated. Also the four-month difference in the lactation period, and its possible restrictive effect on fertility, may be relatively higher in rural areas.

It is interesting to note, however, that in accordance with our expectations, breastfeeding among women who migrated from rural areas to urban areas is closer in length to that of rural women. Thus there is some hint that these women are clinging to customs which are characteristic of their original residence (table 7.2).

Note that in all subsequent tables, the weighted averages of the indexes and of fertility rates of subgroups should ideally add up to the national averages of this table, but often they do not as different methods were sometimes utilized to derive the fertility rates of the subgroups which led to the selection of not all the members of the national sample. For example in the case of the provinces, Baluchistan was left out of the compu-

Table 7.2 Median length of lactation by age of women and residence

| Residence | $C_i$[a] | 15–24 | 25–34 | 35–49 | All ages |
|---|---|---|---|---|---|
| Urban (excluding migrants) | 0.667 | 17.1 | 18.2 | 18.7 | 17.7 |
| Migrants (from rural to urban areas) | 0.611 | 19.2 | 21.6 | 24.8 | 20.8 |
| Rural (excluding migrants from urban areas) | 0.597 | 19.7 | 21.1 | 23.4 | 21.7 |

[a]$C_i$ has been consistently calculated using the median length of lactation for women of all ages (15–49).

Table 7.3 Current use of contraception by age of respondent and residence

| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 | All |
|---|---|---|---|---|---|---|---|---|
| Urban | 0.7 | 7.3 | 17.8 | 22.3 | 26.9 | 24.2 | 35.4 | 17.5 |
| Rural | 0.0 | 1.0 | 2.9 | 3.6 | 7.7 | 7.7 | 10.9 | 3.8 |

tations. Also there is some disagreement between values of TFR and TMFR to be adopted for Pakistan; they range from 6.3 to 7.2 and 8.0 to 8.9 respectively (PFS report 1976; Hobbs 1980). We have tried to use the figures most consistent with estimates for the subgroups. But overall some margin of error should be allowed for in this and subsequent tables.

*Use of contraception*

The use of contraception is much higher in urban areas, reducing the effect of shorter lactation to some extent. The level of current use of contraception was found to be 17.5 per cent in urban areas and 3.8 per cent in rural areas. Table 7.3 gives a breakdown of current use by age of women.

*Nuptiality*

It is well documented elsewhere in this volume (Farid, chapter 3; Karim, chapter 4; Shah, chapter 8) that age at marriage is higher in urban than in rural areas (table 7.4). Consequently the distributions of proportions married are quite different for the two subgroups. The later age at marriage in urban areas has a depressing effect on fertility. In fact, the effect of differential marriage behaviour is strong enough to reverse the direction of the differential observed between marital fertility of the two areas.

*Combined effect*

Using the estimate of total fecundity of 14.5, we find, rather surprisingly, that our estimated TMFR for urban women is lower than the observed TMFR, whereas for rural women the estimated value is somewhat higher than the observed value. This finding seems to suggest either that there are serious differences in the reporting of births in the two areas or that the TF applicable to urban areas ought perhaps to be higher than 14.5, and for the rural areas the estimated TF ought to be lower. The latter is possible, as 14.5 was arrived at using national figures which compound the situation in both areas. Moreover, since the majority of women in Pakistan live in rural areas, it follows that 14.5 lies closer to the desirable estimate of TF applicable to rural areas. The difference in fecundity between the two areas is not unexpected: reasons for its likelihood have been given earlier.

Table 7.4 Combined effect of the three variables on fertility differentials by residence

| | Urban women | Rural women |
|---|---|---|
| $C_c$ | 0.840 | 0.965 |
| $C_i$ | 0.663 | 0.594 |
| Estimated TMFR | 8.08 | 8.31 |
| Observed TMFR | 8.38 | 7.98 |
| $C_m$ | 0.790 | 0.877 |
| Estimated TFR | 6.38 | 7.28 |
| Observed TFR | 6.70 | 7.00 |

## Respondent's education

The effect of education on individual fertility is not always negative. In a detailed investigation

Table 7.5 Median length of lactation by age and education[a]

| | 15–24 | 25–34 | 35–49 | All | $C_i$ |
|---|---|---|---|---|---|
| No education | 19.4 | 22.2 | 25.0 | 21.3 | 0.603 |
| Primary or less | 15.7 | 20.3 | – | 19.4 | 0.635 |

[a]Medians could not be computed for more than primary category because of the very small sample size.

across countries Cochrane (1979) notes:

> It appears that education initially increases the ability to have live births, probably though improved health and better nutrition and the abandoning of traditional patterns of lactation and post-partum abstinence. Initially this effect seems to be strong enough to counteract the effect of education on postponement of marriage.

It has already been seen that education and residence are variables associated with substantial differentials in age at marriage, breastfeeding and use of contraception in Pakistan. It is very likely that other intermediate variables such as abortion, spousal separation and intra-uterine mortality which have been left out of the analysis because of a lack of information, also have a close relationship with education and residence.

A severe constraint in studying the relationship of education and fertility in Pakistan is that very few women have completed any schooling at all. Only 10.3 per cent of the women in the PFS sample had more than zero years of schooling and only 4 per cent acquired more than primary education, and these small subsample sizes do not allow us to make any conclusive judgement about the effect of higher education on fertility. The index for lactation was not calculable for this subgroup because of too small numbers.

*Post-partum infecundability*

As expected, there are interesting differences in lactation between those who are uneducated and those with up to primary school education (table 7.5). The same argument applies as it did in the urban areas: the educated women of Pakistan are an élite group. They are much more likely to be exposed to the media and to Western influences. Breastfeeding therefore is likely to be shorter among these women, and it is more likely that they will supplement breastfeeding with other milk much sooner. Once again, the estimates of infecundability based on the median length of lactation may be an overestimate for educated women.

*Use of contraception*

There is a positive relationship between education and contraceptive use (table 7.6). Women with some schooling use contraception more than those with no education, but younger educated women do not use contraception at a very significant level until above the age of 30.

*Nuptiality*

There are once again marked differences in the behaviour of the three groups. The more educated the women, the later they marry. Marriage is possibly the variable most strongly affected by education. Aspirations regarding marriage seem to have changed more in Pakistan than fertility behaviour.

*Combined effect*

Slightly lower levels of fertility are observed and estimated for women with primary or less education than for uneducated women (table 7.7). The model seems to work quite well for uneducated women and those with primary and less education. Unfortunately, the effects of the intermediate variables on women with more than primary education could not be studied.

Table 7.6 Current use of contraception by age of respondent and education

| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 | All | $C_c$ |
|---|---|---|---|---|---|---|---|---|---|
| No education | 0 | 1.7 | 4.8 | 6.4 | 11.4 | 9.6 | 16.2 | 5.9 | 0.946 |
| Primary or less | (1.7) | (2.8) | (15.0) | 23.7 | (19.3) | (5.0) | (1.0) | 12.9 | 0.882 |
| More than primary | (0) | (16.1) | 29.8 | (67.7) | (35.8) | (66.7) | (62.5) | 29.1 | 0.730 |

NOTE: Brackets indicate cells containing less than 10 women.

Table 7.7 Combined effect of the three variables on fertility differentials by respondent's education

| | No education | Primary or less | More than primary |
|---|---|---|---|
| $C_c$ | 0.946 | 0.882 | 0.734 |
| $C_i$ | 0.603 | 0.635 | – |
| Estimated TMFR | 8.27 | 8.12 | – |
| Observed TMFR | 8.24 | 8.00 | 6.50 |
| $C_m$ | 0.872 | 0.847 | 0.695 |
| Estimated TFR | 7.21 | 6.88 | – |
| Observed TFR | 7.19 | 6.78 | 4.25 |

Table 7.8 Median length of lactation by age of respondent and husband's education

| | 15–24 | 24–34 | 35–49 | All ages | $C_i$ |
|---|---|---|---|---|---|
| No education | 20.1 | 23.0 | 26.1 | 22.3 | 0.588 |
| Primary or less | 18.1 | 20.2 | 20.4 | 19.7 | 0.630 |
| More than primary | – | 11.9 | – | 11.9 | (0.782)[a] |

[a]Based on too few women and therefore not totally reliable.

## Husband's education

The relationship observed between husband's education and fertility was very different from that between a respondent's own education and her fertility. A curvilinear relationship is found between levels of fertility and husband's education, with higher fertility levels observed for women whose husbands who had primary or less education than for women whose husbands had no education (table 7.8). The distribution by education is much more favourable for men in Pakistan and there are enough men with higher education in the sample to conduct the analysis by three different levels of education.

*Post-partum infecundability*

It was found that there was a difference of 2.6 months in the median period of lactation among women with husbands who had not completed any level of education and those who had completed primary school. Again, the number of cases with husbands who had more than primary school education was relatively small, making the estimate of median length of lactation somewhat unreliable. There is an inverse relationship, nevertheless, between husband's education and length of lactation, similar to the one found for lactation and wife's own education.

*Use of contraception*

Once again, a positive relationship is found between husband's education and current contraceptive use: 5.1 per cent of wives whose husbands had no education were currently using contraception, compared to about the same proportion of women, 6 per cent of women whose husbands had primary or less education, and 13.4 per cent of women whose husbands had more than primary education (table 7.9). Thus women whose husbands had a low level of education did not use contraception much more than those whose husbands had no education, but this proportion rises markedly for women with husbands with more than primary education.

Table 7.9 Current use of contraception by age of respondent and husband's education

| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 | All | $C_c$ |
|---|---|---|---|---|---|---|---|---|---|
| No education | 0 | (1.2) | 3.6 | 5.3 | 9.2 | 8.1 | 12.6 | 5.1 | 0.953 |
| Primary or less | (0) | (0.6) | (7.2) | (5.4) | 12.3 | (8.8) | (21.8) | 6.0 | 0.945 |
| More than primary | (0.5) | 6.5 | 12.5 | 18.0 | 24.1 | 27.6 | (35.7) | 13.4 | 0.878 |

NOTE: Brackets indicate cells containing less than 10 women.

Table 7.10 Combined effect of two variables on fertility differentials by husband's education

| | No education | Primary or less | More than primary |
|---|---|---|---|
| $C_c$ | 0.953 | 0.945 | 0.878 |
| $C_i$ | 0.588 | 0.630 | 0.782 |
| Estimated TMFR | 8.13 | 8.63 | 9.96 |
| TMFR observed | 8.19 | 8.62 | 7.65 |

Table 7.11 Median length of lactation by province and age of respondent

| | 15–24 | 25–34 | 35–49 | All ages | $C_i$ |
|---|---|---|---|---|---|
| Punjab | 18.8 | 22.2 | 25.3 | 21.0 | 0.608 |
| Sind | – | 19.3 | 21.0 | 19.9 | 0.626 |
| NWFP | 20.0 | 23.8 | | 24.5 | 0.557 |

*Combined effect*

The question we must ask is whether the higher use of contraception, especially among women whose husbands have had primary education, is sufficient to produce a negative relationship with fertility, given the inverse relationship between lactation and education. The answer is clearly no, as seen in the curvilinear relationship observed between husband's educational level and fertility (table 7.10).

The largest discrepancy between observed and estimated total marital fertility is found for the group with above primary education and this may be due to the unreliability of our estimate of $C_i$ for this group. It is likely that we have overestimated $C_i$. Proportions married were not available by husband's education and therefore the TFR could not be computed for these subgroups.

## Region of residence

The provinces of Pakistan represent more than a geo-political division of area: they contain populations that differ ethnically, in their kinship systems and in their breastfeeding patterns and marital behaviour (Farid, chapter 3; Karim, chapter 4; Shah, chapter 8). In economic terms, Punjab and Sind are more urbanized and prosperous than Baluchistan and NWFP, and contain the major cities of Hyderabad, Karachi, Rawalpindi, Lahore and Multan. Women in the sample selected from Punjab and Sind are more likely to be urban and educated than women from the other two provinces. It was found that the number of women from Baluchistan is too small to permit separate categorization, and these women are therefore left out of the analysis.

*Post-partum infecundability*

As is pointed out by Shah (chapter 8), differentials exist between women's breastfeeding behaviour in different regions. Table 7.11 presents the results of a comparison between regions, showing that breastfeeding is longest in NWFP and shortest in Sind, with Punjab somewhere in between.

*Use of contraception*

Use of contraception is about the same in the three provinces at a level of 7.2, 8.0 and 7.5 per cent for Punjab, Sind and NWFP respectively. Consequently $C_c$ was very similar for all three provinces (table 7.12).

*Nuptiality*

There were some differences in proportions married for the three provinces: women in Punjab

Table 7.12 Current use of contraception by age of respondent and province

| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 | All | $C_c$ |
|---|---|---|---|---|---|---|---|---|---|
| Punjab | 0.2 | 2.8 | 6.5 | 8.1 | 12.2 | 12.5 | 14.1 | 7.2 | 0.934 |
| Sind | 0.0 | 2.2 | 9.2 | 11.6 | 13.7 | 11.2 | 22.1 | 8.0 | 0.926 |
| NWFP | 0.0 | 3.8 | 7.1 | 8.1 | 14.5 | 5.9 | 42.6 | 7.5 | 0.931 |

marry later than those living in NWFP and Sind. However, within Sind, the women living in urban areas have a much higher age at marriage than those living in rural areas. But since the proportion living in urban areas is smaller, the $C_m$ for Sind is higher than for NWFP.

*Combined effect*

The estimate of TF of 14.5 seems to fit very well for both Punjab and Sind where estimated TMFR and TFR are very close to the observed values. The greatest divergence between rates estimated and observed is noted in the case of NWFP where the relatively lower $C_i$ leads to a quite high estimate of fertility, as compared to the observed values, fairly similar for all three provinces (table 7.13). Again, the estimated period of infecundability may be too high as some mothers may resort to supplementary foods while they are breastfeeding for long durations, thereby reducing the amenorrhoeic effect.

## 7.4 CONCLUSIONS

The application of the Bongaarts model to subgroups in Pakistan illustrates that the initial effect of urbanization and education on fertility levels can often be ambiguous because of their contradictory effect on some of the major intermediate variables. The application of the model also shows that even though lactation, contraception and marriage can explain a large degree of the variation in the fertility levels, there is still considerable variation, and in some cases there are large discrepancies between estimated and observed fertility which are left unexplained. This may be due to differential misreporting among subgroups or the absence of intermediate variables in the model used here, variables such as temporary separation, induced abortion, frequency of intercourse and abstinence which may be crucial in a population with predominantly natural fertility.

Table 7.13 Combined effect of the intermediate variables on fertility differentials by province

| | Punjab | Sind | NWFP |
|---|---|---|---|
| $C_c$ | 0.934 | 0.926 | 0.931 |
| $C_i$ | 0.608 | 0.626 | 0.557 |
| Estimated TMFR | 8.23 | 8.41 | 7.52 |
| Observed TMFR | 8.22 | 8.38 | 8.51 |
| $C_m$ | 0.818 | 0.866 | 0.858 |
| Estimated TFR | 6.73 | 7.28 | 6.45 |
| Observed TFR | 6.73 | 7.26 | 7.28 |

In the case of urban–rural fertility differentials, it was found that higher urban marital fertility was not explained by the higher levels of contraception and lower levels of breastfeeding. The model predicted lower levels of total marital and total fertility rates for urban areas, but the observed values for total marital fertility rate are higher for urban areas. Only after the introduction of marriage, which reverses the differential, does the total fertility rate become slightly higher for rural areas. Of course this indicates that either some very important intermediate variables such as abstinence or coital frequency are being left out of the model or that rural women are omitting a large number of births, a fact not substantiated by the data evaluation presented in chapter 2.

The model, when applied to subgroups of women with some and with no education, has shown that though lactation and contraception varied in their strength for the two groups, the overall interaction produced similar levels of marital fertility. Fertility was only slightly less for women with primary and less education. It was not possible, due to too few cases, to apply the model to women with more than primary education.

The interaction of the three intermediate variables considered here produced interesting results which differed for husband's and wife's education. The fertility-increasing effect of reduced lactation for women whose husbands had primary education is *not* compensated by their relatively higher contraceptive use, producing higher fertility than for women whose husbands had no education. The effect of husband's education on fertility seems to be positive and therefore different from the effect of the respondent's own education on her fertility. This is consistent with similar findings of a study on fertility differentials discussed by Casterline in chapter 6.

The provinces of Pakistan were found to vary in their breastfeeding and marital behaviour, with NWFP having longer durations of breastfeeding and displaying a more traditional pattern. The resulting predicted level of marital fertility of this province was consequently much too low in comparison with observed levels.

Overall, the average estimated level of total fecundity (TF) seems to be quite efficient in predicting levels of fertility for most subgroups, with some marked exceptions. In particular, the figure of 14.5 seems too low in the estimation of fertility in urban areas. Perhaps in situations where the traditional structure is changing, a higher value of TF is more appropriate. Furthermore, the model does not seem to work well for women whose husbands had more than primary education (because of the very short estimates of length of lactation) and for women from NWFP (with relatively long durations of lactation). These groups too, may demand a different estimate of TF: their breastfeeding behaviour is quite different from average Pakistanis, and it is plausible that other unmeasured intermediate variable values may also be diverging. However, since the two groups of women are quite small, their estimated indexes and fertility are not altogether reliable.

Despite these problems, this study has illustrated the interaction of some of the main intermediate variables in a simple way. It also shows us that there are some interesting differences in the intermediate variables among subgroups, which indicates that change in the reproductive behaviour of Pakistani couples is under way. These differences, however, may not be reflected as significant differentials in fertility because of the compensatory effects among each of the intermediate variables. This explains, at least partially, why factors such as education and urbanization are not necessarily associated with lower fertility in Pakistan.

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# 8 Socio-Economic Differentials in Breastfeeding

Iqbal H. Shah

## 8.1 INTRODUCTION

The evidence for the fertility-reducing effect of breastfeeding comes from clinical research as well as from studies based on a variety of sources such as parish records, special field surveys and anthropological literature. Prolonged breastfeeding is identified as being instrumental in achieving longer birth intervals in countries where little or no contraception is practised (Van Ginneken 1977; Bonte and Van Balen 1969; Berman *et al* 1972; Chen *et al* 1974).

The fertility-reducing effect of breastfeeding stems from its role in lengthening the period of post-partum amenorrhoea and the inhibition of ovulation. It has been suggested that the high levels of prolactin required for lactation inhibit the cyclical production of follicular stimulating hormones (FSH) and luteinising hormones (LH), delaying the normal return of ovarian function after birth (Beard 1977; Potts 1977). Several studies, however, show a variation in the period of post-partum amenorrhoea associated with lactation.[1]

From their review of literature on breastfeeding, Jelliffe and Jelliffe (1972) conclude that ovulation and menstruation are delayed among lactating women for at least 10 weeks and up to 26 months but only if breastfeeding is complete and unsupplemented.

Whereas prolonged breastfeeding has, indeed, played a prime role in keeping fertility in check in a large part of the developing world, evidence has recently been accumulating that the incidence and duration of breastfeeding are declining with modernization (Jelliffe and Jelliffe 1972; Potts 1977; Rosa 1976). Findings from several studies consistently indicate a much shorter duration of breastfeeding for women who are more educated, belong to upper socio-economic classes and live in urban areas (Jain and Sun 1972; Lesthaeghe *et al* 1981; Gaisie 1981). The extent to which rise in education, expansion of communication and increased urbanization in the developing world lead to the breakdown of prolonged breastfeeding is worrying for all concerned with nutrition, health, economic and population problems. Reports on the advantages of breastfeeding abound in a literature that cuts across several disciplines. Medical literature provides evidence that breastfeeding eliminates the risk of hypocalcaemia with convulsions in new-born infants and reduces the risk of obesity and infection, particularly gastro-enteritis. A reduced incidence of breast cancer among mothers who nurse for an extended period is also documented. Psychologically, breastfeeding is said to be a maturation point in normal maternal development and the first act of communication between mother and child. The economic aspect of breastfeeding can be illustrated by the example of Singapore, where the recorded decline in breastfeeding between 1950 and 1960 required an approximate expenditure by families or agencies of the equivalent of 1.8 million dollars to purchase substitutes.

Concern is also felt about the rapid population growth of a country where modern contraceptives either fall short of or barely keep pace with the fertility-increasing effects of curtailed breastfeeding. In Pakistan, current use and ever-use of contraception are reported to be five and ten per

[1] Reviewing studies relating to different countries, Gray (1981) points out that the average duration of lactation in Taiwan was 17.7 months, corresponding to the mean duration of amenorrhoea of 11.4 months, whereas in Senegal the average duration of lactation was 24.3 months and the mean length of amenorrhoea was 10.8 months. Similarly, the average length of breastfeeding in the Punjab villages of the Khanna study was 21 months and the period of amenorrhoea was 11.7 months. In Bangladesh, however, the mean duration of lactation was 24 months and the mean duration of amenorrhoea was 18.7 months.



Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey*: 123–147. Voorburg, Netherlands: International Statistical Institute.

cent, respectively (International Statistical Institute 1977: 10–11) and the average annual growth rate is estimated at 2.8 per cent (Hobbs 1980: 1). Both ever-use and current use of contraception are higher among more educated and urban women, who are also likely to breastfeed for shorter durations.

Studying the impact of breastfeeding on fertility requires data far more detailed and cleaner than those generally available for Pakistan. Nevertheless, an attempt is made here to estimate the incidence and levels of breastfeeding from the limited data. In doing so, the potential sources of difficulty and inconsistency are identified. Also analysed are the socio-economic differentials of breastfeeding.[2]

## The data source

Data come from the Pakistan Fertility Survey. For methodological details and data limitation see chapter 2.

Questions on breastfeeding were asked for each child while ascertaining information on the maternity history of the respondents. In the following discussion, the length of breastfeeding in the last closed birth interval is taken to mean the length of breastfeeding in the interval between (n – 1) and nth live births for women of parity n, unless otherwise specified. This implies the duration of breastfeeding of the next to last child, and is defined for all women with at least two live births. Breastfeeding in the open interval refers to the breastfeeding of the last child for all women with at least one live birth irrespective of their pregnancy status at the time of survey. It should be noted that these definitions are different from those originally used in producing the PFS tables, where the definition of the open interval excludes currently pregnant women and the duration of breastfeeding in the last closed birth interval refers to the breastfeeding of the next to last child for women not pregnant and to the breastfeeding of the last child for pregnant women.

We consider in section 8.2 the extent to which divergent estimates are obtained by following the PFS definitions.

## Social and demographic background

Despite an increase in urbanization, nearly three-quarters of the population of Pakistan still live in rural areas. Islam is the religion of 97 per cent of the people, with its tradition of prolonged breastfeeding (Kirk 1968: 239), and the Koran makes explicit references to a two-year period of breastfeeding,[3] though the extent to which prolonged breastfeeding in Pakistan has been influenced by Islamic traditions is not known for certain.[4]

Fertility in Pakistan is fairly high. Women aged 45 and over have an average 6.9 children ever born. Marriage is nearly universal for women and occurs at an early age with a mean age at first marriage for females of around 16 years[5] (for further details see chapter 3). Ninety per cent of marriages remain intact, and remarriage of widowed and divorced women is encouraged. The period of post-partum abstinence is generally reckoned to be 40 days, which implies that the couple have resumed their normal sexual life long before the weaning of the child.

Fertility would be even higher but for the practice of prolonged breastfeeding and the early age at which childbearing is terminated. The mean and median age at last birth for women over age 45 are found to be 35.5 and 36.9 years, respectively. Figure 8.1 shows the mean length of breastfeeding for the sample women (based on all closed birth intervals for children surviving at least two years), by region, adjusting by means of multiple classification analysis for the levels of education,

[2] This chapter is based on the author's preliminary analysis of breastfeeding data for Pakistan. Subsequently a more detailed analysis was undertaken by Page, Lesthaeghe and Shah as part of the WFS illustrative analysis subseries and the results are published as 'Illustrative Analysis: Breastfeeding in Pakistan', *WFS Scientific Reports* no 37.

[3] The following quotation comes from the Koran: 'And we have enjoined on man (to be good) to his parents: in travail upon travail did his mother bear him, and in years twain was his weaning' (Sura 31: 41) (Abdullah Yusuf Ali (1946). *The Holy Quran: Text, Translation and Commentary*: 1083. McGregor and Werner.)

[4] Non-Muslim women in the Indian Punjab also breastfeed for 18 months or longer (Potter *et al* 1965), and it might well be argued that prolonged breastfeeding is a tradition of the subcontinent or, indeed, of peasant societies in general.

[5] The summary of the PFS findings (International Statistical Institute 1977: 3) indicates the mean age at first marriage as 16.1 years. This estimate is probably based on the original dataset, with the urban population being oversampled.


Figure 8.1 Mean duration of breastfeeding by region controlling for education, rural–urban place of residence, parity and age, ever-married women, Pakistan 1975, based on all closed intervals for children surviving at least two years

rural–urban place of residence, parity and age. A few words of caution need be said before interpreting the results from this figure. First, the sample size for Baluchistan is too small to allow any reasonable comparisons of its figure. Secondly, the mean is based on all closed birth intervals, which are subject to the problem of truncation. Though the exact magnitude of the bias has still to be examined, the means shown in figure 8.1 are, if anything, underestimates. Finally, the estimates are based on children surviving at least two years. Nevertheless, the results shown in figure 8.1 are indicative of the prevailing patterns of prolonged breastfeeding among women in different regions of Pakistan. The longer duration of breastfeeding among women of the NWFP seems to be an attribute of the ethnic group, who believe that the mother's milk is best for the child's health and discourages early supplementation of breastfeeding.

Table 8.1 provides a socio-economic and demographic profile of the sample women and substantiates most of what has been stated above. Note that the fertility of rural women is lower than that of urban women. It is also noteworthy that rural women manifest most of the characteristics generally attributed to high fertility: younger age at marriage, low literacy, lower levels of contraceptive use. The observed rural–urban fertility differential is upheld when duration of marriage and educational level are controlled; this unexpected finding has been discussed in earlier studies (Sathar 1979; Yusuf and Retherford 1981; International Statistical Institute, 1977). The reversal of the classic rural–urban fertility differential is, however, neither theoretically implausible nor empirically unique when one observes that Pakistan is probably in the early phase of demographic transition. During this phase, social economic factors associated with modernization

**Table 8.1** Selected socio-economic and demographic characteristics by region and place of residence for all ever-married women, Pakistan 1975

| Background characteristics | Punjab | | | Sind | | | NWFP | | | Baluchistan | | | All Pakistan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | Urban | Total | Rural | Urban | Total | Rural | Urban | Total | Rural | Urban | Total | |
| 1 Mean age at first marriage (years) | 15.71 (2586) | 15.98 (741) | 15.77 (3327) | 14.6 (625) | 15.34 (455) | 14.91 (1080) | 15.06 (397) | 16.02 (66) | 15.2 (463) | 14.12 (61) | 16.29 (21) | 14.68 (82) | 15.51 (4952) |
| 2 Mean number of children ever born | 4.18 (2587) | 4.39 (741) | 4.23 (3327) | 3.89 (625) | 4.32 (455) | 4.07 (1080) | 4.11 (397) | 4.25 (66) | 4.13 (463) | 3.45 (61) | 3.71 (21) | 3.52 (82) | 4.17 (4952) |
| 3 % ever used contraceptive method | 6.7 (174) | 21.2 (157) | 9.95 (331) | 2.7 (17) | 20.9 (95) | 10.37 (112) | 7.5 (30) | 20.6 (14) | 9.5 (44) | * | * | * | 9.87 (189) |
| 4 Mean duration of breastfeeding[a] (months) | 18.71 (826) | 15.46 (277) | 17.89 (1103) | 16.63 (224) | 14.80 (179) | 15.81 (403) | 20.51 (130) | 15.48 (27) | 19.65 (158) | 16.41 (20) | 14.54 (9) | 15.84 (29) | 17.53 (1693) |
| 5 % literate | 6.2 (159) | 26.8 (199) | 10.76 (358) | 2.3 (14) | 25.4 (116) | 12.04 (130) | 4.2 (17) | 28.9 (19) | 7.78 (36) | * | * | * | 10.68 (529) |
| 6 % exposed to mass media | 23.4 (604) | 51.8 (384) | 29.7 (988) | 42.1 (263) | 62.3 (284) | 50.65 (547) | 29.8 (119) | 48.5 (32) | 32.61 (151) | 45.1 (28) | 64.5 (14) | 51.22 (42) | 34.87 (1727) |
| 7 % ever worked | 14.7 (381) | 22.7 (168) | 16.50 (549) | 47.7 (298) | 23.0 (105) | 37.31 (403) | 19.0 (75) | 14.4 (10) | 18.36 (85) | 17.6 (11) | 35.5 (7) | 21.95 (18) | 21.30 (1055) |

* Number of cases 5 or less
[a] Based on the duration of lactation in all closed intervals for children surviving at least two years.
NOTE: Number of cases is given in parentheses.

may break down the traditional mechanisms used in peasant societies to keep fertility in check.[6] The same factors may, however, concurrently generate an increase in age at marriage, an increase observed in Pakistan (Karim, chapter 4), greater use of modern contraceptives and a smaller desired family size. The observed levels and differentials of fertility are, therefore, largely determined by the extent to which modernization has influenced the fertility-increasing and fertility-decreasing mechanisms.

The lower fertility of rural or uneducated women in Pakistan might well be attributed to the tradition of prolonged breastfeeding, which has either remained intact or declined less than among their urban counterparts, for whom the influence of reduced breastfeeding has outweighed the influence of any increase in contraception or rise in age at marriage. The initial impetus of modernization seems to be more in the direction of reducing the duration of breastfeeding than in the direction of greater contraceptive use. Thus, the omission of the overriding factor of breastfeeding understandably accounts for the surprising display of socio-economic differentials of fertility as found in several previous studies on Pakistan. While higher marital fertility in urban areas is observed, the age-specific fertility rates and TFR are lower than those observed for rural residents, a consequence of proportionality, ie more unmarried females found in urban areas.

## 8.2 MEASUREMENT OF BREASTFEEDING

To provide an estimate for the length of breastfeeding that does not reflect the biases and defects of the data poses a great challenge, the more so because not all of the biases are obvious. Information on breastfeeding for the last two births (ie breastfeeding in the last closed birth interval and in the open interval) is thought to be somewhat more reliable, since these births constitute more recent events and do not in general involve a long recall period. In an analysis of birth intervals, we must first make it clear whether we are dealing with intervals per woman or intervals per birth. Interval analysis also implies that any truncation effect present in the data would carry over to the derived estimates of breastfeeding, since the length of breastfeeding is closely and positively related to the length of birth interval, especially where contraceptive use is low, as in Pakistan. If short intervals are predominantly selected in the data on the last closed birth interval, any estimate of breastfeeding derived from it would inevitably be downward biased. The other more obvious defects in the data that are available on breastfeeding are heaping and sampling fluctuations. The identification of all possible sources of bias in interval analysis is beyond the scope of this analysis, and the subject is dealt in Page *et al* (1980) in a paper which also provides the explanation for the apparent inconsistencies in the information on breastfeeding. This section investigates primarily the extent to which consistent information on breastfeeding is yielded by different types of data.

### Intervals per woman

Although several definitions of interval per woman are possible, we shall focus only on two definitions and their PFS variants. The first is the retrospectively reported duration of breastfeeding in the last closed birth interval and the second is the current status information on breastfeeding in the open interval. Using both types of data enables us not only to compare the estimates they yield, but also to examine whether certain types of error are particular to a certain type of data.

To minimize the interference stemming from infant and child mortality, the sample for the last closed birth interval was restricted to women whose next to last child survived for two years or longer. For the open interval, the sample included women whose last child still survived. Since the open interval is defined for women with at least one live birth and the last closed interval is defined for women with at least two live births, subpopulation difference complicates the comparison of findings. To minimize this difference, the analysis for the open interval was also restricted to women with at least two live births. The information on the open interval for women with at

[6] In his comment on papers for the Seminar on Nuptiality and Fertility (International Union for the Scientific Study of Population, 8–11 January 1979), Lesthaeghe makes a persuasive case for the rise in marital fertility at the onset of fertility transition, drawing evidence from the experience of historical European populations as well as from Taiwan, Korea and Japan. Through simulation, he also shows how modernization affects different components of marital fertility to show why and how the possibility of a rise in fertility is real. Some discussion can also be found in Page and Lesthaeghe, eds (1981), chapter 1.

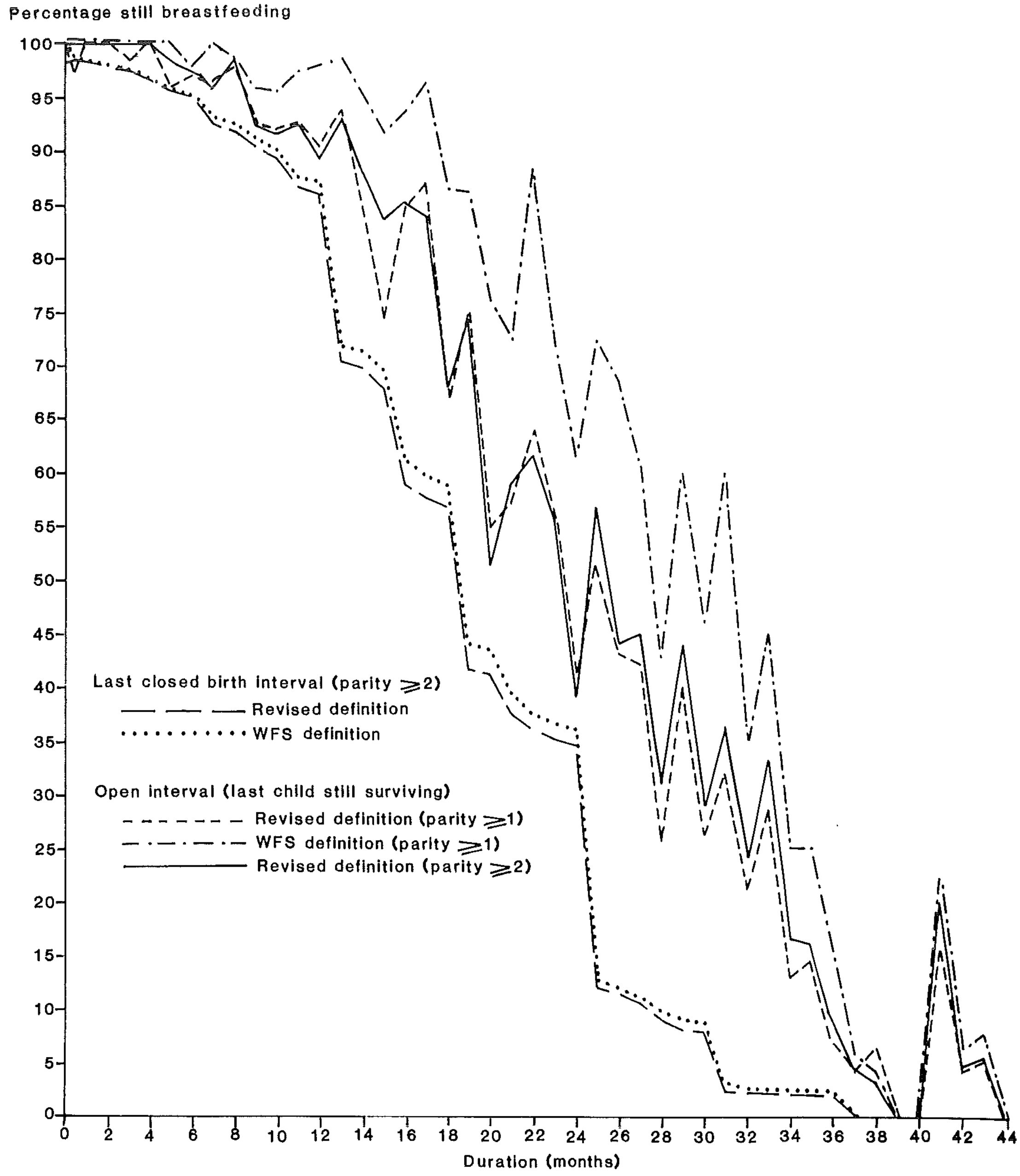


Figure 8.2 Observed distributions of women still breastfeeding by duration according to the different types of data

least one live birth was, however, considered important in order to give an overall population estimate. It is interesting, therefore, to see how far divergent estimates are obtained by restricting the sample for the open interval to women with at least two live births and to women with one live birth. It should also be noted that breastfeeding in the open interval refers to the proportions still breastfeeding by duration elapsed since last birth.

Figure 8.2 shows the percentage distribution of women still breastfeeding by duration as revealed by different types of data. Several findings of interest emerge. First, the WFS definition of the last closed birth interval (which considers the length of breastfeeding of the next to last child for women not currently pregnant and of the last child for women currently pregnant) yields results very similar to those of the definition adopted here that considers the length of breastfeeding of the next to last child irrespective of the pregnancy status of women. The medians for both definitions are almost identical (18.5 months for the present definition and 18.6 months for the WFS definition), though the mean for the WFS definition would be slightly higher. However, the WFS definition of the open interval (which excludes currently pregnant women) yields the highest estimate that can be obtained from the sources considered here. The median for the WFS definition of the open interval was approximately five months higher than that for all women with similar sample restrictions of child survival and parity. The exclusion of pregnant women (who are likely to have shorter intervals) implies a selection for longer intervals in the WFS definition of the open interval.

The second finding of interest is that the difference in the sample of open interval (ie whether it is based on women with at least two live births or one live birth) is not reflected in any greater divergence in the results (see the two central curves).

In general, the estimates based on open intervals are much higher than those based on the last closed birth interval. The truncation effect seems to be the main reason for the trends shown in figure 8.2. The last closed birth interval presents the case where short intervals predominate, while the WFS definition of open interval indicates a selection for the long intervals. Another potential reason for the discrepant results can be the respondent's notion of breastfeeding. Some respondents, especially those at longer durations, may consider themselves to be still breastfeeding when asked about current status (ie the open interval), even though they are breastfeeding only partially. For the retrospectively reported duration of breastfeeding in the last closed interval, the respondent may, on the other hand, report the duration of full breastfeeding. With the data available, it is hard to discern the effects which may be due to these differing notions of breastfeeding. It should be noted, however, that among women who reported the duration of breastfeeding for the last child (ie women not reported as currently breastfeeding), 32 or 3.6 per cent reported a duration that was longer than the age of the child. These women may have reported the intended duration instead of actual experience, since the age of the last child for almost all of these 32 women was under two years. It is clear that further investigation is needed to determine the extent and direction of biases that are inherent in the distributions and their associated measures of central tendency which can be derived from the last closed birth interval and the open interval.

Besides the inconsistent information on breastfeeding shown by different types of data, other more obvious defects are found in the observed schedules. The retrospectively reported durations have proved to be exceptionally subject to heaping biases with 6, 12, 18, 24 and 30 months being favoured (see figure 8.2). For example, 22.5 per cent of the respondents reported having breastfed for 24 months, while the adjacent durations of 23 and 25 were reported by 0.7 and 0.5 per cent, respectively. Had these local concentrations been genuine (because of being the normative durations), we would have observed a similar trend in the open interval, which does not show a sudden drop-off at the corresponding durations. The hypothesis that heapings at certain durations are genuine must therefore be rejected.

The irregularities in the schedule for open interval are primarily due to sampling fluctuation. Despite a total sample of 2301 women, the number of women currently at any given duration is very small, especially at durations longer than 30 months.

One way to smooth out the irregularities and heaping errors is to take three-month weighted moving averages of the observed schedules. This procedure was applied to the distributions for the last closed interval and for the open interval. In the following discussion, the sample for the open interval included women with at least two live births. Results are shown in table 8.2 (columns (2) and (6)) and in figure 8.3. While the smoothing procedure reduced the irregularities to some extent, the schedules still required further treatment.

As with other types of defective data, techniques are now available for adjusting the reported durations of breastfeeding by model schedules. The model schedule of breastfeeding utilized here comes from Lesthaeghe and Page (1980), who provide a detailed discussion on the development and application of model schedules. A summary of their discussion is given below.

The model schedule for breastfeeding has been

Table 8.2 Estimation of smoothed and adjusted distribution of the duration of breastfeeding based on data from the last closed interval and the open interval, all women with at least two live births[a]

| Duration (month) | Last closed interval | | | | Open interval | | | |
|---|---|---|---|---|---|---|---|---|
| | Proportion still breastfeeding | | Logit transform | Prop. still breast-feeding according to $\alpha = 0.634$, $\beta = 0.800$ | Proportion still breastfeeding | | Logit transform | Proportion still breastfeeding according to $\alpha = 1.051$, $\beta = 0.685$ |
| | Original data | 3-month moving averages | | | Original data | 3-month moving averages | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 1 | 0.983 | 0.983 | 2.029 | 0.987 | 1.0 | 1.0 | | 0.991 |
| 2 | 0.978 | 0.978 | 1.897 | 0.982 | 1.0 | 1.0 | | 0.989 |
| 3 | 0.975 | 0.972 | 1.832 | 0.977 | 1.0 | 1.0 | | 0.985 |
| 4 | 0.965 | 0.967 | 1.658 | 0.970 | 1.0 | 0.995 | 2.647 | 0.982 |
| 5 | 0.956 | 0.954 | 1.539 | 0.960 | 0.983 | 0.986 | 2.127 | 0.977 |
| 6 | 0.950 | 0.947 | 1.472 | 0.949 | 0.975 | 0.971 | 1.756 | 0.971 |
| 7 | 0.925 | 0.936 | 1.256 | 0.935 | 0.958 | 0.973 | 1.792 | 0.964 |
| 8 | 0.919 | 0.914 | 1.214 | 0.917 | 0.986 | 0.954 | 1.516 | 0.956 |
| 9 | 0.903 | 0.902 | 1.116 | 0.895 | 0.922 | 0.940 | 1.376 | 0.946 |
| 10 | 0.891 | 0.891 | 1.050 | 0.869 | 0.915 | 0.921 | 1.228 | 0.933 |
| 11 | 0.866 | 0.864 | 0.933 | 0.837 | 0.924 | 0.909 | 1.151 | 0.918 |
| 12 | 0.860 | 0.855 | 0.908 | 0.802 | 0.892 | 0.913 | 1.175 | 0.901 |
| 13 | 0.704 | 0.837 | 0.433 | 0.761 | 0.927 | 0.902 | 1.110 | 0.881 |
| 14 | 0.698 | 0.682 | 0.419 | 0.714 | 0.880 | 0.879 | 0.991 | 0.858 |
| 15 | 0.677 | 0.672 | 0.370 | 0.666 | 0.786 | 0.843 | 0.840 | 0.833 |
| 16 | 0.590 | 0.660 | 0.182 | 0.615 | 0.852 | 0.827 | 0.782 | 0.805 |
| 17 | 0.577 | 0.571 | 0.155 | 0.561 | 0.839 | 0.764 | 0.587 | 0.773 |
| 18 | 0.569 | 0.565 | 0.139 | 0.505 | 0.679 | 0.728 | 0.492 | 0.737 |
| 19 | 0.419 | 0.536 | −0.163 | 0.449 | 0.744 | 0.659 | 0.329 | 0.699 |
| 20 | 0.414 | 0.405 | −0.174 | 0.395 | 0.514 | 0.618 | 0.241 | 0.657 |
| 21 | 0.378 | 0.397 | −0.249 | 0.343 | 0.588 | 0.578 | 0.157 | 0.613 |
| 22 | 0.362 | 0.368 | −0.283 | 0.297 | 0.617 | 0.586 | 0.174 | 0.570 |
| 23 | 0.353 | 0.348 | −0.303 | 0.256 | 0.556 | 0.500 | 0.000 | 0.525 |
| 24 | 0.347 | 0.342 | −0.316 | 0.218 | 0.392 | 0.489 | −0.022 | 0.481 |
| 25 | 0.121 | 0.334 | −0.991 | 0.185 | 0.569 | 0.457 | −0.086 | 0.437 |
| 26 | 0.116 | 0.113 | −1.015 | 0.156 | 0.441 | 0.496 | −0.008 | 0.394 |
| 27 | 0.108 | 0.106 | −1.056 | 0.132 | 0.450 | 0.408 | −0.186 | 0.355 |

**Table 8.2** *(cont)*

| Duration (month) | Last closed interval | | | | Open interval | | | |
|---|---|---|---|---|---|---|---|---|
| | Proportion still breastfeeding | | Logit transform | Prop. still breast-feeding according to $\alpha = 0.634$, $\beta = 0.800$ | Proportion still breastfeeding | | Logit transform | Proportion still breastfeeding according to $\alpha = 1.051$, $\beta = 0.685$ |
| | Original data | 3-month moving averages | | | Original data | 3-month moving averages | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 28 | 0.092 | 0.101 | − 1.145 | 0.111 | 0.310 | 0.406 | − 0.190 | 0.318 |
| 29 | 0.083 | 0.083 | − 1.201 | 0.094 | 0.444 | 0.330 | − 0.354 | 0.284 |
| 30 | 0.082 | 0.081 | − 1.208 | 0.079 | 0.290 | 0.342 | − 0.327 | 0.252 |
| 31 | 0.025 | 0.081 | − 1.832 | 0.066 | 0.364 | 0.292 | − 0.443 | 0.222 |
| 32 | 0.024 | 0.025 | − 1.853 | 0.056 | 0.241 | 0.308 | − 0.405 | 0.197 |
| 33 | 0.024 | 0.024 | − 1.853 | 0.047 | 0.333 | 0.253 | − 0.541 | 0.174 |
| 34 | 0.024 | 0.024 | − 1.853 | 0.040 | 0.167 | 0.220 | − 0.633 | 0.154 |
| 35 | 0.023 | 0.023 | − 1.874 | 0.034 | 0.162 | 0.145 | − 0.887 | 0.135 |
| 36 | 0.023 | 0.023 | − 1.874 | 0.029 | 0.091 | 0.100 | − 1.099 | 0.120 |
| 37 | 0.002 | 0.022 | − 3.106 | 0.025 | 0.049 | 0.054 | − 1.432 | 0.106 |
| 38 | 0.001 | 0.002 | − 3.453 | 0.021 | 0.034 | 0.034 | − 1.673 | 0.094 |
| 39 | 0.001 | 0.001 | − 3.453 | 0.018 | — | 0.016 | − 2.060 | 0.083 |
| 40 | 0.001 | 0.001 | − 3.453 | 0.016 | — | 0.065 | − 1.333 | 0.074 |
| 41 | 0.001 | 0.001 | − 3.453 | 0.013 | 0.200 | 0.080 | − 1.221 | 0.065 |
| 42 | 0.001 | 0.001 | − 3.453 | 0.012 | 0.048 | 0.093 | − 1.139 | 0.058 |
| 43 | — | — | — | — | 0.056 | 0.034 | − 1.673 | 0.052 |

[a] Raw data, column (1) were used for the last closed interval, but smoothed data, column (6), were used for the open interval because raw data were erratic and the sample sizes became very small at longer durations.

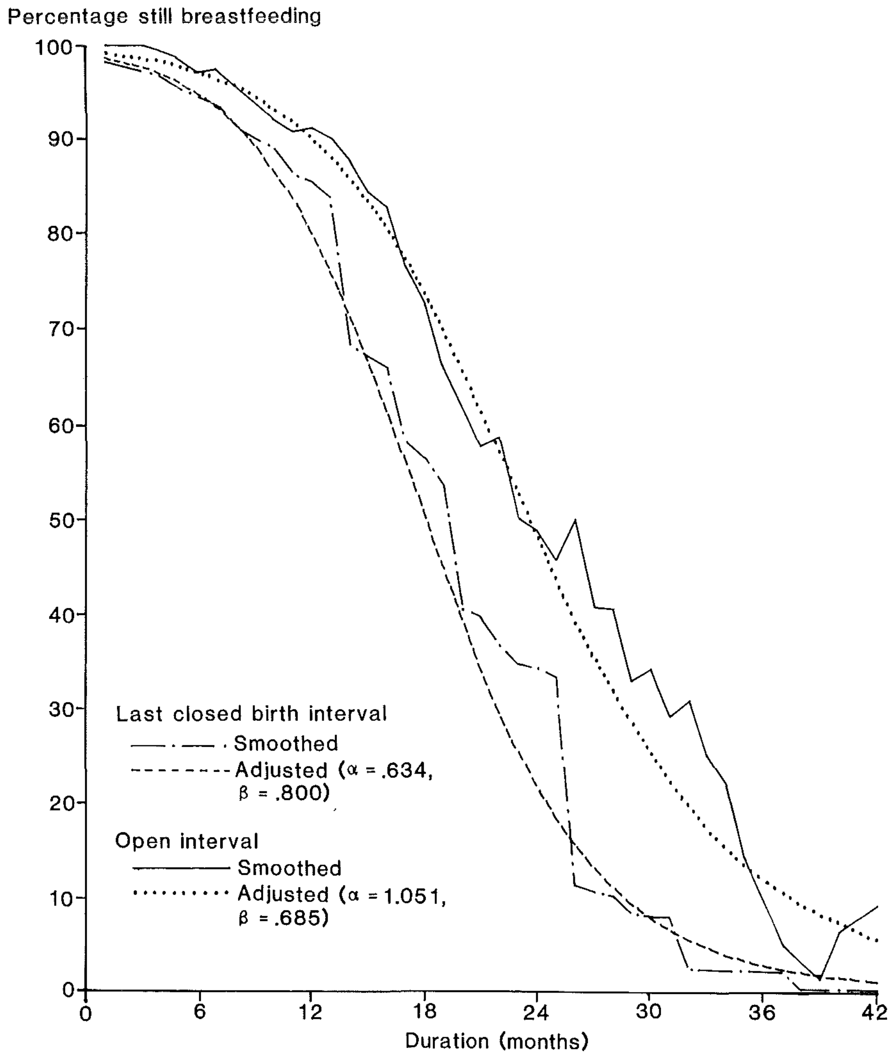


Figure 8.3 Smoothed and adjusted distributions of women still breastfeeding by duration, all women with at least two live births

developed from the observation that the proportions breastfeeding for a given population tabulated by duration of time since birth exhibit a strong linear relationship to the corresponding proportions in other populations once a logit transform is made. The standard schedule for breastfeeding was constructed so that the proportion observed at duration d, P(d) can be related to the standard using the linear relation:

$$\text{Logit } [P(d)] = \alpha + \beta \text{ logit } [P(d)_{\text{standard}}]$$

For each reported schedule of P(d)-values, the best fitting values of $\alpha$ and $\beta$ can be estimated. The irregularities in the raw data are then eliminated by calculating the adjusted series of P(d)-values implied by the $\alpha$ and $\beta$. Both the procedure and its underlying rationale are analogous to those in the logit system of model life tables (Brass 1975).

The reported proportions breastfeeding (P(d)) from both the last closed interval and the open interval[7] were transformed into logits and plotted against the logit of the standard schedule constructed by Lesthaeghe and Page. The best fitting

[7] Raw data (column (1) in table 8.2) were used for the last closed interval but smoothed data (column (6) in table 8.2) were used for the open interval because raw data were erratic and the sample sizes became very small at longer durations.

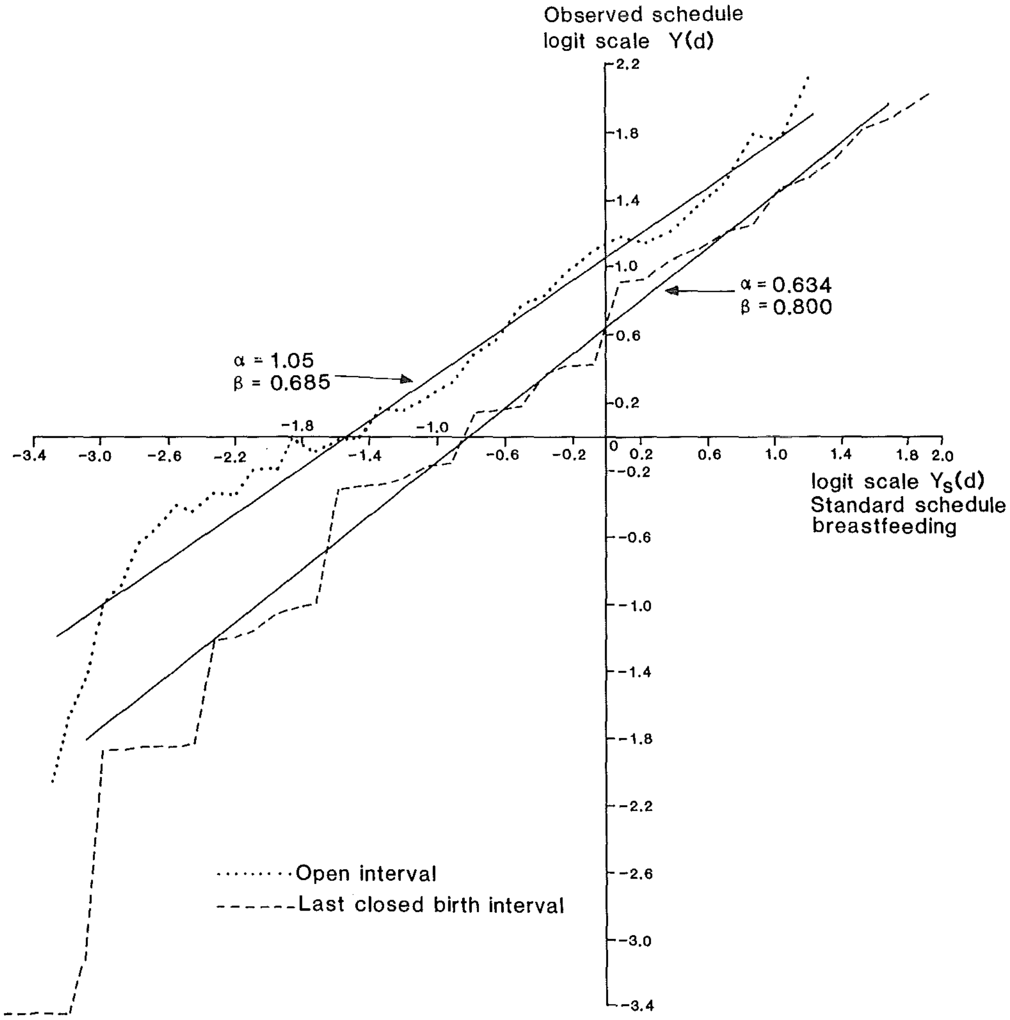


**Figure 8.4** Comparison of breastfeeding schedules to the standard schedule after conversion to logits, all women with at least two live births

$\alpha$ and $\beta$ for each schedule of breastfeeding were estimated and adjusted series of proportion breastfeeding were computed. Figure 8.4 shows the reported and adjusted proportions on a logit scale and figure 8.3 presents the adjusted schedules along with those smoothed by using three-month weighted moving averages. The medians obtained from the smoothed and adjusted schedules of breastfeeding are given in table 8.3.

While the smoothing of data and the application of a model schedule of breastfeeding have helped to eliminate the obvious irregularities in the reported distributions, neither procedure could overcome the problem of a selection or truncation effect in the interval analysis. Figure 8.5 demonstrates again the inconsistency in the information on breastfeeding yielded by the retrospective data for the last closed interval and the current status data for the open interval.

The current state of the art does not indicate any preference for one type of data, nor does it recommend the pooling of estimates that are so far apart, so that the precise level of breastfeeding remains undetermined. Nevertheless, we can safely conclude that the average length of breastfeeding was at least 18 months when the child survived

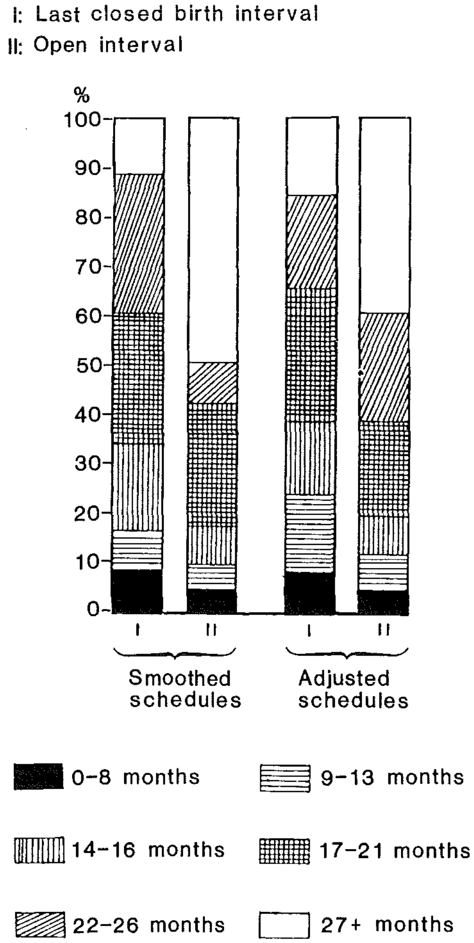


**Figure 8.5** Duration of breastfeeding, according to the smoothed and adjusted schedules of the last closed birth interval and the open interval, all women with at least two live births

**Table 8.3** The estimates of median duration (in months) of breastfeeding, all women with at least two live births

| Source of data | Breastfeeding | |
|---|---|---|
| | Smoothed schedules | Adjusted schedules[a] |
| Retrospectively reported duration for the last closed int. | 19.27 | 18.09 ($\alpha = 0.634, \beta = 0.80$) |
| Proportions still breastfeeding by duration since last birth (open int.) | 23.00 | 23.57 ($\alpha = 1.051, \beta = 0.685$) |

[a] The median of the adjusted schedule is indicated by $-\alpha/\beta$; it is the duration associated in the standard with the estimated value of $-\alpha/\beta$.

two years or longer. It can also be concluded that the heaping in the retrospective data is due more to rounding of responses than to rounding of behaviour. Finally, both types of data indicate that breastfeeding was nearly universal since only one per cent (a consistent figure for both data types) of the respondents did not breastfeed.

## Intervals per birth

The estimates of breastfeeding can also be derived by studying the interval following all births in the last n years. The computer program developed by Smith was utilized for this purpose. This program focuses on all births that occurred in the last five years and uses the information on the date of birth and the breastfeeding status at the time of the interview. The underlying method of analysis is that of the life table and it has been fully described in Smith (1980).

The estimates produced by the program are not affected by rounding errors, since they do not involve reported durations or reported dates of breastfeeding termination, or by irregularities (if the sample sizes are not too small). They remain, however, susceptible to a misreporting of dates of birth which is systematically upwards or downwards biased.

The analysis was restricted to surviving children only. The program was used to obtain estimates for the total sample as well as for different socio-economic subgroups. The sample output of the program is given in appendix A (table A1). Table 8.4 presents the summary of results and figure 8.6 shows how the total sample and the subgroups are ranked according to their associated means for the duration of breastfeeding. (The estimates are inferred for the group from the observation based on births.) The mean for the total sample was 21.9 months but the means for the groups with a more traditional background – illiterate, rural place of residence, not exposed to mass media, and farm occupation – were much higher. The highest mean was 23.4 months for those with a farm occupation and the lowest was 18.7 months for the urban residents. Other differentials suggest that the average breastfeeding was 4.4 months less among urban residents than among rural residents; 3.6 months less among women exposed to mass media than those not exposed; and 2.5 months less among those with a non-farm occupation than those with a farm occupation. Both the proportions ever breastfed and the mean duration of

Table 8.4 Mean duration of breastfeeding and the proportions ever breastfed for the total sample and selected socio-economic subgroups, surviving children

| Sample | Mean | Proportions ever breastfed |
|---|---|---|
| Total | 21.92 | 0.988 |
| *Ethnic group* | | |
| Punjabi | 22.32 | 0.992 |
| Non-Punjabi | 21.07 | 0.980 |
| *Place of residence* | | |
| Rural | 23.09 | 0.997 |
| Urban | 18.68 | 0.959 |
| *Exposure to mass media* | | |
| No exposure | 23.19 | 0.992 |
| Exposed | 19.59 | 0.979 |
| *Husband's literacy* | | |
| Illiterate | 22.93 | 0.994 |
| Literate | 20.70 | 0.980 |
| *Husband's occupation* | | |
| Farm | 23.38 | 0.997 |
| Non-farm | 20.87 | 0.982 |

breastfeeding, shown in table 8.4 and figure 8.6, indicate that prolonged breastfeeding is universal in Pakistan. Over 96 per cent of the children were breastfed at least briefly, and the lowest mean duration of breastfeeding was 18.7 months.

The cohort trend[8] in breastfeeding can be ascertained from figure 8.7 (a and b). (See table A2 for further details on mean duration of breastfeeding and proportions ever breastfed by age, duration of marriage of women at the birth of the child and the birth order of the child.) Though a consistent decline in breastfeeding is noticed for each younger cohort of women, the decline is much more pronounced among the groups that represent traditional characteristics. For example, in the group of women not exposed to mass media, women aged 15–24 breastfed on the average 21.2 months as compared to 26.4 months for those aged 35–44 years (a difference of 5.2 months). A similar trend was noticed for rural residents and

[8] Since the age of a woman also identifies her birth cohort, the terms age and cohort are used interchangeably.

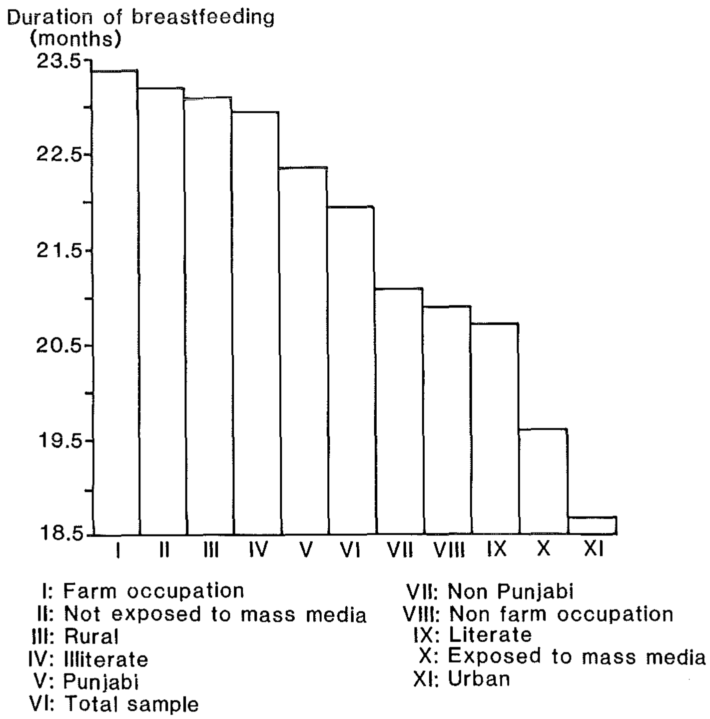


**Figure 8.6** Mean duration of breastfeeding for the total sample and selected socio-economic subgroups, surviving children

the illiterate group. For the total sample, the decline in the average length of breastfeeding of women aged 15–24 from the duration of women aged 35–44 was of the order of 4.8 months.

Focusing on the total sample and the groups for which sample sizes across age groups were comparable, we observe that the cohort of women aged 25–34 showed much greater decline in the length of breastfeeding from its predecessor cohort of 35–44 years than did the youngest cohort of 15–24 years from its predecessor cohort. For the total sample, for example, the mean duration of breastfeeding for women aged 35–44 was 25.2 months while the mean for women aged 25–34 was 22 months (a difference of 3.2 months). However, the mean for women aged 15–24 was 20.4 months, which was just 1.6 months short of the mean for its predecessor cohort aged 25–34. This is probably an indication of the prevalence of strong norms for a minimum length of breastfeeding.

So far, the primary objective of the analysis has been to provide estimates for the levels of breastfeeding. By considering different socio-economic subgroups and age groups, we have outlined the simple relationships. The next section is devoted to a study of the socio-economic differentials of breastfeeding in a multivariate context.

## 8.3 SOCIO-ECONOMIC DIFFERENTIALS OF BREASTFEEDING

In a detailed discussion of the differentials of breastfeeding, the life-table estimates given above provide only preliminary answers. In order to study these differentials, we must control for the confounding effects of other interrelated variables before we draw conclusions about the relationship between a particular independent (socio-economic) variable and breastfeeding. We can, of course, obtain life-table estimates which are specific to two or more socio-economic variables (for example, 'rural–illiterate' or 'rural–illiterate–not exposed to mass media' and so on for other combinations of the variables of interest) and compare these estimates. Strong consideration of sample size, however, constrains the extension of life-table analysis to allow for such an exercise, to say nothing of the categories within a single

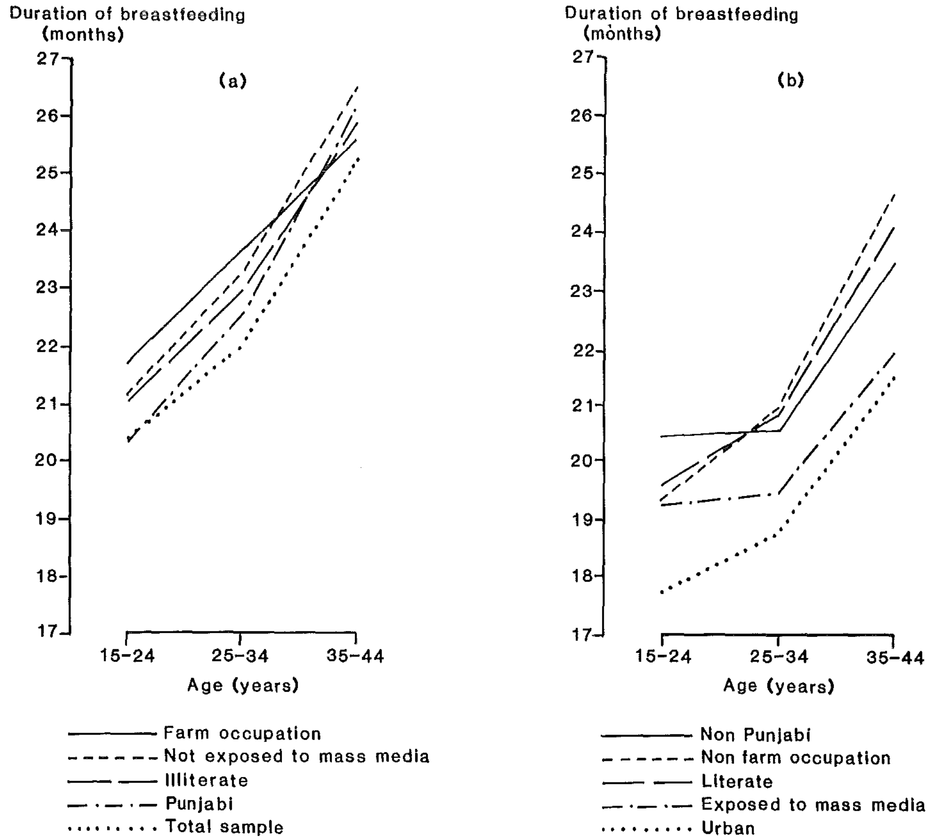


**Figure 8.7** Mean duration of breastfeeding by mother's age at birth of the child, total sample and selected socio-economic subgroups

variable which are lumped together to avoid the unnecessary data fluctuation due to their small sample sizes. Models such as the proportional hazards model (see Cox 1972 and Rodríguez and Hobcraft 1980) allow us to combine the data over several groups and evaluate the effects of independent variables (called covariates), but the models are fairly complex. From the sociological perspective, one may also argue that it is the behaviour and background characteristics of women that we are interested in and women therefore constitute the logical unit of analysis rather than births, as was the case for life tables. However, an analysis based on either of the measures available for women — the duration of breastfeeding in the last closed interval or the proportion still breastfeeding in the open interval — remains susceptible to the inherent biases. It was considered essential to perform a parallel analysis on both the last closed interval and the open interval.

The structural model of social background and breastfeeding proposed by Hirschman and Sweet (1974) guided the choice of socio-economic independent variables and the systematic investigation of their influence upon breastfeeding. Hirschman and Sweet constructed the model by following a life-cycle perspective to indicate the important social determinants of breastfeeding. Some determinants originate from the family of orientation (called 'social origins' by Hirschman and Sweet), which provides an initial social matrix of personal relationships, opportunities, and beliefs that shape future behaviour. The next source is educational attainment, which is an index of the socialization of an adult. The final source is the social status of a woman as an adult, which may transmit influences from her earlier life or have important independent effects.

The limitations of the data do not permit a rigorous analysis of the model. Some information is, however, available to make use of this model. Ethnic affiliation and residential mobility of the respondents are used to measure the influence of social origins on the pattern of breastfeeding. The ethnic group is identified from the information on the language of interview. Women who speak Baluchi and Barohi were excluded from the analysis because they numbered less than ten. The variable 'residential mobility' was derived from the information on the respondent's childhood place of residence and her current place of residence. This variable was classified into the following four categories, with the first word referring to childhood place of residence, and the second to the current place of residence:

1 rural–rural (or rural indigenous);
2 urban–rural (or migrant from urban to rural areas);
3 rural–urban (or migrant from rural to urban areas);
4 urban–urban (or urban indigenous).

The influence of education and adult status was measured from the derived index of education, exposure to mass media and the use of contraceptives. The index of education was constructed by taking into account the level of education of both husband and wife. The five categories of the index are as follows:

1 both are illiterate;
2 wife is illiterate but husband is educated up to primary level (ie one to five years of schooling);
3 wife is illiterate but husband's education is secondary or higher (ie more than five years of schooling);
4 wife's educational level is up to primary;
5 wife's educational level is secondary or higher.

The choice of contraceptive use as an explanatory variable stems from its connotation as a measure of individual modernity and the autonomy a woman enjoys in decision-making. We shall, of course, control for fertility because of its confounding effects on the relationship between contraceptive use and breastfeeding. The influence of modernization and socio-economic change on the patterns of breastfeeding has been described earlier. We reiterate it with the hypothesis that women with higher education, greater residential mobility, greater exposure to mass media and a higher level of contraceptive use are likely to breastfeed for a shorter duration and will be proportionately fewer in the group of women still breastfeeding in the open interval. Figure 8.8 indicates the variables in the framework of the model.

The statistical model of multiple classification analysis (MCA) was used for the analysis. Age of women was taken as a covariate for the analysis on the duration of breastfeeding in the last closed interval, while time elapsed since last birth and the age of women at last birth were covariates for the analysis on the proportion still breastfeeding in the open interval. For the last closed interval, the sample included all women who had had at least two live births and whose next to last child survived for two years or more. For the open interval, the sample included all women who had had at least two live births, whose last child still survived and with a duration since last birth of four years or under.

We ran five separate, but cumulative, models of the effects of socio-economic background variables on breastfeeding. The results for the two measures of breastfeeding did not square perfectly, as some irregularities were noticeable in the coefficients for the open interval (table A3). In general, however,

| Independent variables | | Dependent variables |
|---|---|---|
| Social origins | Education and adult status | |
| 1 Ethnic group<br>2 Residential mobility | 1 Index of education<br>2 Exposure to mass media<br>3 Use of contraception | 1 Length of breastfeeding in the last closed birth interval<br>2 Proportion still breastfeeding in the open interval |

**Figure 8.8** Social structure model of socio-economic variables and breastfeeding (adopted from Hirschman and Sweet (1974))

**Table 8.5** Multiple classification analysis for the duration of breastfeeding in the last closed birth interval, all women with at least two live births where the next-to-last child survived at least two years

| Variable and category | Unadjusted deviation from the overall mean | Overall mean = 18.00 (months) Adjusted (for other factors and covariate) Deviation from the overall mean | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *Ethnic group* | | | | | | |
| Urdu | − 2.89 | − 2.84 | − 0.69 | − 0.70 | − 0.66 | − 0.51 |
| Punjabi | 0.59 | 0.52 | 0.35 | 0.38 | 0.34 | 0.36 |
| Pushto | 1.32 | 1.58 | 1.29 | 1.26 | 1.27 | 1.21 |
| Sindhi | − 1.68 | − 1.47 | − 1.95 | − 2.09 | − 1.91 | − 2.09 |
| | (0.16) | (0.16) | (0.12) | (0.12) | (0.11) | (0.12) |
| *Residential mobility* | | | | | | |
| Rural–rural | 0.88 | | 0.83 | 0.64 | 0.59 | 0.52 |
| Urban–rural | − 0.80 | | − 0.77 | − 0.67 | − 0.62 | − 0.73 |
| Rural–urban | − 0.62 | | − 0.84 | − 0.82 | − 0.78 | − 0.60 |
| Urban–urban | − 2.88 | | − 2.59 | − 1.89 | − 1.72 | − 1.52 |
| | (0.19) | | (0.18) | (0.13) | (0.12) | (0.11) |
| *Index of education* | | | | | | |
| Both illit. | 0.67 | | | 0.30 | 0.24 | 0.16 |
| Wife illit., hus. prim. | 0.39 | | | 0.58 | 0.60 | 0.56 |
| Wife illit., hus. sec+ | − 0.80 | | | − 0.39 | − 0.31 | − 0.23 |
| Wife prim. | − 2.31 | | | − 1.28 | − 1.11 | − 0.85 |
| Wife sec.+ | − 5.59 | | | − 3.60 | − 3.34 | − 2.68 |
| | (0.18) | | | (0.11) | (0.10) | (0.08) |
| *Exposure to mass media* | | | | | | |
| Never exposed | 0.83 | | | | 0.28 | 0.20 |
| Exposed | − 1.57 | | | | − 0.54 | − 0.37 |
| | (0.15) | | | | (0.05) | (0.04) |
| *Ever-use of contraceptives* | | | | | | |
| Never used | 0.47 | | | | | 0.35 |
| Ever used | − 2.99 | | | | | − 2.19 |
| | (0.16) | | | | | (0.12) |
| $R^2$ | | 0.059 | 0.082 | 0.092 | 0.094 | 0.105 |
| Partial $R^2$ (due to the variable added in the model | | – | 0.024 | 0.011 | 0.002 | 0.012 |

NOTE: Significance of F ratio: 0.001 for ethnic group; residential mobility; index of education and contraception; 0.05 for exposure to mass media.
Standardized regression coefficient (*beta*) for age = 0.16 ($p < 0.001$). Values in parentheses are of *eta* and *beta* coefficients.
Number of women = 3044.

the direction of the influence of socio-economic variables on breastfeeding was similar. Further support for the similar trend in the differentials also came from the discriminant analysis performed for the open interval to distinguish statistically between the group still breastfeeding and the group not breastfeeding (results not reported here). It is worth noting that all these findings upheld the hypothesis proposed above.

We report here only findings for the last closed interval. For the findings on open interval, see table A3. For further discussion on the apparent inconsistencies in the MCA results for open and closed intervals, see Page *et al* (1980).

Table 8.5 shows the MCA results for the duration of breastfeeding in the last closed interval. The coefficients in the first column are expressed as the deviations from the overall mean duration of breastfeeding (which equals 18 months). Each coefficient in columns (2)–(6) can be interpreted as the effect of being in that particular category net of all other variables (factors as well as covariates) in the model. The *beta* coefficients given in parentheses (in columns (2)–(6)) are equivalent to standardized partial-regression coefficients whereas the *eta* coefficients in column (1) are equivalent to a simple *beta* from the bivariate linear regression of the dependent variable on the factors. The last row refers to the proportional increment in the explained variation due to the variable added in the model, expressed as a proportion of the variation unexplained by the preceding model. In effect, it represents a proportional reduction of the unexplained variation.[9]

One general conclusion can be drawn from the row of variance-explained ($R^2$) figures for each of the five models. The age of a woman explains 3.4 per cent (figure not shown) of the variance, and the first model with age and ethnic group together explains 5.9 per cent of the variance in breastfeeding. This increases by a statistically significant amount for each of the subsequent models and the final cumulative model (column (6)) has an $R^2$ of 10.5 per cent. While these figures of variance are not trivial, it is clear that there are many other determinants of breastfeeding behaviour that are not in this model.

However, the variables included do indicate significant influences on behaviour. With the exception of women who use contraception or who have secondary or higher education, ethnic group and residential mobility seem to have a rather strong influence on breastfeeding. Among the four ethnic groups, the highest mean length of breastfeeding was 19.2 months for the Pushto-speaking group and the lowest mean was 15.9 months for Sindhi-speaking women. The net effect of ethnic group on breastfeeding remains strong (*beta* coefficients) and the tradition of prolonged breastfeeding is found among all the ethnic groups, though the levels differ.

Because of their predominant residence in urban areas, the coefficient for Urdu-speaking women changes most dramatically when the confounding effects of residential mobility are adjusted for (columns (2) and (3)). Residential mobility has other important implications. Adjusting for age and all other variables of the final model (column (6)), the women who were brought up in and still live in rural areas (the rural–rural group) breastfeed, on the average, for 18.5 months, while the women in urban areas (the urban–urban group) breastfeed, on the average, for 16.5 months. The intermediate categories of residential mobility show a sort of average effect of childhood and current place of residence. For example, women who were brought up in rural areas and who are currently living in urban areas (the rural–urban group) breastfeed approximately one month less than the rural–rural group and one month more than the urban–urban group (table 8.6). Overall, residential mobility accounts for the single largest increase in the proportion of variance explained in breastfeeding ($R^2$ and partial $R^2$). The inclusion of education in the model (column (4)), however, diminishes its influence slightly (*beta* coefficients in columns (3) and (4)).

The effects of educational attainment on breastfeeding can be ascertained from figure 8.9 (panel B). Besides showing the quartile characteristics of the raw frequency distribution of the

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[9] The following example may help to clarify the formula and computations.

The $R^2$ due to age and ethnic group is 0.059 (see column (2)) while the addition of residential mobility raises this figure to 0.082 (see column (3)). Substituting Y for the duration of breastfeeding, the dependent variable, $X_1$ for age, $X_2$ for ethnic group, and $X_3$ for the residential mobility, the partial $R^2$ due to residential mobility is:

$$R^2_{YX_3.X_1X_2} = \frac{R^2_{Y.X_1X_2X_3} - R^2_{Y.X_1X_2}}{1 - R^2_{Y.X_1X_2}}$$

$$= \frac{0.082 - 0.059}{1 - 0.059} = 0.024$$

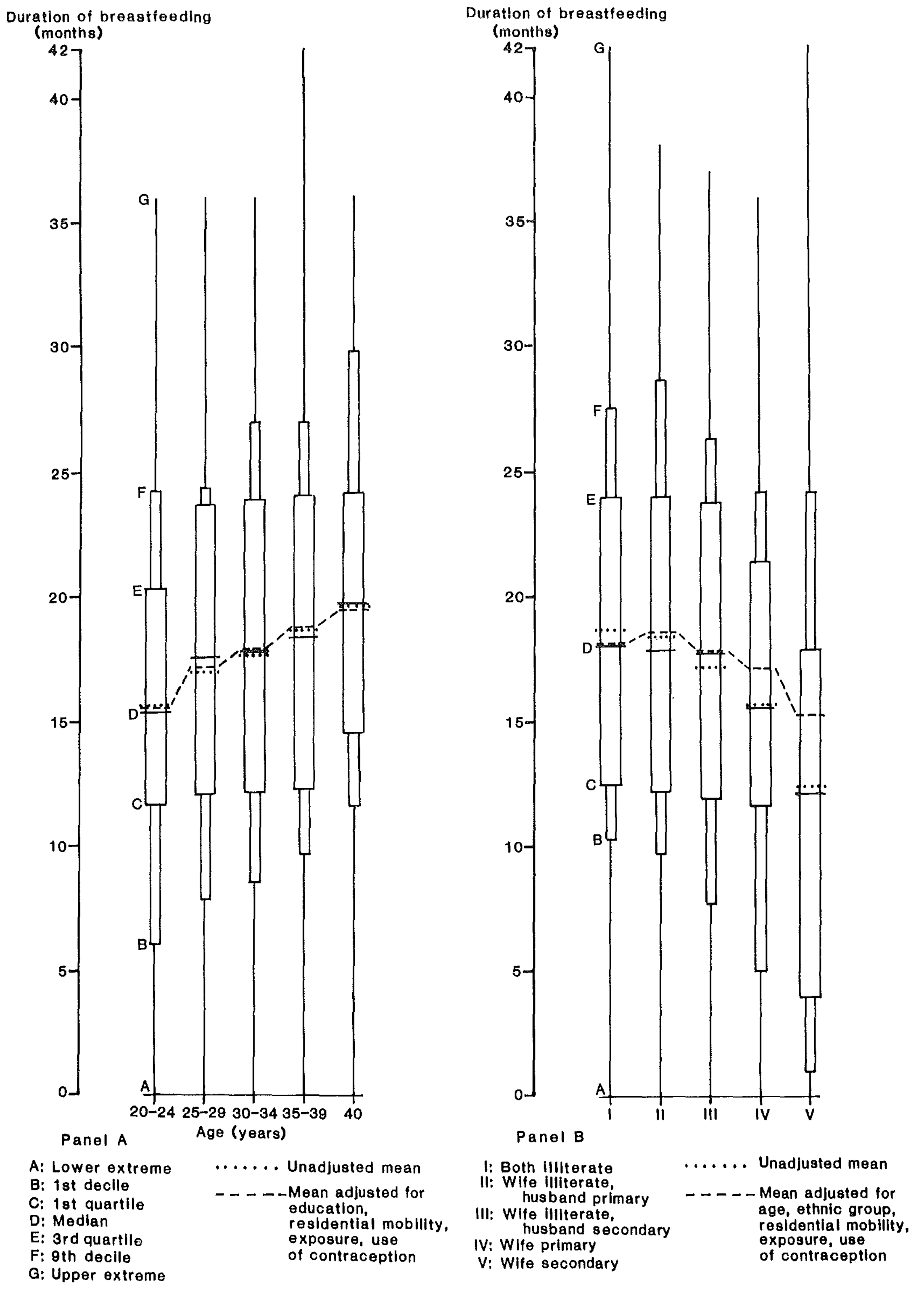


**Figure 8.9** Duration of breastfeeding in the last closed birth interval by (A) age and (B) education

Table 8.6 Adjusted[a] mean duration (in months) of breastfeeding in the last closed interval by residential mobility

| Residential mobility | Mean | Deviation from the mean for rural-rural | Deviation from the mean for urban–urban |
|---|---|---|---|
| Rural–rural | 18.52 | – | 2.04 |
| Urban–rural | 17.27 | – 1.25 | 0.79 |
| Rural–urban | 17.40 | – 1.12 | 0.92 |
| Urban–urban | 16.48 | – 2.04 | – |

[a] Adjusted (through MCA) for age, ethnic group, index of education, exposure to mass media and ever-use of contraception.
NOTE: Number of women = 3044.
*Source:* Column (6) of table 8.5

length of breastfeeding, the figure indicates the trend in the means (the broken line), adjusted for age and all the variables of the final model (based on column (6)). When the wife is illiterate, the educational level of her husband does not seem to have much influence upon her breastfeeding behaviour. Although women with primary education breastfeed one month less than those of the 'both illiterate' category, the major drop in breastfeeding occurs when women's education is secondary or higher. Women with secondary or higher education breastfeed three months less than women with primary education. The effects of wife's education would have been even higher (column (4) and unadjusted medians and means in figure 8.9) but for the fact that some of the educational influence is transmitted via exposure to mass media and the use of contraception.

The contraceptive behaviour of a woman appears to have a strong relationship with her pattern of breastfeeding. Women who had ever used contraceptives breastfeed 2.5 months less than those who had never used. Since some women use contraception because they have high fertility (probably due to their reduced breastfeeding), we ran another model controlling for parity of women in addition to the variables described. Controlling for fertility diminished the difference only slightly, as the women who had used contraceptives were still found to be breastfeeding for two months less than those who never used.

Although the truncation effect in the last closed interval makes it difficult to discern the cohort effects on breastfeeding, evidence from different sources indicates a decline in breastfeeding among younger women. The life-table estimates show that women aged 15–24 breastfeed on the average for 20.4 months as compared to women aged 35–44 who breastfeed for 25.2 months (figure 8.7 and table A2). Discriminant analysis and MCA for the open interval also suggest that older women were proportionately more in the group still breastfeeding. Figure 8.9 (panel A) presents the results obtained for the duration of breastfeeding in the last closed birth interval. The broken line shows the trend in breastfeeding, adjusting (through MCA) for ethnic group, residential mobility, education and use of contraception.

The adjusted mean length of breastfeeding for the youngest cohort aged 20–24 was 15.6 months as compared to the adjusted mean of 19.5 months for the cohort aged 40 or more. Following the trend in the decline of breastfeeding from the oldest to the youngest cohort, there is a substantial drop for the cohort aged 20–24 from that of the cohort aged 25–29.

From these findings, the influence of social environment and cultural tradition on breastfeeding appear to be greater than the influence of education and exposure to mass media. The effect of educational attainment becomes pronounced only at secondary or higher levels of education. However, increased urbanization in Pakistan is likely to curtail the current levels of prolonged breastfeeding, since women in urban areas and rural to urban migrants breastfeed less than their rural counterparts.

The average duration of breastfeeding among women using contraception was two months less than among non-contracepting women, revealing the limited influence of contraceptive use on fertility. Further dampening of the contraceptive effect comes from the findings that younger women breastfeed for shorter durations and are also less likely to use contraceptives. These findings are, in general, consistent with those observed for several other countries.

## 8.4 SUMMARY AND CONCLUSIONS

The estimates of breastfeeding range from the median length of breastfeeding of 18 months (for the last closed interval) to 28.4 months (for the PFS definition of open interval). The PFS definition of the last closed interval yields an estimate that is very close to what can be found by focusing on the actual last closed interval. However, the exclusion of pregnant women in the PFS definition of open interval leads to an estimate of the median which is five months higher than that for all women. The retrospectively reported durations of breastfeeding for the last closed interval show heapings at 12, 18 and particularly at 24 months, which was reported by 22.5 per cent of the total respondents. This trend does not appear in the data on the open interval, implying that the heaping is probably due to a rounding of responses. The data on the open interval, however, suffer from the irregularities that are produced by sampling fluctuations, especially at durations longer than 30 months. These problems are overcome by using a model schedule of breastfeeding, though estimates unaffected by the truncation effect still cannot be obtained.

Focusing on births as the unit of analysis and applying the life-table technique, we find a mean duration of breastfeeding of 21.9 months for all surviving children. The lowest mean of 18.7 months is found for urban residents and means slightly over 23 months are found for rural residents, women not exposed to mass media and those with a farm occupation. Though estimates of the length of breastfeeding vary across types of data, it can be concluded that the average duration of breastfeeding is 18 months or longer when the child survives at least two years. Breastfeeding is also found to be universal, since all types of data consistently report that 99 per cent breastfeed at least briefly.

Ethnic group, residential mobility, education and use of contraception are important differentials of breastfeeding in the last closed interval. Women whose current place of residence is different from childhood place of residence manifest the mixed influence of both places, with an intermediate value in the range of 16.5 months for urban indigenous and 18.5 months for rural indigenous. The education of the husband when the wife is illiterate has no important effect on the breastfeeding behaviour of a woman. The reducing effect of education is substantial when a woman's education is secondary or higher. Controlling for fertility along with other important socio-economic variables, women who use contraceptives are found to breastfeed two months less than women who have never used contraception. A trend of reduced breastfeeding is observed among younger cohorts.

Although this analysis has provided some conclusions on a subject where the data have often been considered ambiguous, it has also raised several questions. Methodologically we must question whether the information on women is adequate for obtaining unbiased estimates on the levels of breastfeeding and their differentials. Substantively, we need to explore further the reasons for the ethnic differentials in breastfeeding behaviour and for the surprisingly small impact of husband's educational level on the breastfeeding behaviour of the wife.

**Table A1** Breastfeeding rate for births X months prior to interview, surviving children only, PFS all women

| At x = (month) | Sample size | Number breastfeeding | Proportions | | SE of L (X) under SRS |
|---|---|---|---|---|---|
| | | | Ever breastfed = L (O) | Currently breastfed = L (X) | |
| 6 | 497 | 474 | 0.98795 | 0.95404 | 0.00940 |
| 12 | 556 | 498 | ——— | 0.89599 | 0.01295 |
| 18 | 386 | 250 | | 0.64801 | 0.02433 |
| 24 | 488 | 180 | MEAN = | 0.36765 | 0.02183 |
| 30 | 403 | 76 | 0.98789 | 0.18767 | 0.01946 |
| 36 | 502 | 23 | | 0.04496 | 0.00925 |
| 42 | 418 | 5 | | 0.01187 | 0.00530 |
| 48 | 504 | 3 | | 0.00475 | 0.00307 |
| 54 | 371 | 0 | | 0.00000 | 0.00000 |
| 60 | 516 | 0 | | 0.00000 | 0.00000 |

Mean duration of breastfeeding = 21.92 months

NOTES:
At x = (month) = number of months prior to interview.
Sample size = number of women having births x months prior to interview.
Number breastfeeding = number of women in col. (2) for whom this was most recent birth, and whose child is still being breastfed.
Proportion ever breastfed = proportion of women in col. (2) for whom this was most recent birth and whose child was breastfed at least briefly.
Proportion current = col. (3)/col. (2) = proportion of women breastfeeding at x months since birth of this child.
SE of L (X) under SRS = the standard error of L (X) assuming simple random sampling.

**Table A2** Estimated mean duration of breastfeeding and the proportions ever breastfed by age and duration of marriage of mother and the birth order, surviving children

| Sample | Age of mother at event (in years) | | | Duration of marriage at event (in years) | | | Birth order | | | All women |
|---|---|---|---|---|---|---|---|---|---|---|
| | 15–24 | 25–34 | 35–44 | 0–9 | 10–19 | 20 + | 1 and 2 | 3 and 4 | 5 + | |
| Total | 20.36 | 22.00 | 25.17 | 19.96 | 22.68 | 25.69 | 19.65 | 21.98 | 23.42 | 21.92 |
| | (0.977) | (0.988) | (0.988) | (0.986) | (0.988) | (0.988) | (0.987) | (0.987) | (0.988) | (0.988) |
| *Ethnic group* | | | | | | | | | | |
| Punjabi | 20.32 | 22.54 | 26.05 | 19.79 | 23.67 | 26.54 | 19.47 | 22.40 | 24.22 | 22.32 |
| | (0.983) | (0.990) | (0.992) | (0.990) | (0.991) | (0.992) | (0.991) | (0.991) | (0.992) | (0.992) |
| Non-Punjabi | 20.47 | 20.55 | 23.47 | 20.38 | 20.55 | 24.10 | 20.00 | 21.14 | 21.58 | 21.07 |
| | (0.969) | (0.982) | (0.980) | (0.979) | (0.981) | (0.980) | (0.980) | (0.980) | (0.980) | (0.980) |
| *Residence* | | | | | | | | | | |
| Rural | 21.27 | 23.21 | 26.33 | 21.12 | 23.67 | 27.09 | 20.51 | 23.55 | 24.65 | 23.09 |
| | (0.992) | (0.996) | (0.997) | (0.996) | (0.997) | (0.997) | (0.996) | (0.996) | (0.997) | (0.997) |
| Urban | 17.76 | 18.82 | 21.47 | 16.99 | 19.73 | 21.43 | 17.07 | 17.18 | 20.48 | 18.68 |
| | (0.932) | (0.961) | (0.959) | (0.955) | (0.960) | (0.959) | (0.957) | (0.957) | (0.959) | (0.959) |
| *Exposure to mass media* | | | | | | | | | | |
| No exposure | 21.16 | 23.28 | 26.41 | 21.03 | 23.54 | 27.71 | 20.59 | 23.28 | 24.81 | 23.19 |
| | (0.984) | (0.993) | (0.992) | (0.991) | (0.993) | (0.992) | (0.991) | (0.992) | (0.992) | (0.992) |
| Exposed | 19.28 | 19.44 | 21.90 | 18.36 | 20.92 | 20.41 | 18.01 | 20.01 | 20.42 | 19.59 |
| | (0.967) | (0.977) | (0.979) | (0.977) | (0.978) | (0.979) | (0.978) | (0.978) | (0.979) | (0.979) |
| *Husband's literacy* | | | | | | | | | | |
| Illiterate | 21.01 | 22.97 | 25.83 | 20.90 | 23.32 | 26.35 | 19.87 | 23.76 | 24.21 | 22.93 |
| | (0.989) | (0.995) | (0.993) | (0.993) | (0.994) | (0.994) | (0.993) | (0.993) | (0.994) | (0.994) |
| Literate | 19.61 | 20.88 | 24.03 | 19.08 | 21.77 | 24.19 | 19.40 | 20.10 | 22.25 | 20.70 |
| | (0.965) | (0.978) | (0.980) | (0.977) | (0.979) | (0.980) | (0.979) | (0.979) | (0.980) | (0.980) |
| *Husband's occupation* | | | | | | | | | | |
| Farm | 21.69 | 23.65 | 25.54 | 21.68 | 23.81 | 26.39 | 21.04 | 23.82 | 24.83 | 23.38 |
| | (0.992) | (0.996) | (0.997) | (0.997) | (0.997) | (0.997) | (0.997) | (0.997) | (0.997) | (0.997) |
| Non-farm | 19.34 | 20.97 | 24.62 | 18.95 | 21.82 | 24.87 | 18.99 | 20.40 | 22.52 | 20.87 |
| | (0.968) | (0.981) | (0.981) | (0.979) | (0.982) | (0.982) | (0.980) | (0.980) | (0.982) | (0.982) |

NOTE: Proportions are given in parentheses.

**Table A3** Multiple classification analysis for the proportions still breastfeeding in the open interval, all women with at least two live births with the last child surviving

| Variable and category | Unadjusted deviation from the overall proportion[a] | Adjusted (for other factors and covariates[b]) deviation from the overall proportion | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *Ethnic group* | | | | | | |
| Urdu | −0.09 | −0.08 | 0.01 | 0.01 | 0.01 | 0.01 |
| Punjabi | 0.00 | 0.00 | −0.00[c] | −0.00 | −0.00 | −0.00 |
| Pushto | 0.08 | 0.06 | 0.05 | 0.05 | 0.05 | 0.05 |
| Sindhi | 0.00 | 0.00 | −0.02 | −0.02 | −0.01 | −0.01 |
| | (0.07) | (0.06) | (0.03) | (0.04) | (0.03) | (0.03) |
| *Residential mobility* | | | | | | |
| Rural—rural | 0.03 | | 0.03 | 0.02 | 0.02 | 0.02 |
| Urban—rural | −0.00 | | 0.02 | 0.02 | 0.03 | 0.03 |
| Rural—urban | −0.03 | | −0.03 | −0.03 | −0.02 | −0.02 |
| Urban—urban | −0.11 | | −0.11 | −0.09 | −0.08 | −0.08 |
| | (0.11) | | (0.12) | (0.09) | (0.08) | (0.08) |
| *Index of education* | | | | | | |
| Both illit. | 0.02 | | | 0.02 | 0.01 | 0.01 |
| Wife illit., hus. prim. | 0.02 | | | 0.01 | 0.01 | 0.01 |
| Wife illit., hus. sec+ | −0.04 | | | −0.05 | −0.04 | −0.04 |
| Wife prim. | −0.04 | | | −0.01 | 0.01 | 0.01 |
| Wife secondary | −0.22 | | | −0.14 | −0.12 | −0.12 |
| | (0.10) | | | (0.08) | (0.06) | (0.06) |
| *Exposure to mass media* | | | | | | |
| Never exposed | 0.04 | | | | 0.02 | 0.02 |
| Exposed | −0.07 | | | | −0.04 | −0.04 |
| | (0.11) | | | | (0.06) | (0.06) |
| *Ever-use of contraceptives* | | | | | | |
| Never used | 0.01 | | | | | 0.00 |
| Ever used | −0.10 | | | | | −0.01 |
| | (0.08) | | | | | (0.01) |
| $R^2$ | – | 0.475 | 0.485 | 0.490 | 0.493 | 0.493 |
| Partial $R^2$ (due to the factor (added) | | – | 0.019 | 0.010 | 0.006 | 0.000 |

[a]Overall proportion still breastfeeding = 0.66.
[b]Covariates and their statistics are as follows:

| Covariate | Standardized regression coefficient | Significance |
|---|---|---|
| Mother's age at last birth | 0.005 | 0.001 |
| Duration elapsed since last birth | −0.026 | 0.001 |

c = value is below − 0.005.

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# 9 From Non-Use to Use: Prospects of Contraceptive Adoption

Nasra M. Shah and Makhdoom A. Shah

Pakistan has had a national family planning programme for the last 15 years and according to official estimates the birth rate has been reduced from 50 per thousand to 44 per thousand (Planning Commission 1978). The Fifth Five-Year Plan covering the period 1978–83 projects a decline in the crude birth rate from 43.6 in 1977–8 to 35.5 per thousand in 1982–3, and a corresponding decline in the total fertility rate from 6.75 to 5.00. This projection is based on two assumptions: first, the target for 1982–3 provides for an average of five live births per woman which does not indicate a very severe restriction on family size; secondly, data from the 1975 Pakistan Fertility Survey show that even though few of the eligible women are actually practising contraception, more than half of the never users state that they will use contraception in the future. Our objective of this chapter is to examine critically the validity of the second assumption both by analysing the past trends of contraceptive use in Pakistan and by studying the characteristics of prospective or possible future users.

## 9.1 DATA

We have used data from two national surveys, the 1975 Pakistan Fertility Survey and the 1968–9 National Impact Survey (NIS), to analyse current and past trends in contraceptive use and to assess future possibilities of contraceptive adoption in Pakistan. Women in both samples who are compared here consist of currently married women aged 10–49. The NIS sample consists of 2910 women and the PFS of 4663, both groups selected by a stratified two-stage sampling procedure.[1] The data collected in both surveys included the respondent's and her husband's educational and occupational background, her marriage and maternity history, her contraceptive knowledge and use, and her exposure to the mass media. In chapter 2 a detailed analysis of the quality of PFS data is presented. No such analysis was done for NIS, but the available evidence suggests that NIS data did not suffer from any serious errors and that it is safe to assume that the two data sets are of the same quality and reasonably comparable.

## 9.2 LEVELS OF KNOWLEDGE AND USE

The NIS findings showed that about 12 per cent of currently married women aged 15–49 reported ever using a contraceptive method, and 6 per cent reported currently using a method (Table 9.1). A large majority of women knew about contraceptive methods in both surveys. In the NIS 97 per cent of the women knew of at least one contraceptive method, whereas 83 per cent knew of an efficient method. These figures demonstrate that, in its first three years, the programme had made significant headway in disseminating knowledge about contraceptive methods. In the PFS the proportion of users was somewhat smaller among currently married women aged 15–49 than in the NIS: 10 per cent reported ever-use and 5 per cent reported current use. The proportion of respondents knowing of any method of contraception had dropped sharply since the first survey, to only 76 per cent. Almost all the respondents who reported contraceptive knowledge, however, knew of an efficient method. It has been argued elsewhere that the drop in the overall levels of contraceptive knowledge and use is probably a result of the differences in the methodology used by the two surveys rather than a real difference (Shah 1979). The three methods that

[1] For a description of the NIS, see TREC[b] (ND), Sirageldin (1975) and Sirageldin *et al* (1976); for a description of the PFS, see Population Planning Council (1976).



Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey*: 149–162. Voorburg, Netherlands: International Statistical Institute.

Table 9.1 Past and current contraceptive use of currently married women, by type of place of residence: National Impact Survey (NIS) and Pakistan Fertility Survey (PFS), 1968 and 1975 (in per cents)

| Item | Total | | Urban | | Rural | |
|---|---|---|---|---|---|---|
| | 1968 (NIS) | 1975 (PFS) | 1968 (NIS) | 1975 (PFS) | 1968 (NIS) | 1975 (PFS) |
| *Ever used* | | | | | | |
| Any method | 12.1 | 10.5 | 19.5 | 21.9 | 9.2 | 6.3 |
| Programme method[a] | 8.5 | 8.7 | 13.9 | 18.7 | 6.6 | 5.2 |
| *Currently using* | | | | | | |
| Any method (including sterilization) | 5.5 | 5.2 | 9.8 | 12.4 | 3.9 | 2.7 |
| Efficient method (including sterilization) | 3.8 | 3.8 | 7.0 | 9.0 | 2.6 | 2.0 |
| Never used, intends future use | 31.5 | 57.4 | 38.0 | 53.1 | 29.2 | 58.7 |
| Weighted N[b] | 7979 | 4663 | | | | |
| Unweighted N | 2910 | | 1180 | 1778 | 1730 | 2885 |

[a] Methods include condom, diaphragm, foam, jelly or cream, IUD, pill, and male and female sterilization.
[b] Percentages for the total country in this and subsequent tables are based on weighted data. Those for rural and urban areas are based on unweighted data for both surveys.
NOTE: All tables refer to unweighted data.

were most commonly reported to be known by respondents in both surveys were IUD, pill and condom. Knowledge of the pill was particularly high in the PFS with 74 per cent of urban and 60 per cent of rural respondents reporting such knowledge (for details on other methods, see Shah 1979).

As for rural—urban differentials in knowledge and use of contraception, it should be noted from table 9.1 that while the overall use level was lower in the PFS as compared to the NIS, use rates declined only in the rural areas over the period of the two surveys. In the urban areas, the number of women who had ever used any contraceptive method increased two percentage points, and the ever-use of effective (programme) methods increased five percentage points — from 14 per cent in the NIS to 19 per cent in the PFS. A differential in the same direction was also shown for current users. Use rates in rural areas which were very low at the time of the NIS actually declined somewhat at the time of the second survey.

The Pakistan family planning programme has been based largely on the field worker, medical as well as paramedical. Knowledge of programme personnel has been regarded as a salient feature of the network which makes contraception available to the respondent. Data from PFS show, however, that only 29 per cent of all respondents said that they had met a family planning person (doctor or paramedic) while only one-third know of a clinic or any other facility which provided family planning services (table 9.2). Knowledge of a facility was more than twice as high in urban than in rural areas (55 and 26 per cent), indicating perhaps the great importance of clinical facilities in adoption of contraception. Furthermore, knowledge of a facility had increased considerably in urban areas between the two surveys while such knowledge had actually declined in rural areas. The relatively low level of knowledge in rural areas is consistent with the lack of change in contraceptive use in these areas.

As for changes in the exposure to family planning messages in the mass media from 1968 (NIS) to 1975 (PFS), radio seems to have become a source of knowledge for many women since 1968 (Table 8.2). The proportion of those who had heard of family planning from the radio more than doubled in rural areas (from 21 to 48 per cent) and increased considerably in urban areas (from 48 to 69 per cent). Television has become an important source of knowledge about family

Table 9.2 Source of family planning knowledge for currently married women, by type of place of residence: NIS and PFS, 1968 and 1975 (in per cents)

| Source | Total | | Urban | | Rural | |
|---|---|---|---|---|---|---|
| | NIS | PFS | NIS | PFS | NIS | PFS |
| Met personnel | 21.9 | 29.2 | 23.7 | 39.1 | 21.3 | 25.7 |
| Knows facility | 32.0 | 33.4 | 39.9 | 54.9 | 28.7 | 25.9 |
| Radio | 28.7[a] | 53.6 | 48.1[a] | 69.3 | 21.3[a] | 48.1 |
| Films | 3.8 | 2.5 | 9.5 | 7.0 | 1.6 | 0.9 |
| Television | – | 7.8 | – | 21.0 | – | 3.2 |
| Magazine, newspaper | 9.4 | 3.4 | 23.1 | 10.5 | 4.1 | 1.0 |
| Total | 7979 | 4663 | 1180 | 1778 | 1730 | 2885 |

[a] Includes both radio and television.

planning, particularly in the urban areas. Although we cannot compare this to the former period, the data indicate that television may be a more effective mode of communication than films or newspapers.

## 9.3 A PROFILE OF USERS IN 1968 AND 1975

Table 9.3 presents socio-demographic profiles of married urban and rural users, three years (NIS) and ten years (PFS) after the national family planning programme was initiated. The average age of all current users was 32 years in the NIS and 34 in the PFS (data not shown in table); the average age of urban current users in the two surveys was the same (33 years), while current users in rural areas were on average four years older in the later survey (31.2 in NIS and 35.2 in PFS). Consistent with the older ages of rural current users in the PFS, they had relatively larger numbers of children ever born than the women in the NIS (6.1 and 5.5, respectively). In order to adjust for the differences in the age pattern of current users in the two surveys, age-standardized fertility measures were calculated using the mean of the two age distributions of current users as the standard. For urban current users the figures remained essentially unchanged after age standardization. Among the rural current users, however, age standardization reversed the differential between women in the two surveys to 5.6 and 6.2 in the PFS and NIS, respectively. On the other hand, past users in rural areas in the PFS had slightly higher levels of parity than past users in the NIS and this pattern remained unchanged after age standardization (in this case the standard was derived as the mean of the two age distributions of past users).

When correlates of contraceptive use were analysed by using multivariate analysis, we found that wife's education, access to a family planning worker and excess fertility were the three most important factors related with ever-use in urban areas (table 9.4),[2,3] The dependent variable (ever-use) was highly skewed in rural areas and there were generally small differences between categories except for access to a family planning worker. Much larger proportions of women in rural areas who had access to a worker had used contraception than women who had not met a worker (12 and 2 per cent respectively). The significance of wife's education in positive behaviour towards family planning is noteworthy and provides a guideline for specific action by the population planners. One finding that is evident from table 9.4 is the continuing importance of the family planning worker which suggests the need for strengthening the field structure.[4]

In view of the efforts at reorganization and the continued emphasis of planners on the need for fertility reduction, the findings that the knowledge

[2] The technique used for the multivariate analysis was MCA (multiple classification analysis), a form of dummy variable regression which is well suited for analysis of data with many categorical variables (for an exposition of the technique see Andrews *et al* 1973).

[3] For a detailed exposition of the relationship between excess fertility and contraceptive use based on PFS data see Shah and Palmore 1979.

[4] For additional analysis of the significance of access to fieldworkers based on PFS data see Syed 1979.

Table 9.3 Socio-demographic characteristics of past and current users and sterilization acceptors for currently married women, by type of place of residence: NIS and PFS, 1968 and 1975

| Respondent characteristics | Past users | | Women sterilized | | Current users | | All women | |
|---|---|---|---|---|---|---|---|---|
| | NIS | PFS | NIS | PFS | NIS | PFS | NIS | PFS |
| A Urban | | | | | | | | |
| Age of wife[a] | 32.3 | 32.5 | 36.1 | 38.4 | 33.0 | 33.0 | 30.3 | 30.6 |
| Age at marriage[a] | 16.5 | 16.8 | 16.0 | 16.2 | 16.2 | 17.0 | 16.2 | 16.7 |
| *Children ever born*[a] | 5.6 | 5.8 | 6.7 | 6.3 | 6.2 | 5.9 | 4.3 | 4.4 |
| | (5.6) | (5.8) | (6.9) | (6.2) | (6.2) | (6.0) | (4.3) | (4.4) |
| *Living children*[a] | 4.6 | 4.9 | 5.6 | 5.4 | 5.1 | 5.1 | 3.4 | 3.5 |
| | (4.5) | (4.9) | (5.3) | (5.3) | (4.8) | (5.1) | (3.3) | (3.5) |
| % of wives literate | 41.7 | 39.4 | 47.8 | 48.9 | 47.3 | 41.1 | 23.6 | 26.6 |
| % of husbands literate | 73.0 | 72.9 | 78.3 | 73.3 | 87.9 | 73.7 | 64.7 | 60.8 |
| *Ideal family size*[a] | 3.9 | 3.8 | 4.0 | 3.8 | 3.9 | 3.4 | 4.2 | 3.9 |
| | (4.0) | (3.8) | (4.0) | (3.8) | (3.9) | (3.4) | (4.2) | (3.9) |
| *Additional children desired*[b] | 0.5 | 0.5 | –[a] | –[a] | 0.3 | 0.1 | 1.2 | 1.3 |
| | (0.5) | (0.6) | – | – | (0.3) | (0.1) | (1.3) | (1.2) |
| % met f.p. personnel[c] | 46.4 | 68.8 | 26.1 | – | 45.6 | 67.4 | 23.7 | 39.1 |
| % own radio | 48.7 | 61.2 | 65.2 | 62.2 | 55.9 | 70.9 | 36.0 | 61.3 |
| Number (unweighted) | 115 | 170 | 23 | 45 | 93 | 175 | 1180 | 1778 |
| B Rural | | | | | | | | |
| Age of wife | 31.9 | 36.2 | 37.3 | 41.3 | 31.2 | 35.2 | 29.3 | 30.3 |
| Age at marriage | 15.1 | 16.4 | 15.0 | 16.5 | 15.4 | 16.2 | 15.9 | 16.4 |
| *Children ever born* | 5.9 | 7.0 | 5.0 | 7.5 | 5.5 | 6.1 | 3.9 | 4.2 |
| | (6.3) | (6.6) | (4.3) | (6.0) | (6.2) | (5.6) | (4.0) | (4.1) |
| *Living children* | 4.5 | 5.4 | 3.3 | 5.3 | 4.6 | 4.7 | 2.9 | 3.1 |
| | (4.5) | (5.1) | (2.5) | (4.1) | (4.7) | (4.3) | (2.9) | (3.1) |
| % of wives literate | 9.7 | 11.6 | 0.0 | 30.8 | 7.8 | 1.5 | 4.1 | 5.3 |
| % of husbands literate | 43.0 | 40.0 | 66.7 | 38.5 | 42.2 | 39.4 | 37.8 | 34.9 |
| *Ideal family size*[a] | 4.1 | 4.2 | 5.7 | 3.9 | 4.4 | 3.9 | 4.5 | 4.3 |
| | (4.2) | (4.1) | (5.0) | (3.2) | (4.5) | (3.7) | (4.5) | (4.3) |
| *Additional children desired*[b] | 0.6 | 0.3 | – | – | 0.7 | 0.1 | 1.6 | 1.4 |
| | (0.5) | (0.3) | – | – | (0.6) | (0.2) | (1.6) | (1.4) |
| % met f.p. personnel[c] | 63.3 | 83.5 | 66.7 | – | 65.6 | 72.7 | 21.3 | 25.7 |
| % own radio | 22.6 | 27.2 | 0.0 | 23.1 | 9.5 | 24.2 | 11.0 | 36.1 |
| Number (unweighted) | 93 | 103 | 3 | 13 | 64 | 66 | 1730 | 2885 |

[a] Excludes women who did not provide numerical responses to this question.
[b] Questions on additional children desired and contact with family planning personnel were not asked.
[c] f.p. = family planning.
NOTE: Unless otherwise indicated, number shown is the mean and age standardized values are given in parenthesis.

**Table 9.4** Unadjusted and adjusted percentages of ever-use of contraceptive methods, currently married urban and rural women, PFS 1975

| | Urban | | | Rural | | |
|---|---|---|---|---|---|---|
| | Unadjusted % | Adjusted % | N | Unadjusted % | Adjusted % | N |
| *Wife's age* | | | | | | |
| < 25 | 6.4 | 16.1 | 482 | 0.7 | 3.1 | 871 |
| 25–34 | 22.4 | 20.6 | 588 | 4.6 | 5.0 | 927 |
| 35+ | 22.3 | 15.3 | 510 | 8.1 | 5.3 | 881 |
| *No of living children* | | | | | | |
| ⩽ 3 | 8.8 | 15.6 | 868 | 2.1 | 4.2 | 1613 |
| 4–5 | 25.4 | 20.9 | 347 | 5.0 | 3.4 | 595 |
| 6+ | 30.5 | 18.8 | 370 | 11.9 | 6.7 | 471 |
| *Wife's education* | | | | | | |
| Illiterate | 13.9 | 14.9 | 1163 | 4.4 | 4.5 | 2541 |
| 1–4 grades | 18.1 | 18.6 | 105 | 6.3 | 6.2 | 63 |
| 5+ grades | 30.8 | 26.9 | 312 | 4.0 | 1.9 | 75 |
| *Husband's education* | | | | | | |
| Illiterate | 11.1 | 13.1 | 620 | 4.1 | 4.0 | 1735 |
| 1–4 grades | 16.9 | 17.8 | 118 | 3.6 | 3.4 | 252 |
| 5–9 grades | 18.7 | 18.7 | 427 | 5.8 | 5.9 | 519 |
| 10+ grades | 26.0 | 22.8 | 415 | 5.8 | 6.3 | 173 |
| *Met f.p. personnel* | | | | | | |
| Yes | 29.7 | 25.9 | 566 | 13.3 | 12.4 | 649 |
| No | 10.7 | 12.9 | 1014 | 1.7 | 1.9 | 2030 |
| *Ideal vs living children* | | | | | | |
| Ideal < living, don't want more | 34.8 | 32.5 | 457 | 12.5 | 9.7 | 511 |
| Ideal ⩾ living, don't want more | 18.1 | 17.1 | 381 | 5.2 | 4.9 | 697 |
| Ideal < living, want more | 16.0 | 13.8 | 50 | 3.2 | 2.5 | 62 |
| Ideal ⩾ living, want more | 5.9 | 8.1 | 692 | 1.3 | 2.4 | 1409 |
| $R^2 \times 100$ | 17.3 | | | 9.0 | | |
| Grand mean | 17.5 | | | 4.5 | | |
| N | | | 1580 | | | 2679 |

and use of contraception have not increased in any substantial way since 1968 are cause for concern.

## 9.4 CONTINUOUS USERS, DROPOUTS AND NEVER USERS

Thus far, we have analysed changes in the level of contraceptive knowledge and use over 1968–75, and have looked at the correlates of ever-use. In this section, we make an attempt to analyse the dynamics of adoption and to assess the implications for future contraceptive use in Pakistan. In table 9.5, we present selected characteristics of women who are at five different points in the adoption process: continuous users, new acceptors, dropouts, never users who will use in future and never users who will not use in future. The first and last

Table 9.5 Characteristics of users and non-users by type of use and intentions for future use, currently married urban and rural women, PFS 1975

| Respondent characteristics[a] | Continuous user[b] | New acceptor[c] | Dropout[d] | Never used, will use | Never use, will not use | All women |
|---|---|---|---|---|---|---|
| A Urban | | | | | | |
| (N) | (80) | (95) | (95) | (736) | (653) | (1659) |
| Wife's age | 33.8 | 32.3 | 31.5 | 26.2 | 33.7 | 30.2 |
| Children ever born | 6.0 | 5.9 | 5.7 | 3.2 | 4.8 | 4.2 |
| Children still living | 5.3 | 5.0 | 4.8 | 2.5 | 3.7 | 3.4 |
| Living sons | 2.9 | 2.6 | 2.4 | 1.3 | 1.9 | 1.8 |
| Ideal family size | 3.4 | 3.3 | 3.8 | 3.9 | 4.2 | 3.9 |
| % husbands literate | 81.3 | 67.4 | 66.3 | 63.4 | 50.4 | 59.6 |
| % wives literate | 52.5 | 31.6 | 40.0 | 27.9 | 16.4 | 25.4 |
| % want future births | 20.2 | 14.7 | 17.3 | 64.2 | 41.8 | 47.8 |
| % heard f.p. radio[e] | 86.1 | 85.1 | 79.8 | 73.8 | 59.6 | 69.9 |
| % heard f.p. film[e] | 31.6 | 25.0 | 27.1 | 17.3 | 9.2 | 17.9 |
| % seen f.p. TV[e] | 64.8 | 52.9 | 52.2 | 36.0 | 30.0 | 39.1 |
| % read f.p. newspaper | 60.0 | 62.1 | 62.2 | 43.4 | 31.5 | 45.8 |
| % met f.p. person | 70.5 | 50.6 | 62.7 | 30.2 | 29.7 | 34.0 |
| Months since met f.p. person[e] | 15.7 | 10.1 | 21.4 | 11.6 | 14.4 | 13.6 |
| B Rural | | | | | | |
| (N) | (19) | (47) | (45) | (1589) | (1114) | (2814) |
| Wife's age | 33.5 | 35.9 | 34.5 | 27.6 | 33.4 | 30.2 |
| Children ever born | 6.0 | 6.1 | 6.0 | 3.7 | 4.5 | 4.1 |
| Children still living | 4.5 | 4.8 | 4.6 | 2.8 | 3.3 | 3.1 |
| Living sons | 2.7 | 2.5 | 2.5 | 1.5 | 1.7 | 1.6 |
| Ideal family size | 3.8 | 3.9 | 4.3 | 4.3 | 4.4 | 4.3 |
| % husbands literate | 42.1 | 38.3 | 35.6 | 37.7 | 30.0 | 34.7 |
| % wives literate | 0.0 | 2.1 | 13.3 | 5.7 | 4.0 | 5.0 |
| % want future births | 10.5 | 8.5 | 24.4 | 63.3 | 46.7 | 54.8 |
| % heard f.p. radio[e] | 73.7 | 47.8 | 56.8 | 56.7 | 39.1 | 49.8 |
| % heard f.p. film[e] | 25.0 | 25.0 | 14.3 | 14.7 | 6.4 | 12.3 |
| % seen f.p. TV[e] | 50.0 | 25.0 | 35.7 | 23.3 | 19.1 | 22.8 |
| % read f.p. newspaper | – | – | 16.7 | 33.3 | 25.0 | 29.3 |
| % met f.p. person | 64.3 | 63.9 | 68.8 | 22.8 | 20.7 | 23.3 |
| Months since met f.p. person | 24.6 | 23.6 | 42.9 | 18.7 | 20.0 | 20.2 |

[a] Unless otherwise indicated, number shown is the mean.
[b] Used in last closed interval and are currently using.
[c] Defined as those who are currently using a method but did not use one in the last closed interval.
[d] Defined as those who were using a method in the last closed interval but are not currently using one.
[e] Only for persons who were exposed to this media or person.

groups of women can be regarded as ones representing the two extremes of an adoption continuum. We found distinct differences in the age, parity, socio-economic levels and access to family planning information of the two extreme groups. In urban areas continuous users, ie women who had used contraceptives in the closed interval and were currently using, had the highest average age and parity. Compared with continuous users, the average age of never users who did not intend to adopt contraceptive use in the future was about the same, but the latter group had substantially lower parity, 3.7 living children compared with 5.3 living children for continuous users. Never users who did not intend future use had about half a child less than their ideal family size while continuous users had exceeded their ideal family size by 1.9 children. Consistent with this, more than twice as many women from the former group wanted another child compared with the latter (42 and 20 per cent). Thus, the age, parity and desired fertility structure of the two extreme groups of users and non-users was strikingly different, with the never users who had no intention to use unlikely to perceive the need for family planning. Compared with the continuous users, the dropouts had lower parity and probably felt less pressure to continue using, even though they had exceeded their ideal family size by one child.

The socio-economic status as measured by husbands' and wives' education was markedly higher for users than for non-users, the differences between the two extreme groups being very large. For example, 53 per cent of continuous users were literate compared with only 16 per cent of the never users who do not intend future use. Among the users, the continuous users were the most highly educated group. Also, the continuous users had the greatest exposure to family planning information from most mass media channels and from family planning workers compared with other users and non-users. The decline in exposure to information was almost linear from continuous users to never users who do not intend to use contraception in the future. Within the small group of users, new acceptors had had much more recent exposure to a family planning worker than dropouts – 10 and 21 months respectively (table 9.5). Part of the reason for dropping out might be the lack of contact itself and lack of re-supply, especially if the respondent was using a personnel-dependent method.

In the rural areas, most of the patterns which differentiate users and non-users were similar to that in urban areas. A few exceptions are worth noting. First, the average age of new acceptors was about two and a half years older than the continuous users. New acceptors in urban areas were one and a half years younger than continuous users. Secondly, the parity of new acceptors in rural areas was higher than that of continuous users (table 9.5). The higher age and parity of new acceptors could be associated with the smaller number of living sons and higher ideal family size of the women compared with continuous users. Finally, the average duration since the respondent had met a family planning worker was much longer for all categories of users in the rural areas. The dropouts in rural areas had met the family planning worker more than three and a half years before the survey. In order to make a detailed study of the differences between the various groups of users and non-users one ideally needs to control for the effects of several variables before looking at the impact on use of any one of the individual factors. We would have liked, for example, to do a multivariate analysis of why respondents are continuous users. The extremely low levels of use, however, did not permit such an analysis.

While the group of continuous users represents a group which has a relatively high commitment to family planning, it is somewhat disturbing to find that a quarter of urban and almost two-thirds of rural continuous users were using abstinence as a contraceptive method (table 9.6). Among those who changed their method between the two intervals, more than a quarter (28 per cent) in urban areas switched from programme to non-programme, that is less efficient, methods. It is encouraging to note that 61 of the urban and 66 per cent of the rural new acceptors were using programme methods, but it should also be noted that more than a quarter of the new acceptors were still using abstinence as a method. While abstinence is completely effective as long as the couples are practising it, the chances of it being practised for prolonged periods are fairly low, particularly for younger couples at lower parities. Our findings thus point out once again the urgent need for motivating couples to use more efficient methods rather than relying on methods like abstinence.

Dropouts were defined as women who had used a method during the last closed interval but were not currently using. Of all the women who had

Table 9.6 Continuation rate and shift in methods between last closed interval and current use, currently married urban and rural women, PFS 1975

| | Urban | | | Rural | | |
|---|---|---|---|---|---|---|
| | No | % | % of all current users | No | % | % of all current users |
| A All current users | 175 | | 100.0 | 64 | | 100.0 |
| **Continuous users**[a] | 80 | | 45.6 | 17 | | 26.6 |
| *Same method* | 48 | 100.0 | 27.4 | 11 | 100.0 | 17.2 |
| Condom | 22 | 45.8 | | 2 | 18.2 | |
| Pill | 5 | 10.4 | | 1 | 9.1 | |
| IUD | 5 | 10.4 | | 0 | 0.0 | |
| Abstinence | 12 | 25.0 | | 7 | 63.6 | |
| Other | 4 | 8.3 | | 1 | 9.1 | |
| *Different method*[b] | 32 | 100.0 | 18.3 | 6 | 100.0 | 9.4 |
| From NP to NP | 3 | 9.4 | | 0 | 0.0 | |
| From P to P | 19 | 59.4 | | 6 | 100.0 | |
| From P to NP | 9 | 28.1 | | 0 | 0.0 | |
| From NP to P | 1 | 3.1 | | 0 | 0.0 | |
| **New Acceptors by method**[c] | 95 | 100.0 | 54.3 | 47 | 100.0 | 73.4 |
| Condom | 26 | 27.4 | | 1 | 2.1 | |
| Pill | 24 | 25.3 | | 17 | 36.2 | |
| IUD | 8 | 8.4 | | 13 | 27.7 | |
| Abstinence | 25 | 26.3 | | 13 | 27.7 | |
| Other | 12 | 12.6 | | 3 | 6.4 | |
| B Dropouts by method[d] | | | | | | |
| Total | 95 | 100.0 | | 45 | 100.0 | |
| Condom | 26 | 27.4 | | 5 | 11.1 | |
| Pill | 39 | 41.1 | | 13 | 28.9 | |
| IUD | 11 | 11.6 | | 18 | 40.0 | |
| Abstinence | 4 | 4.2 | | 6 | 13.3 | |
| Other | 15 | 15.8 | | 3 | 6.7 | |

[a] Used in closed interval and are currently using.
[b] Currently using different method from the one used in closed interval. P refers to programme methods and NP refers to non-programme methods. Programme methods include IUD, condom, pill, EMKO/foam while non-programme methods include abstinence, rhythm, withdrawal and other.
[c] New acceptors defined as those who are currently using a method but did not use one in the last closed interval.
[d] Dropouts defined as those who were using a method in the last closed interval but are not currently using any method.

used a method in the last two intervals, 54 per cent in urban and 73 per cent in rural areas had dropped out after the first interval and a majority of these had used efficient methods. The most common reasons for stopping that were reported by dropouts were side-effects, exhaustion of supplies and ineffectiveness of methods, reasons related to the programme methods themselves. Excessive bleeding in case of IUD and giddiness in case of pill were the side-effects reported by a large majority of dropouts who had used these methods (table 9.7). It should be noted that non-

Table 9.7 Reasons for stopping use in the last closed birth interval and 'contraceptive failure'[a] by method, currently married urban and rural women, PFS 1975 (in per cents)

| Reasons for stopping use[b] | Condom | | Oral pills | | IUD | | All others | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural |
| Excessive bleeding | 0.0 | 0.0 | 10.0 | 14.3 | 87.5 | 85.0 | 14.3 | 0.0 | 20.4 | 47.5 |
| Giddiness | 3.0 | 0.0 | 63.3 | 28.6 | 0.0 | 0.0 | 7.1 | 0.0 | 22.6 | 10.0 |
| To have another child | 39.4 | 75.0[c] | 3.3 | 21.4 | 6.3 | 5.0 | 28.6 | 0.0 | 20.4 | 17.5 |
| Supply exhausted | 18.2 | 0.0 | 13.3 | 14.3 | 0.0 | 0.0 | 21.4 | 0.0 | 14.0 | 5.0 |
| Ineffective method | 12.1 | 25.0[c] | 0.0 | 7.1 | 0.0 | 0.0 | 7.1 | 50.0[c] | 5.4 | 7.5 |
| Husband objected | 3.0 | 0.0 | 0.0 | 0.0 | 6.3 | 5.0 | 7.1 | 50.0[c] | 3.2 | 5.0 |
| Could not afford financially | 0.0 | 0.0 | 6.7 | 0.0 | 0.0 | 0.0 | 7.1 | 0.0 | 3.2 | – |
| Other reasons | 24.2 | 0.0 | 3.3 | 14.3 | 0.0 | 5.0 | 7.1 | 0.0 | 10.7 | 7.5 |
| Total | 33 | 4 | 30 | 14 | 16 | 20 | 14 | 2 | 93 | 40 |
| Contraceptive failure (ie became pregnant in spite of using) | 46.0 | 50.0 | 38.0 | 11.8 | 11.1 | 4.8 | 38.0 | 40.0 | 38.1 | 17.6 |
| Total[d] | 63 | 8 | 50 | 17 | 18 | 21 | 24 | 5 | 155 | 51 |

[a] Method failure was calculated as the percentage of women who became pregnant while using a given method. The rest of the women had stopped using the method before they became pregnant.
[b] Excluding those who became pregnant in spite of using methods.
[c] Less than 10 cases in category
[d] All women who used the method in the last closed interval.

programme factors such as disapproval of the husband were mentioned by only a few respondents. In addition to side-effects, a considerable proportion of urban and rural women (38 and 18 per cent) who had used a method during their last closed interval said that they became pregnant in spite of using method. Of the condom users, for example, 45 per cent in urban and 50 per cent in rural areas became pregnant in spite of using the method. In earlier studies the most common reasons for discontinuation have also been found to include side-effects of the method, ineffectiveness of the methods or desire for additional children (see, for example, Lewis 1977; Kiani 1977; TREC (a) n.d.; USAID 1977; Family Health Care Inc 1976; Sinding 1977). The findings indicate clearly that side-effects continue to be a major concern for the respondent and constitute a major factor in low continuation rates.[5]

[5] Some of the conclusions in this section are based on small numbers of cases but these findings do provide a good indication of the climate of opinion and perceptions of side-effects of various contraceptive methods.

## 9.5 FUTURE USERS

It was shown in table 9.1 that 53 per cent of the urban and 59 per cent of the rural never users said that they will use contraceptive methods in the future, the remaining 47 and 41 per cent in each area stating that they will not. A cursory examination of the age, parity and socio-economic status of those who plan to use in the future shows that these women are typically younger with less than average parity, that a little less than two-thirds of them in rural and urban areas want additional children, and that relatively few of them have met a family planning person (table 9.5, column 5). In terms of literacy and exposure to family planning messages through the mass media, this group occupies an intermediate position between the users and the hard core group, ie never-users who will not use in the future.

In order to assess in a more rigorous fashion the pattern of intended future use expressed by this subgroup, we calculated adjusted percentages of

Table 9.8 Unadjusted and adjusted percentages of intention for future contraceptive use, currently married women who have never used any method, urban and rural Pakistan, PFS 1975

| | Urban | | | Rural | | |
|---|---|---|---|---|---|---|
| | Unadjusted | Adjusted | N | Unadjusted | Adjusted | N |
| *Wife's age* | | | | | | |
| < 25 | 74.5 | 71.9 | 451 | 73.8 | 76.5 | 865 |
| 25–34 | 61.8 | 62.4 | 456 | 65.4 | 65.8 | 884 |
| 35+ | 27.3 | 29.6 | 396 | 40.5 | 37.1 | 810 |
| *No of living children* | | | | | | |
| ⩽ 3 | 64.4 | 55.7 | 787 | 63.6 | 55.8 | 1579 |
| 4–5 | 44.4 | 53.9 | 259 | 54.3 | 63.5 | 565 |
| 6+ | 40.5 | 57.7 | 257 | 56.1 | 73.1 | 415 |
| *Wife's education* | | | | | | |
| Illiterate | 52.2 | 53.9 | 1001 | 59.9 | 60.1 | 2428 |
| 1–4 grades | 61.6 | 56.9 | 86 | 74.6 | 69.2 | 59 |
| 5+ grades | 69.4 | 63.9 | 216 | 62.5 | 59.1 | 72 |
| *Husband's education* | | | | | | |
| Illiterate | 48.5 | 53.4 | 551 | 57.6 | 59.3 | 1664 |
| 1–4 grades | 63.5 | 66.3 | 98 | 65.0 | 63.9 | 243 |
| 5–9 grades | 59.7 | 57.9 | 347 | 66.3 | 62.8 | 489 |
| 10+ grades | 61.9 | 53.9 | 307 | 63.8 | 58.5 | 163 |
| *Met f.p. person* | | | | | | |
| Yes | 55.6 | 57.9 | 398 | 63.1 | 63.8 | 563 |
| No | 55.8 | 54.8 | 905 | 59.6 | 59.3 | 1996 |
| *Ideal vs living children* | | | | | | |
| Ideal < living, don't want more | 41.6 | 54.6 | 298 | 55.9 | 61.9 | 447 |
| Ideal ⩾ living, don't want more | 43.6 | 50.2 | 312 | 47.7 | 54.4 | 661 |
| Ideal < living, want more | 45.2 | 48.9 | 42 | 65.0 | 64.3 | 60 |
| Ideal ⩾ living, want more | 68.7 | 59.3 | 651 | 67.6 | 62.5 | 1391 |
| $R^2 \times 100$ | 16.4 | | | 9.8 | | |
| Grand mean | 55.7 | | | 60.3 | | |
| N | | | 1303 | | | 2559 |

intentions for future use for all never users. Multiple classification analysis was again used for this purpose. Intention to use in the future was recoded as 1 while non-intention was recoded as 0. The results are presented in table 9.8. Age of wife is the only variable for which we found a clear negative effect on intentions for future use. In both the urban and rural areas, an overwhelming proportion of the younger women stated that they will use contraception in future (72 and 77 per cent of women aged under 25). In contrast, relatively few of the women aged 35 or more said that they intended to use: 30 and 37 per cent respectively. We know from our earlier analysis of PFS and other data that there is a generally positive association between age of wife and actual practice of contraception, with contraceptive use declining somewhat at higher ages (say above 35). This finding about the strikingly lower proportions of older women intending to use in future is therefore confusing. There are at least two possible explanations for such a finding.

First, older women probably do not consider themselves fecund and therefore do not feel the need for contraceptive use in future. Secondly, older women are more realistic in assessing their actual future behaviour since they must use contraception in the relatively near future if they are to use it at all; and therefore fewer of them state that they intend using contraception. While we have no means of assessing the latter argument, the earlier argument found some support when we analysed the data for fecund women only. The adjusted proportions of intended use were: 68, 65 and 50 per cent among women in the age groups under 25, 25–34 and 35 and over (data not shown). Data for fecund rural women showed a similar narrowing of differentials, although the negative relationship between age and intended use still remains.

Unlike age, the relationship of parity with intended use followed the expected positive direction, being particularly strong in rural areas. Seventy-three per cent of rural women with six or more children said that they would use contraception compared with 56 per cent of women with three or fewer children. Wife's education had a consistent positive effect on intended use in urban areas and a statistically non-significant curvilinear effect in rural areas. Husband's education had a curvilinear effect on intended use in both urban and rural areas, with the largest proportion of wives whose husbands had one to four years of education expressing intention for future use. Some additional data in table 9.6 support our scepticism about the responses of younger women, as follows. First, access to a family planning worker makes only a small difference in terms of the respondent's intention to use. This finding is in direct conflict with the great importance attached to the family planning worker as an agent of messages and methods. Secondly, more women who want additional children (and whose ideal family size is greater than or equal to their actual family size) say that they will use contraception in the future compared to the excess fertility group, ie woman who have exceeded their ideal and do not want more children. This finding is again in direct contradiction to the actual behaviour of women as reported in 1975 PFS. From table 9.4 we observed that women with excess fertility had contraceptive use rates almost four times higher than the women who had not exceeded their ideal and wanted more children. These data seem to indicate that many of the young respondents might be providing the 'right' answer simply to please the interviewers. For the older respondents who are closer to their ideal family size, the question probably represents a more concrete situation; also, more older women are likely to be aware of the dangers of contraception, eg side-effects, and they have therefore responded to a more real situation, rather than imagined one, as in the case of younger women. Finally, analysis of the hard-core future non-users in the next section provides some idea of the general social climate which influences these younger women. The reasons for non-use mentioned by the future non-users indicate the types of barrier to contraception that exist in the minds of many eligible women, and the kind of environment that the younger women are going to face before they actually decide about future contraception.

## 9.6 THE HARD-CORE GROUP: WHY THEY WON'T USE

As mentioned above, more than 40 per cent of the never users said that they will not use contraceptive methods in the future. When asked about their reasons for this negative response, a very large proportion of these – 46 per cent in urban and 52 per cent in rural areas – said that they would not use for religious reasons (table 9.9). Since no further specification or elaboration of this response was elicited, we do not know whether this answer is based on genuine beliefs or whether it is an easy way out of a question which the respondent does not wish to answer. We do know that the local religious leaders in many areas of the country have been and still are against family planning.[6] There is a need to explore what kind of religious teachings and messages conveyed through which media and channels are at the roots of respondents' perceptions that family planning is against religion. It is only after these structures and mechanisms are understood that effective programmes aimed

[6] The religious prescription on the subject has been interpreted in different ways by adherents of different viewpoints. The Family Planning Association of Pakistan has, for instance, compiled a volume in which it presents 'fatwas' (declarations by religious scholars) which state that the use of contraception is not anti-Islamic (FPAP, ND). Other writings which state that family planning is anti-Islamic are abundant, eg the writings of Maulana Maudoodi.

Table 9.9 Reasons for non-use given by women who never used, and do not intend to use contraception in the future, currently married urban and rural women, PFS 1975

| Reasons given | Urban | | Rural | |
|---|---|---|---|---|
| | No | % | No | % |
| Religious reasons | 204 | 46.1 | 395 | 51.7 |
| Fear of side-effects | 70 | 15.8 | 127 | 16.6 |
| Husband objects | 70 | 15.8 | 61 | 8.0 |
| Husband too old | 29 | 6.6 | 39 | 5.0 |
| Secondary sterility | 13 | 2.9 | 25 | 3.3 |
| Ineffective method | 11 | 2.5 | 20 | 2.6 |
| Family objects | 10 | 2.3 | 9 | 1.2 |
| Want children/sons | 5 | 1.0 | 44 | 5.8 |
| Other reasons | 31 | 7.0 | 44 | 5.8 |
| Total | 443 | 100.0 | 764 | 100.0 |

at countering the underlying attitudes can be launched.

Besides religious beliefs, the second most important reason given by respondents for future non-use was that of side-effects; 16 and 17 per cent of urban and rural respondents respectively gave this reason (table 9.9). When compared with the 1968–9 NIS, we note that side-effects were given as a reason by a large proportion of women who said that they would not use the IUD in future – 58 and 43 per cent in urban and rural areas. Side-effects were also mentioned as a reason for not wishing to use sterilization in the future by more than one-fifth of the NIS women (data not shown). Thus, it seems that knowledge of the side-effects of various methods and rumours about them continue to act as an effective deterrent to contraceptive use.

Objection by husband and other relatives was reported as the reason for future non-use by a substantial proportion of women in the PFS. A similar pattern of dislike by husband or the respondent herself was also reported in the NIS. In the PFS, desire for additional children (and sons) was given as a reason by many more rural than urban respondents – 6 and 1 per cent respectively. It should be noted that lack of effectiveness of a method was a cause for concern for only a small proportion of PFS future non-users. An analysis of socio-demographic characteristics of women reporting the three most important reasons for non-use (ie religious belief, fear of side-effects and objections by husband or family) shows that the average age of urban women who gave side-effects as a reason for non-use was notably higher (31.7 years) than those who mentioned religious belief (28.6 years) or husband's objection (27.9 years). Consistent with their higher ages, women who

Table 9.10 Selected characteristics of currently married women expressing the three most important reasons for future non-use, PFS 1975

| Characteristics | Religious reasons | Fear of side effects | Husband/ family objects | All non-user women who do not intend to use |
|---|---|---|---|---|
| A Urban | | | | |
| $\bar{x}$ age wife | 28.6 | 31.7 | 27.9 | 33.7 |
| $\bar{x}$ no of children ever born | 4.2 | 5.4 | 4.2 | 4.8 |
| $\bar{x}$ no of living children | 3.8 | 4.7 | 4.0 | 3.7 |
| $\bar{x}$ ideal no of children | 4.6 | 3.9 | 4.5 | 4.2 |
| % wives literate | 14.2 | 20.0 | 25.0 | 16.4 |
| % husbands literate | 52.0 | 52.9 | 65.0 | 50.4 |
| B Rural | | | | |
| $\bar{x}$ age wife | 29.8 | 29.5 | 27.5 | 33.4 |
| $\bar{x}$ no of children ever born | 4.2 | 4.3 | 3.9 | 4.5 |
| $\bar{x}$ no of living children | 3.7 | 3.5 | 3.9 | 3.3 |
| $\bar{x}$ ideal no of children | 4.6 | 4.4 | 4.5 | 4.4 |
| % wives literate | 3.8 | 5.5 | 5.7 | 4.0 |
| % husbands literate | 31.1 | 33.9 | 47.1 | 30.0 |

expressed a fear of side-effects had a higher average parity compared with the other two groups, although their ideal family size was relatively smaller (table 9.10). Those who gave religious beliefs as their reason for non-use had the highest ideal family size – 4.6 compared to 3.9 for women who mentioned side-effects. Among the latter group of non-users, it seems that even though high parity may have motivated the women to revise their ideal family size downwards, they are not motivated enough to take action which would prevent a widening gap between their ideal and actual fertility. Their inaction is based on fear of side-effects. Finally, it is worth noting that literacy was lowest among urban women who reported religious reasons. In the rural areas, women who gave religious reasons for non-use had the highest average age, the highest parity and the highest ideal family size although the differences were generally quite small (table 9.10). Also, both husbands and wives who gave religious reasons were the least literate compared to the other two groups.

Thus, judging from the responses of the PFS women, basic attitudinal constraints lead women to define family planning in negative terms; and these constraints are still significant for a very large proportion of all women in the reproductive age range. The idea of family planning has not been legitimized by religious leaders, and a basic core of resistance persists. In addition to this fundamental problem, there is the problem of widespread awareness of serious side-effects of methods like IUD and pill, the two methods that the family planning programme has emphasized during the last decade. These constraints produce an extremely difficult situation for programme planners.

## 9.7 CONCLUSIONS

Analysis of data from the 1968–9 NIS and 1975 PFS shows that contraceptive use has increased slightly in urban but has declined in rural areas over the two time periods. Furthermore, the average age of rural current users is about four years higher in the PFS than in the NIS and has remained constant in urban areas. These findings pertain to a period when there was considerable family planning activity in the country. Between the two survey periods the programme was re-evaluated, restructured and strengthened (for details see Robinson 1978; Ahmad 1971; Zaidi *et al* 1975; USAID 1977). Since then, programme activities have slackened considerably. Field activities were suspended in early 1977 and were restored only in July 1978 but failed 'to gain a significant momentum' during the 1978–9 period (Planning Commission 1979–80). The targets which had been set for 1978–9 for various methods were achieved only by one-third to one-half.

The national programme is still undergoing organizational changes and has not settled down. Forty-three per cent of never users (or 38 per cent of all currently married, ie eligible women) say that they will not use contraceptive methods in the future. The reasons they cite for their intentions not to use include religious belief, fear of side-effects and objection to the use of contraception by husband or other relatives. These responses provide an indication of the general environment and the general climate of opinion prevalent among almost 40 per cent of all eligible couples. There still are significant attitudinal as well as programme-related factors that constitute barriers to the adoption of contraception. The dropout rate is high with only about 39 per cent of women continuing to use contraception over two birth intervals (the last closed and the open interval). The majority of users of the two main methods, pill and IUD, say that they stopped using the method because of side-effects. That information about side-effects spreads widely and is used as a reason for rationalizing future non-use is evident from the data in PFS.

Those women who state that they will use contraception in the future are typically younger women with less than three children on average. Once age, parity and knowledge of family planning personnel are controlled, more urban women wi· five or more years of education say that they will use contraception in the future than illiterate urban women (64 and 54 per cent respectively). This differential points out at least one area in which population planners can take action. But the markedly large proportions of younger women who state that they will use contraception in the future must be interpreted with great caution. These responses cannot be accepted at face value, given our experience with past age-parity patterns of contraceptive adoption in Pakistan and given the seemingly negative attitudes of a large proportion of people who do not intend to use contraception in the future. Such negative attitudes are bound to affect the climate of opinion in a community, and might alter the younger women's positive attitude towards contraception when they are older. It is not possible to predict with any degree of accuracy the future behaviour of these younger women but to assume that all (or most of them) will use contraception in the next five or ten years is hazardous. The fulfilment of such an assumption is possible only if the barriers inherent in their attitudes and in the structure of the programme itself (ie its logistics) are overcome immediately, or if there is a dramatic improvement in the income and educational level of the population. Neither of these possibilities seems highly likely, at least in the next five or ten years.

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# 10 Community and Programme Variables and their Effects on the Fertility-Related Behaviour of Rural Pakistani Women

M. Nizamuddin

## 10.1 INTRODUCTION

A review of social science literature on the study of social change, attitude formation and behaviour modification amply demonstrates that human attitudes and behaviour are products of both individual and environmental influences (Fishbein and Ajzen 1975). But although both are generally acknowledged, environmental factors are seldom taken into consideration in any of an individual's fertility behaviour. One reason for this could be, at least partly, the heavy dependence of fertility studies on survey methodology, which involves interviewing individuals as respondents.

In recent years, however, we have witnessed a growing interest among social scientists in general, and demographers in particular, in human fertility viewed from both individual and contextual perspectives. The latter involves supra-individual dimensions which are referred to in the literature as structural, contextual, ecological, environmental, or community-level characteristics and variables. Collection of community-level data, or aggregation of individual-level data to some higher level of measurement, has become more common in recent studies of fertility-related behaviour. Freedman (1974), McNicoll (1975), and Berelson (1976) have pointed out the potential for utilizing community-level data in conjunction with the individual-level data for fertility research and as a basis for formulating population policy and designing programmes. These authors argue that if the community factors which affect individual attitudes and behaviour in family planning can be identified, then it might be possible to develop more effective and less expensive community-level approaches to providing contraceptive services and supplies than the individual approaches that have been used in the administration of large-scale population programmes in many developing countries.

A number of the large-scale national family planning programmes around the world, particularly in the less developed countries, have been based on an interesting policy premise. The most salient feature of these programmes is that they have a medical or clinical orientation and have adopted methods that aim at individuals or, at best, households, usually ignoring the social and structural contexts (Hauser 1973). This, in fact, has been the principal criticism of the organized family planning programmes and a major thrust of the Bucharest Debate at the World Population Conference in 1974.

In recent years, both implicit and explicit population-related policies have emerged which advocate community-based development programmes, including population control programmes. Lately, international agencies, such as the World Bank and the United Nations, have also come to emphasize the need to develop community contexts and redistribute resources, because until the social and economic milieu of the majority of the people is altered, innovations such as birth control cannot become wholly acceptable.

The underlying assumption here is that a 'minimum threshold' of socio-economic security for the poorest segment is not simply important but indeed a precondition for making any headway in a programme of social change. It is further argued that, once the rural infrastructure for socio-economic development is established, instituting a community-level programme of fertility control which involves community participation is more relevant and practical.

It is only by ensuring community-level participation in the overall socio-economic development of rural areas that the external implications of excess fertility can be emphasized to individuals,



Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey*: 163–186. Voorburg, Netherlands: International Statistical Institute.

which may influence their fertility-related decisions (McNicoll 1975). Thus, this analysis has both substantive and methodological implications for population policy in less developed countries.

The principal aim of the chapter is to assess the relative contribution of structural or community characteristics in explaining individual fertility behaviour, over and beyond the effects of individual-level factors in rural Pakistan.

## 10.2 ANALYTICAL FRAMEWORK

The effort to measure the joint effects of individual and community characteristics on individual fertility behaviour is a recent phenomenon. However, social science literature, particularly sociological writings on the structural and societal effects on the individual's behaviour, can be traced back at least to Durkheim (1897).[1] Since then a series of sociologists have addressed the question through their studies of human groups (Cooley 1909; Simmel 1922; and Lewin 1951). Also, the studies dealing with the influence of ecological and individual factors on different aspects of human behaviour, such as voting and interpersonal relationships, have contributed a great deal to clarifying the dynamics of human behaviour (Hawley 1950; Robinson 1950; Katz 1957; Young 1960; Murdock 1966; Moos 1973).

The earliest attention to ecological factors in demographic research was in mortality studies, where it was recognized that environmental conditions were at least as important, if not more important, than individual characteristics in affecting the overall level of mortality (Ohlin 1961; McKeown 1965). More recently, Duncan (1964) and Rhodes (1971) demonstrated that both the aggregate educational levels of an individual couple (at census tract level) and the educational level of the couple (at the individual level) are related to their fertility.

In general, however, most of the studies of fertility and family planning suggest that community or structural-level factors do not add significantly to the explanation of individual variation. At best the evidence is mixed. One explanation for this lack of significant community effects may be that there are certain intermediate structural or normative links between the individual's behaviour and the less immediate milieu, which have not been captured in these studies.[2]

We may add, however, that most of the studies to date have been based on data sets inadequate to the task of disaggregating the influence of community and structural factors from the influence of individual characteristics. Some were based on a very small number of villages (Hong 1976; Lee 1977). Others suffered from a lack of reliable or valid information on a number of community characteristics which relate to fertility, including some essential ones (Cain and Siregeldin 1975). Furthermore, the data for these studies were not always collected with the primary intention of multi-level analysis.

The data for the present study do not suffer from all of the above deficiencies. Data are available for 193 villages. A specially designed community-level questionnaire was used, which includes community-level information on variables that relate to fertility behaviour. The present research is thus free from some of the deficiencies of the previous studies, and we hope that it will provide better insight into the dynamics of interaction between individual behaviour and community factors influencing that behaviour.

A review of relevant literature (see Nizamuddin 1979) underscores the point that, while relatively few studies have dealt with *fertility-related* behaviour using communities or other aggregates as the units of analysis, there are sizeable numbers of studies in other disciplines that have used countries, regional areas and other agglomerates as units of analysis, for example studies dealing with voting behaviour, racial and ethnic segregation, distribution of poverty and levels of economic development. However, use of both the community and the individual as units of analysis remains rare. Freedman (1974a and b) has provided a comprehensive methodology for collection and compilation as well as analysis of community-level variables. The theoretical model of cross-level analysis of fertility behaviour in this chapter has been influenced largely by Freedman's suggestions. Similarly, the individual-level fertility behaviour

[1] For a collection of articles on comparative ecological and areal analysis, see Dogan and Rokkan 1974.

[2] Lee (1977) did not observe any significant contribution of contextual or community-level factors over and above individual factors in explaining individual fertility behaviour in Korea, but he has found that communication network variables, which he classifies as community characteristics, had significant effects over and above the individual factors.

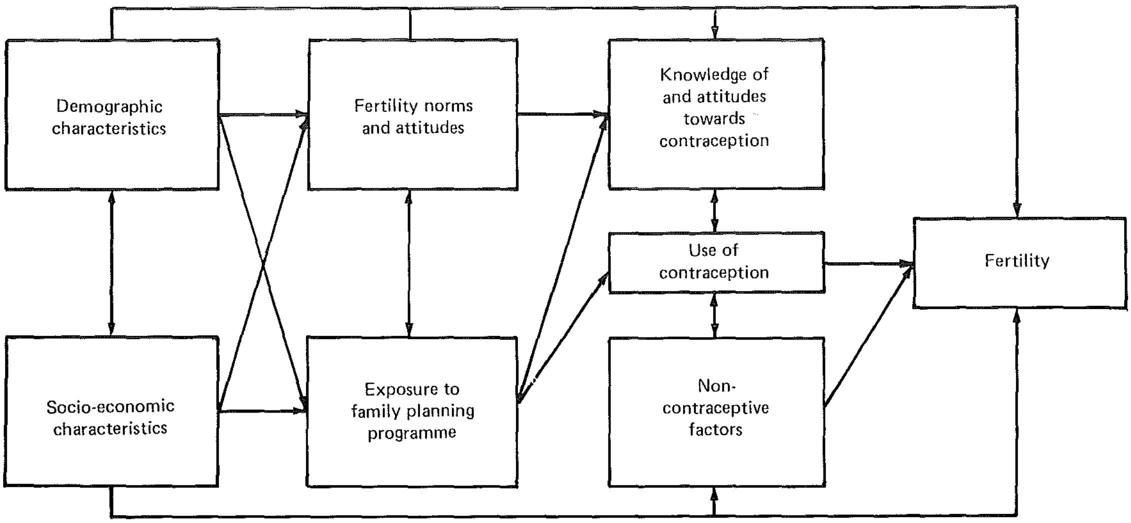



Figure 10.1 Determinants of fertility: an individual (micro-level) fertility model

model has been influenced by Davis and Blake's (1956) framework for fertility analysis. The modifications introduced by Freedman (1967) in the Davis and Blake framework by explicitly placing the latter in the total societal context and introducing the family planning programme factors as a set of independent variables have also been incorporated.

## 10.3 DETERMINANTS OF FERTILITY-RELATED BEHAVIOUR AT THE INDIVIDUAL LEVEL

Freedman, in commenting on the determinants of fertility, observes that 'fertility levels are part of a complex system of social, biological, and environmental interactions, as is any phenomenon dependent on such central and universal human concerns as sex, marriage, and kinship' (1975: 13).

Taking leads from the general framework elaborated by Freedman and based on the available data from the Pakistan Fertility Survey of 1975, an individual-level analytical model is developed (figure 10.1) which identifies the key variables. Briefly, this model specifies that fertility-related behaviour is determined by a number of socio-economic, attitudinal and demographic factors. Included in these factors are Davis and Blake's 'intermediate variables'. These intermediate variables operate singly or in combination with other factors to affect the level of fertility. Though they are not shown in figure 10.1, feedback influences such as fertility levels may affect the norms and attitudes towards the intermediate variables (Freedman 1975: 15). The family planning programme variables have also been included in this model, to indicate their role in affecting contraception-related attitudes and behaviour.

## 10.4 DETERMINANTS OF FERTILITY-RELATED BEHAVIOUR AT THE COMMUNITY LEVEL

It is commonly observed that even apparently uniformly administered social changes, such as family planning programmes, receive differential responses from individuals and communities (Freedman and Takeshita 1969; Rogers 1971). Why do communities vary in their response to certain stimuli or innovations? Is it, in fact, due to a lack of uniformity and standardization in implementing these programmes? Is it due to the differences in the individuals themselves?

To answer these questions, in this study we perform analysis at the village-level, that is, using the villages as the units of analysis. For the villages we have direct measures from the community survey (which we term 'global community variables'). In addition, we calculate community measures by aggregation of information collected in the individual survey (we term these 'aggregated community variables'). For example, the mean age and educational attainment of women of child-bearing age in the community can be calculated from the individual survey data. (Obviously these

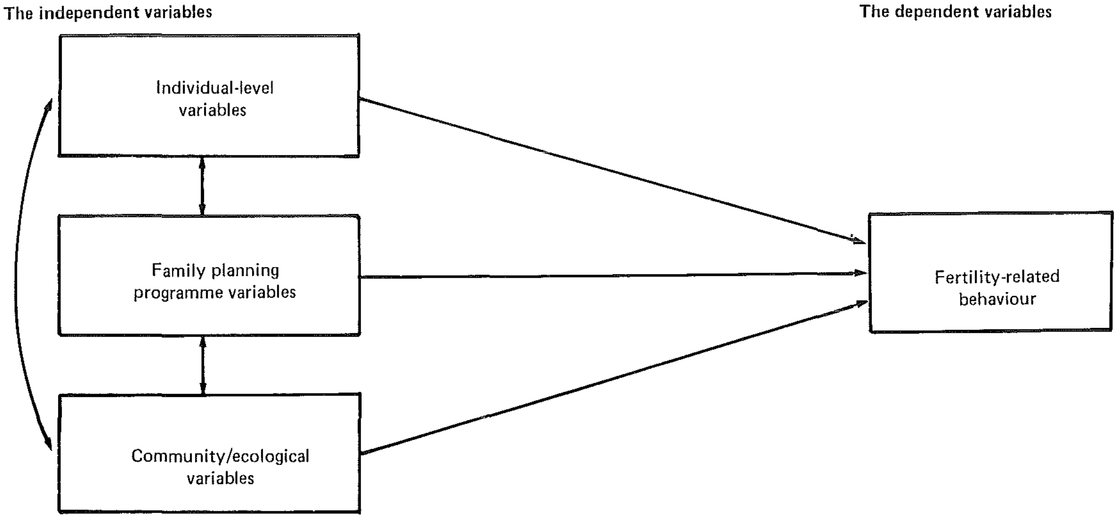



**Figure 10.2** Determinants of fertility-related behaviour: a prediction model

are estimates, since all women in the villages were not interviewed.) The village-level analysis directly answers questions only about variation *among* villages. To explain variation among individual women, we rely on the individual-level analysis. It may well be misleading to draw conclusions about individual behaviour from the results of the village-level analysis (see Robinson 1950 and subsequent literature on the 'ecological fallacy').

A comprehensive analytical model is developed to study the determinants of fertility behaviour at the community level. The model is the community-level analogue of figure 10.1. The aim of the model is to ascertain the relative contribution of community and aggregated individual factors on fertility-related behaviour at the community level. Included are measures of family planning programme effects, and thus the relative contribution of programme factors can also be assessed. One of the primary objectives is to measure the extent to which the family planning programme influences contraceptive behaviour, through the provision of contraceptive information, services and supplies.

The model depicted in figure 10.1 relates fertility behaviour to socio-economic and demographic characteristics and environmental and community characteristics, intervening through four sets of variables, namely fertility norms and attitudes, exposure to the family planning programme, knowledge of and attitudes towards contraception, and the use of contraception. Even a modest attempt to disentangle the relationships between these variables would require the application of complicated techniques of multivariate analysis. To make the task manageable, we estimate a simplified model shown in figure 10.2. This model indicates that the importance of the community ecological variables will be assessed, controlling for the individual variables which influence the knowledge and use of contraception and future fertility intentions of rural women.

## 10.5 THE SOURCE OF DATA

The data for the present research come from the Pakistan Fertility Survey, which used the household schedule, an individual-level core questionnaire and a community questionnaire. This last was administered by the field supervisors at the time of listing and mapping the selected villages. Typical respondents were village school teachers, retired military or civil personnel, the village headmen or any other influential person in the village.[3]

## 10.6 THE STRATEGY OF ANALYSIS

The general framework presented in figure 10.1 suggests the following sequence: fertility levels affect future fertility intentions, which in turn motivate women to control their fertility by first

[3] Out of a sample of 200 villages, fieldwork was completed in 193. For details of sample design, see the First Country Report of the PFS.

educating themselves in methods of controlling fertility (knowledge of contraception) and finally using that information to do so. The dependent variables we investigate are: (1) children ever born, (2) desire to cease childbearing, (3) knowledge of contraceptive methods, and (4) ever-use of contraception. The same variables, measured at the individual level, are aggregated across all individuals within each village for the community-level analysis. All in all, we use three sets of predictors: global community variables, aggregated community variables and individual-level variables. The present analysis has been carried out using a set of 25 predictor variables, listed below (for further details, see Nizamuddin 1979: 51–81).

PREDICTOR VARIABLES USED IN THE ANALYSIS

**I Demographic and socio-economic variables**

(A) Wife's age
(B) Wife's age at first marriage
(C) Number of living children
(D) Number of living sons
(E) Number of child deaths
(F) Wife's education
(G) Wife's work status
(H) Husband's occupation
(I) Family structure
(J) Household education

**II Knowledge of and attitudes towards family planning**

(A) Knowledge of efficient contraceptive methods
(B) Desire to cease childbearing
(C) Ideal family size
(D) Breastfeeding practice

**III Family planning programme variables**

(A) Knows family planning places
(B) Contact with family planning personnel
(C) Exposure to family planning programme index
(D) Modernity index

**IV Global community variables** (measured as distance *from* village)

(A) Accessibility to family planning facilities
(B) Accessibility to education facilities
(C) Accessibility to transportation centres
(D) Accessibility to communication centres
(E) Accessibility to agricultural extension facilities

Both bivariate and multivariate analysis was performed. The analysis proceeds in several interrelated stages. In stage 1, the community-level data are inspected and indices created to optimize the measurements of our key variables. In stage II, based on theoretical considerations and availability of data, two empirical models of fertility-related behaviour are developed: (1) a community or macro-level model and (2) an individual or micro-level model. In stage III, several statistical techniques are used to obtain empirical estimates of the parameters of the models of fertility-related behaviour. Specifically, product–moment correlation is used as an indicator of the gross bivariate relationship between the predictors and the dependent variables. To identify the 'best' set of predictors, we subject the data to stepwise regression and AID-Search[4] analyses, for the community and individual-level analyses, respectively. Additionally, the AID-Search strategy was used to detect significant interaction effects. In order to examine the relationships between the selected predictors and the dependent variables, the ordinary least squares (OLS) multiple regression and the multiple classification analysis (MCA)[5] techniques were employed, for the community and the individual-level analyses, respectively. Finally, the commonality analysis procedure[6] is used to decompose the total variance explained in each dependent variable into the unique and common effects of the three general categories of predictors: community, programme, and socio-economic and demographic. This procedure enables us to assess the contribution of each predictor set, net of others, in the explanation of the variance in each of our selected dependent variables.

[4] For a discussion of AID, see Sonquist and Morgan 1974.

[5] For a discussion of MCA, see Andrews *et al* 1973.

[6] For a discussion of commonality analysis, see Kerlinger and Pedhazer 1973: 297–305.

Table 10.3 Full regression model for desire to cease childbearing at the community level (N = 189 villages)

| Predictors | *Beta* | t-statistics |
|---|---|---|
| Accessibility to f.p. facilities | − 0.01 | − 0.18 |
| Accessibility to transportation centres | 0.01 | 0.10 |
| Accessibility to education facilities | 0.00 | 0.05 |
| Accessibility to agricultural extension facilities | − 0.10 | − 1.94 |
| Wife's age | − 0.60 | − 9.01*** |
| Wife's age at first marriage | 0.12 | 2.11* |
| Number of living sons | − 0.19 | − 3.08** |
| Number of child deaths | 0.01 | 0.24 |
| Wife's work status | 0.07 | 1.20 |
| Wife's education | 0.00 | 0.08 |
| Husband's occupation | 0.09 | 1.48 |
| Ideal family size | 0.10 | 1.65 |
| Exposure to family planning programme | − 0.04 | − 0.76 |
| $R^2$ | 0.57 | |

*Significant at $p < 0.05$ level.
**Significant at $p < 0.01$ level.
***Significant at $p < 0.001$ level.

the predictors of the desire to cease childbearing, reveals a pattern of relationships similar to the one observed in the regression analysis. Out of a total of 55 per cent of variance explained, 45 percentage points are unique to the aggregated socio-economic and demographic factors, while less than two per cent is attributed uniquely to the global community variables. Here again, as can be seen, the community institutions only weakly relate to the variable of interest.

## Knowledge of contraception

As expected the aggregate knowledge of contraception is significantly correlated with the village's

Table 10.4 Commonality analysis of the effects of global community, programme and socio-economic variables on desire to cease childbearing (N = 189 villages)

| Unique and common effects[a] | | Variable type | | |
|---|---|---|---|---|
| | | Global | Programme | Socio-economic |
| Unique global effects | U(c) | 0.013 | | |
| Unique programme effects | U(p) | | 0.010 | |
| Unique socio-economic effects | U(s) | | | 0.453 |
| Common global and programme effects | C(c,p) | 0.004 | 0.004 | |
| Common global and socio-economic effects | C(c,s) | 0.035 | | 0.035 |
| Common programme and socio-economic effects | C(p,s) | | 0.038 | 0.038 |
| Common global programme and socio-economic effects | C(cps) | 0.020 | 0.020 | 0.020 |
| Total for indicated variable type | | 0.072 | 0.072 | 0.546 |

[a]See footnote a to table 10.2.

Table 10.5 Regression model for knowledge of contraceptive methods at the community level (N = 190 villages)

| Predictors | *Beta* | t-statistics |
|---|---|---|
| Accessibility to f.p. facilities | 0.10 | 1.68 |
| Accessibility to transportation centres | − 0.06 | − 1.11 |
| Accessibility to education facilities | − 0.13 | − 2.27* |
| Accessibility to agricultural extension facilities | 0.13 | 2.29* |
| Wife's age | − 0.02 | − 0.23 |
| Wife's age at first marriage | 0.04 | 0.61 |
| Number of living sons | 0.05 | 0.81 |
| Number of child deaths | 0.08 | 1.25 |
| Wife's work status | − 0.14 | − 2.23* |
| Wife's education | − 0.03 | − 0.55 |
| Husband's occupation | − 0.17 | − 2.45* |
| Ideal family size | − 0.06 | − 0.96 |
| Exposure to family planning programme | 0.49 | 7.75*** |
| $R^2$ | 0.49 | |

*Significant at $p < 0.05$ level.
**Significant at $p < 0.01$ level.
***Significant at $p < 0.001$ level.

exposure to the family planning programme. When aggregate knowledge of contraception is regressed on the selected predictors, the expected relationships between family planning exposure and contraceptive knowledge remain. Both the direction of relationship and the importance of the family planning programme as a powerful predictor are evident (tables 10.5 and 10.6). The finding is not surprising, given Pakistan's massive efforts in the last decade to disseminate contraceptive information to its rural populations. Another significant finding is that certain global community characteristics emerge as important predictors of community-level knowledge. For example, villages

Table 10.6 Community-level analysis: commonality analysis of the effects of global community, programme and socio-economic variables on knowledge of contraceptive methods (N = 190 villages)

| Unique and common effects[a] | | Variable type | | |
|---|---|---|---|---|
| | | Global | Programme | Socio-economic |
| Unique global effects | U(c) | 0.047 | | |
| Unique programme effects | U(p) | | 0.193 | |
| Unique socio-economic effects | U(s) | | | 0.055 |
| Common global and programme effects | C(cp) | − 0.004[b] | − 0.004[b] | |
| Common global and socio-economic effects | C(cs) | 0.023 | | 0.023 |
| Common programme and socio-economic effects | C(ps) | | 0.134 | 0.134 |
| Common global, programme and socio-economic effects | C(cps) | 0.043 | 0.043 | 0.043 |
| Total for indicated variable type | | 0.109 | 0.366 | 0.255 |

[a]See footnote a to table 10.2
[b]See footnote b to table 10.2

where girls do not have easy access to schools tend to have less knowledge of contraception. (The negative sign on the coefficient indicates that *greater* distance is associated with *less* knowledge.) Agricultural modernization of a village, on the other hand, is associated with higher levels of contraceptive knowledge. This may be due to family planning fieldworkers paying more visits to villages that are conveniently located. It is well known that developmental activities, such as agricultural extension services, the rural economic development programme, health and family planning facilities, and schools are concentrated in certain villages. The aggregated demographic factors presumed to be correlated with contraceptive knowledge do not show significant relationships.

## Ever-use of contraception

The village-level use of contraception may differ within and between villages due to the differential performance of the family planning programme. We found that villages differ in aggregate contraceptive use. Although the overall use of contraception is very low (only six per cent), wide variations between villages were observed. The proportion of ever-use of contraception varies from 0 to 0.40. When we regress the selected set of community-level predictors on aggregate use of contraception, the final model explains 42 per cent of the variance (table 10.7). The most powerful predictor of ever-use is exposure to the family planning programme index. The other important and statistically significant predictors are aggregate wife's education, aggregate number of living sons, aggregate ideal family size, and accessibility to educational facilities. Overall, the global community variables, except accessibility to educational facilities, do not show any significant relationship with aggregate ever-use in the multivariate analysis.

From among the aggregate socio-economic and demographic variables, the aggregate number of living sons and ideal family size are significantly related to aggregate ever-use of contraception. For example villages having a higher average number of living sons show higher average use of contraception. It may be mentioned here that we use living sons instead of living children in the regression equation in order to capture the effects of both the achieved parity and son preference. Looked at in this context, this finding suggests that the decision to use contraception depends upon the achieved parity level. The stronger the preference for sons, the larger the number of children and ultimately a higher propensity to use contraception. It is important to note that aggregate wife's education and accessibility to female educational facilities are both significantly related to contraceptive use. We may speculate that aggregate wife's

**Table 10.7** Full regression model for ever-use of contraception at the community level (N = 187 villages)

| Predictors | *Beta* | t-statistics |
|---|---|---|
| Accessibility to f.p. facilities | 0.03 | 0.52 |
| Accessibility to transportation centres | 0.01 | 0.15 |
| Accessibility to education facilities | −0.16 | −2.60** |
| Accessibility to agricultural extension facilities | −0.05 | −0.76 |
| Wife's age | 0.05 | 0.66 |
| Wife's age at first marriage | −0.04 | −0.57 |
| Number of living sons | 0.15 | 2.08* |
| Number of child deaths | 0.07 | 1.04 |
| Wife's work status | 0.07 | 1.02 |
| Wife's education | 0.36 | 5.21*** |
| Husband's occupation | −0.06 | −0.74 |
| Ideal family size | −0.20 | −2.91** |
| Exposure to family planning programme | 0.30 | 4.50*** |
| $R^2$ | 0.42 | |

*Significant at $p < 0.05$ level.
**Significant at $p < 0.01$ level.
***Significant at $p < 0.001$ level.

Table 10.8 Commonality analysis of the effects of global community, programme and socio-economic variables on ever-use of contraception (N = 187 villages)

| Unique and common effects[a] | | Variable type | | |
|---|---|---|---|---|
| | | Global | Programme | Socio-economic |
| Unique global effects | U(c) | 0.025 | | |
| Unique programme effects | U(p) | | 0.115 | |
| Unique socio-economic effects | U(s) | | | 0.150 |
| Common global and programme effects | C(c,p) | −0.011[b] | −0.001[b] | |
| Common global and socio-economic effects | C(c,s) | 0.101 | | 0.101 |
| Common programme and socio-economic effects | C(p,s) | | 0.092 | 0.092 |
| Common global, programme and socio-economic effects | C(cps) | 0.042 | 0.042 | 0.042 |
| Total for indicated variable type | | 0.067 | 0.238 | 0.295 |

[a]See footnote a to table 10.2.
[b]See footnote b to table 10.2.

education may be operating both directly and indirectly. Directly it may expose women to the pressure of having a large number of children, and indirectly it may have a negative effect on fertility through decreasing the desired family size. In short, then, education of females (of currently married wives as well as future wives) is the second most important factor associated with contraceptive use after exposure to the family planning programme. Table 10.8 presents the summarized results of the commonality analysis of ever-use of contraception. As can be seen, global community-level variables as a whole do not show any significant relationship with the use of contraception. Half (0.12 out of 0.24) of the variance is due to the programme factors and half is due to other commonalities.

## 10.9 INDIVIDUAL-LEVEL ANALYSIS

Both bivariate (zero-order correlations and cross-tabulations) and multivariate analyses were carried out on the individual-level variables. Since most of the individual-level predictors were categorical variables, the MCA technique was used. The commonality analysis procedure was also used to compute the unique and common effects of different sets of predictors (community, socio-economic and demographic, and family planning programme) on each dependent variable. As with the community-level analysis, the major findings of the individual-level analysis are organized around each of the dependent variables.

### Children ever born

The results of the MCA analysis are presented in table 10.9. Wife's age, wife's age at marriage, ideal family size, and community child mortality emerge as the most important predictors of children ever born. The most striking finding is that none of the global community variables demonstrate any significant associations with the fertility of rural women. Community child mortality – an aggregated variable – shows a significant positive relationship with fertility, ie the higher the community child mortality, the higher the number of children ever born to women residing in these communities. However, we should be cautious in attributing causality to this finding. It may be that women bear more children because they have suffered a higher number of child deaths. Or it may be that a higher child mortality rate is due to a higher level of fertility. The MCA model for children ever born explains 58 per cent of the total variance, and almost all of this explained variance is accounted for by wife's age, age at marriage, ideal family size, and community child mortality. Commonality analysis indicates that community variables have negligible unique effects on children ever born (table 10.10).

**Table 10.9** Predictor category-specific MCA results of children ever born to currently married rural women
Grand mean = 4.17
N = 2884

| Predictors | Number of cases | Class mean | | *Beta* coefficients |
|---|---|---|---|---|
| | | Unadjusted | Adjusted | |
| *Wife's age* | | | | 0.683 |
| Less than 20 | 399 | 0.576 | 0.549 | |
| 20–29 | 1024 | 2.684 | 2.825 | |
| 30–39 | 840 | 5.467 | 5.451 | |
| *Wife's age at first marriage* | | | | 0.192 |
| 10–14 | 829 | 4.782 | 4.703 | |
| 15–16 | 956 | 4.226 | 4.379 | |
| 17–18 | 565 | 3.909 | 4.186 | |
| 19 + | 534 | 3.404 | 2.960 | |
| *Wife's education* | | | | 0.017 |
| No education | 2727 | 4.231 | 4.184 | |
| Some education | 157 | 3.134 | 3.952 | |
| *Wife's work status* | | | | 0.011 |
| Never worked | 2302 | 4.105 | 4.154 | |
| Ever worked | 582 | 4.434 | 4.243 | |
| *Family structure* | | | | |
| Nuclear | 1382 | 4.873 | 4.404 | |
| Non-nuclear | 1502 | 3.527 | 3.958 | |
| *Ethnic group* | | | | 0.033 |
| Punjabi | 2138 | 4.249 | 4.198 | |
| Sindhi | 503 | 3.889 | 3.966 | |
| Pushto and others | 243 | 4.078 | 4.362 | |
| *Accessibility to educational facilities* | | | | 0.006 |
| Low | 829 | 4.101 | 4.172 | |
| Medium | 867 | 4.276 | 4.199 | |
| High | 1188 | 4.144 | 4.151 | |
| *Accessibility to communication centres* | | | | 0.026 |
| Low | 1599 | 4.163 | 4.199 | |
| Medium | 833 | 4.308 | 4.054 | |
| High | 452 | 3.949 | 4.289 | |
| *Exposure to family planning programme* | | | | 0.067 |
| No exposure | 1802 | 3.942 | 4.060 | |
| Contact with family planning worker only | 335 | 4.364 | 4.061 | |
| Knows family planning places only | 341 | 4.109 | 4.277 | |
| Both contact with and knows family planning places | 406 | 5.084 | 4.688 | |

Table 10.9 (*cont*)

| Predictors | Number of cases | Class mean | | *Beta* coefficient |
|---|---|---|---|---|
| | | Unadjusted | Adjusted | |
| *Ideal family size* | | | | 0.143 |
| 1–3 children desired | 662 | 3.273 | 3.598 | |
| 4–5 children desired | 1705 | 4.149 | 4.142 | |
| 6 or more children desired | 434 | 5.355 | 5.052 | |
| No information | 83 | 5.614 | 4.760 | |
| *Husband's education* | | | | 0.031 |
| No education | 1879 | 4.534 | 4.186 | |
| Primary | 502 | 3.789 | 4.122 | |
| Secondary | 443 | 3.255 | 4.137 | |
| College | 60 | 2.800 | 4.390 | |
| *Husband's occupation* | | | | |
| Professional, clerical and sales workers | 342 | 4.208 | 4.198 | 0.031 |
| Farmers and farm managers | 425 | 4.064 | 4.215 | |
| Agricultural workers | 938 | 4.363 | 4.119 | |
| Unskilled and other service-related workers | 513 | 3.735 | 4.033 | |
| Craftsmen | 666 | 4.288 | 4.315 | |
| *Accessibility to transportation centres* | | | | 0.026 |
| Low | 695 | 3.931 | 4.027 | |
| Medium | 996 | 4.203 | 4.233 | |
| High | 1193 | 4.286 | 4.205 | |
| *Accessibility to agricultural extension facilities* | | | | 0.010 |
| Low | 914 | 4.172 | 4.213 | |
| Medium | 1501 | 4.113 | 4.145 | |
| High | 469 | 4.360 | 4.178 | |
| *Accessibility to f.p. facilities* | | | | 0.018 |
| Low | 732 | 4.059 | 4.125 | |
| Medium | 1290 | 4.238 | 4.236 | |
| High | 862 | 4.168 | 4.114 | |
| *Community-level child mortality* | | | | 0.096 |
| Low | 1686 | 3.738 | 3.917 | |
| High | 1198 | 4.782 | 4.530 | |

Table 10.10 Commonality analysis of the effects of global community, programme and socio-economic variables on children ever born (N = 2884)

| | | Variable type | | |
|---|---|---|---|---|
| Unique and common effects[a] | | Global community | Programme | Socio-economic and demographic |
| Unique global community effects | U(c) | 0.009 | | |
| Unique programme effects | U(p) | | 0.004 | |
| Unique socio-economic and demographic effects | U(s) | | | 0.539 |
| Common global community and programme effects | C(cp) | 0.000 | 0.000 | |
| Common global community and socio-economic and demographic effects | C(cs) | 0.016 | | 0.016 |
| Common programme and socio-economic and demographic effects | C(ps) | | 0.012 | 0.012 |
| Common global comunity, programme and socio-economic and demographic effects | C(cps) | 0.000 | 0.000 | 0.000 |
| Total for indicated variable type | | 0.025 | 0.016 | 0.567 |

[a]See footnote a to table 10.2.

## Desire to cease childbearing

The results of MCA analysis on the desire to cease childbearing are presented in table 10.11. The general findings from this analysis more or less follow the same patterns of relationship found in the case of children ever born. It seems that both past fertility behaviour and future fertility intentions are based primarily on the individual-level life-cycle variables. The global community variables do not show statistically significant net relationships with past fertility or future fertility intentions (table 10.12). However, it must be mentioned here that we are dealing with cross-sectional data for currently married women, representing different ages, marital durations and parity cohorts, and that it is therefore possible that the finer effects of certain other variables are being masked under this broad category of life-cycle variables.

## Knowledge of contraceptive methods

The results of the multiple classification analysis of knowledge of contraceptive methods are presented in table 10.13. As expected, family planning programme exposure seems to be highly correlated with knowledge of contraceptive methods. Some community factors show statistically significant but weak relationships. The community variable that appears as the second best predictor in both the AID and MCA analyses is accessibility to agricultural extension services. This may be serving as a proxy measure for modernization of the villages.

Villages in which agricultural extension facilities are widely available show higher levels of knowledge of contraceptive methods. Wife's education also shows a significant positive relationship with knowledge of contraceptive methods. It is interesting to note that the actual availability of contraceptive services in the village does not significantly influence contraceptive knowledge. None of the demographic variables show significant effects on knowledge of contraceptive methods. The communality analysis indicates that three-quarters of the explanatory power is unique to the family planning programme variables (table 10.14).

**Table 10.11** Predictor category-specific MCA results of desire to cease childbearing
Grand mean = 0.459
N = 2884

| Predictors | Number of cases | Class mean | | *Beta* coefficients |
|---|---|---|---|---|
| | | Unadjusted | Adjusted | |
| *Wife's age* | | | | 0.259 |
| Less than 20 | 398 | 0.038 | 0.339 | |
| 20–29 | 993 | 0.240 | 0.357 | |
| 30–39 | 807 | 0.622 | 0.476 | |
| 40–49 | 603 | 0.881 | 0.684 | |
| *Wife's age at first marriage* | | | | 0.012 |
| 10–14 | 808 | 0.515 | 0.465 | |
| 15–16 | 931 | 0.459 | 0.463 | |
| 17–18 | 552 | 0.417 | 0.450 | |
| 19 + | 510 | 0.418 | 0.453 | |
| *Number of living sons* | | | | 0.343 |
| No living sons | 799 | 0.059 | 0.249 | |
| One living son | 701 | 0.291 | 0.372 | |
| Two living sons | 591 | 0.682 | 0.601 | |
| Three or more living sons | 710 | 0.890 | 0.663 | |
| *Wife's education* | | | | 0.007 |
| No education | 2652 | 0.466 | 0.459 | |
| Some education | 149 | 0.342 | 0.444 | |
| *Wife's work status* | | | | 0.005 |
| Never worked | 2236 | 0.459 | 0.460 | |
| Ever worked | 565 | 0.458 | 0.454 | |
| *Family structure* | | | | 0.011 |
| Nuclear | 1339 | 0.537 | 0.465 | |
| Non-nuclear | 1462 | 3.88 | 0.453 | |
| *Ethnic group* | | | | 0.030 |
| Punjabi | 2086 | 0.491 | 0.467 | |
| Sindhi | 477 | 0.365 | 0.444 | |
| Pushto and others | 238 | 0.366 | 0.419 | |
| *Ideal vs. actual number of children* | | | | 0.327 |
| Less than living | 594 | 0.896 | 0.638 | |
| Equal to living | 493 | 0.839 | 0.692 | |
| More than living | 1714 | 0.198 | 0.330 | |
| *Husband's education* | | | | 0.009 |
| No education | 1824 | 0.493 | 0.458 | |
| Primary | 488 | 0.414 | 0.462 | |
| Secondary | 434 | 0.389 | 0.465 | |
| College | 55 | 0.291 | 0.433 | |

(*continued on p 178*)

Table 10.11 (*cont*)

| Predictors | Number of cases | Class mean | | *Beta* coefficient |
|---|---|---|---|---|
| | | Unadjusted | Adjusted | |
| *Husband's occupation* | | | | 0.036 |
| Professional, clerical and sales worker | 337 | 0.463 | 0.452 | |
| Farmers and farm managers | 410 | 0.461 | 0.491 | |
| Agricultural workers | 915 | 0.502 | 0.462 | |
| Unskilled and other service-related workers | 497 | 0.423 | 0.467 | |
| Craftsmen | 642 | 0.424 | 0.433 | |
| *Exposure to family planning programme* | | | | 0.031 |
| No exposure | 1751 | 0.412 | 0.447 | |
| Contact with family planning worker only | 324 | 0.431 | 0.483 | |
| Knows family planning places only | 338 | 0.485 | 0.483 | |
| Both contact and knows family planning places | 388 | 0.588 | 0.471 | |
| *Accessibility to communication centres* | | | | 0.014 |
| Low | 1555 | 0.457 | 0.454 | |
| Medium | 810 | 0.465 | 0.470 | |
| High | 436 | 0.454 | 0.456 | |
| *Accessibility to transportation centres* | | | | 0.012 |
| Low | 671 | 0.439 | 0.453 | |
| Medium | 971 | 0.462 | 0.467 | |
| High | 1159 | 0.468 | 0.456 | |
| *Accessibility to agricultural extension facilities* | | | | 0.018 |
| Low | 464 | 0.504 | 0.448 | |
| Medium | 1452 | 0.463 | 0.461 | |
| High | 885 | 0.428 | 0.474 | |
| *Accessibility to f.p. facilities* | | | | 0.031 |
| Low | 706 | 0.435 | 0.467 | |
| Medium | 1258 | 0.448 | 0.442 | |
| High | 837 | 0.496 | 0.476 | |
| *Accessibility to educational facilities* | | | | 0.003 |
| Low | 800 | 0.423 | 0.458 | |
| Medium | 844 | 0.502 | 0.462 | |
| High | 1157 | 0.453 | 0.458 | |
| *Community-level child mortality* | | | | 0.002 |
| Low | 1640 | 0.432 | 0.460 | |
| High | 1161 | 0.498 | 0.458 | |

Table 10.12 Community-level analysis: commonality analysis of the effects of community, programme and socio-economic variables on desire to cease childbearing (N = 2884)

| Unique and common effects[a] | | Variable type | | |
|---|---|---|---|---|
| | | Global community | Programme | Socio-economic and demographic |
| Unique global community effects | U (c) | 0.000 | | |
| Unique programme effects | U (p) | | 0.001 | |
| Unique socio-economic and demographic effects | U (s) | | | 0.567 |
| Common global community and programme effects | C (cp) | 0.000 | 0.000 | |
| Common global community and socio-economic and demographic effects | C (cs) | 0.007 | | 0.007 |
| Common programme and socio-economic and demographic effects | C (ps) | | 0.014 | 0.014 |
| Common global community programme and socio-economic and demographic effects | C (cps) | 0.001 | 0.001 | 0.001 |
| Total for indicated variable type | | 0.008 | 0.016 | 0.589 |

[a]See footnote a to table 10.2

## Ever-use of contraception

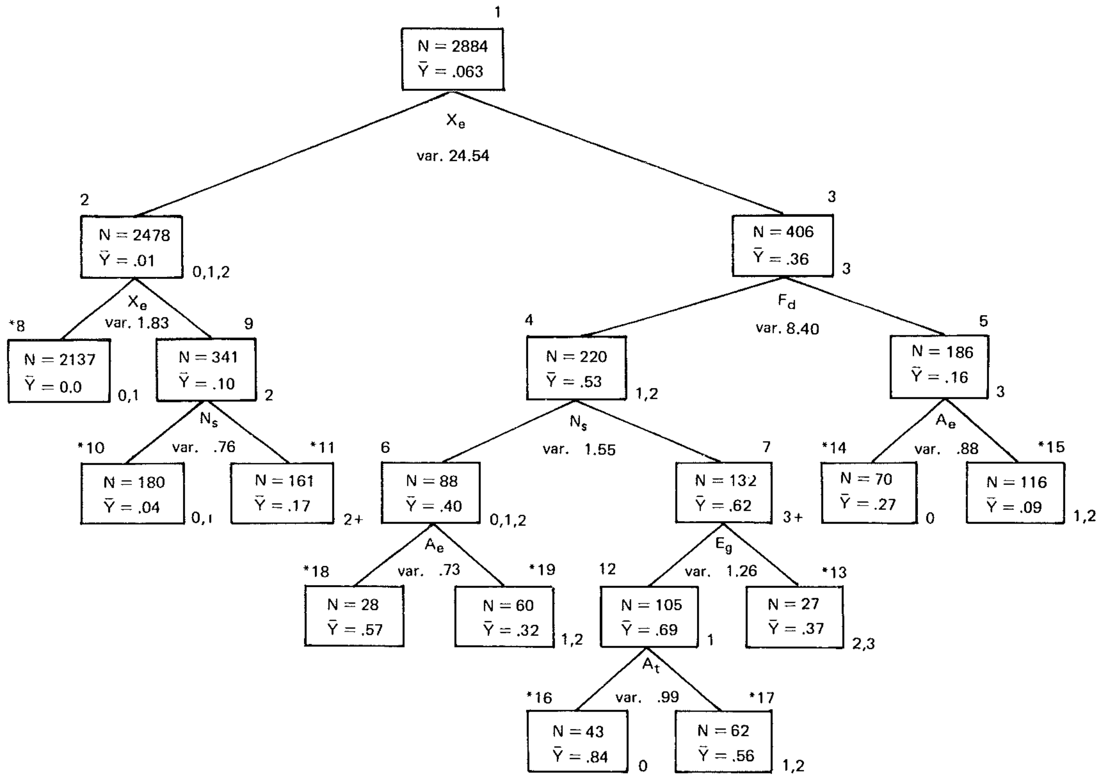
The overall ever-use rate is very low (a little over six per cent). The AID-Search analysis indicates strong interaction effects between exposure to the family planning programme, number of living sons, and ideal family size on ever-use of contraception. The set of 'best' predictors generated by the AID-Search analysis was subjected to an MCA analysis. The results of the MCA analysis confirm the earlier findings obtained through assessing the 'best' splits (figure 10.3 and table 10.15). Hence, given the presence of strong interaction effects and the very skewed distribution of ever-use, only the AID-Search analysis for this dependent variable is presented.

We note a strong positive relationship between ever-use of contraception and exposure to the family planning programme, as expected. As stated earlier, the family planning programme in Pakistan is more or less the sole channel for disseminating contraceptive knowledge and supplies. The most interesting implication of this analysis is that both contact with family planning fieldworkers and knowledge of places to obtain family planning services may be necessary in order to make some impact on ever-use of contraception. We are led to conclude that in a practically non-contracepting society, substantial family planning programme efforts are required to maintain and increase the level of contraceptive use.

## 10.10 DISCUSSION OF THE FINDINGS AND IMPLICATIONS

Contraceptive acceptance and fertility decline may be viewed as a by-product of the modernization of communities, a process which influences the structure of family relationships and childbearing expectations. Very often modernization brings about in its wake changes in the patterns of marriage (age at marriage), kinship ties, family formation (transformation from extended and joint families to nuclear families), and fertility expectations (ideal family size desired).

At the community level, the strong statistical associations between agricultural extension facilities, transportation and communication facilities,




$X_e$ = Exposure to family planning
0 = no exposure
1 = contact with family planning workers only
2 = knows family planning places only
3 = both contact with family planning workers and knows family planning places

$A_e$ = Accessibility to educational facilities
0 = high
1 = medium
2 = low

$N_s$ = Number of living sons
N = Number of cases used in the AID analysis
$\bar{Y}$ = The proportion of ever use of contraception
var. = Variability explained by the splitting variable
*Final group

$F_d$ = Ideal vs. actual number of children
1 = less than actual
2 = equal to actual
3 = more than actual

$A_t$ = Accessibility to transportation centers
0 = high
1 = medium
2 = low

$E_g$ = Ethnic groups
1 = Punjabi
2 = Sindhi
3 = Others

**Figure 10.3** AID summary of best splits on ever-use of contraception (per cent of total variance explained = 41)

**Table 10.13** Predictor category-specific MCA results on knowledge of efficient contraception methods
Grand mean = 1.44
N = 2884

| Predictors | Number of cases | Class mean | | *Beta* coefficients |
|---|---|---|---|---|
| | | Unadjusted | Adjusted | |
| *Wife's age* | | | | 0.079 |
| Less than 20 | 399 | 1.110 | 1.268 | |
| 20–29 | 1024 | 1.436 | 1.498 | |
| 30–39 | 840 | 1.568 | 1.478 | |
| 40–49 | 621 | 1.473 | 1.391 | |
| *Wife's age at first marriage* | | | | 0.015 |
| 10–14 | 829 | 1.367 | 1.442 | |
| 15–16 | 956 | 1.460 | 1.458 | |
| 17–18 | 565 | 1.446 | 1.414 | |
| 19 + | 534 | 1.496 | 1.416 | |
| *Number of living sons* | | | | 0.032 |
| No living sons | 805 | 1.261 | 1.389 | |
| One living son | 722 | 1.375 | 1.417 | |
| Two living sons | 615 | 1.553 | 1.484 | |
| Three or more living sons | 742 | 1.593 | 1.471 | |
| *Wife's education* | | | | 0.079 |
| No education | 2727 | 1.393 | 1.415 | |
| Some education | 157 | 2.197 | 1.832 | |
| *Ethnic group* | | | | |
| Punjabi | 2138 | 1.519 | 1.469 | |
| Sindhi | 503 | 1.054 | 1.317 | |
| Pushto and others | 243 | 1.506 | 1.398 | |
| *Exposure to family planning programme* | | | | 0.411 |
| Contact with family planning worker only | 1802 | 1.043 | 1.076 | |
| Knows family planning places only | 341 | 1.941 | 1.881 | |
| Both contact and knows family planning places | 406 | 2.453 | 2.356 | |
| *Husband's education* | | | | 0.083 |
| No education | 1879 | 1.323 | 1.370 | |
| Primary | 502 | 1.514 | 1.555 | |
| Secondary | 443 | 1.754 | 1.543 | |
| College | 60 | 2.033 | 1.794 | |
| *Husband's occupation* | | | | 0.016 |
| Professional, clerical and sales worker | 342 | 1.681 | 1.425 | |
| Farmers and farm managers | 425 | 1.496 | 1.430 | |
| Agricultural workers | 938 | 1.469 | 1.464 | |
| Unskilled and other service-related workers | 513 | 1.472 | 1.432 | |
| Craftsmen | 666 | 1.203 | 1.415 | |

(*continued on p 182*)

Table 10.13 (*cont*)

| Predictors | Number of cases | Class mean | | *Beta* coefficient |
|---|---|---|---|---|
| | | Unadjusted | Adjusted | |
| *Wife's work status* | | | | 0.044 |
| Never worked | 2302 | 1.486 | 1.464 | |
| Ever worked | 582 | 1.244 | 1.333 | |
| *Family structure* | | | | 0.014 |
| Nuclear | 1382 | 1.409 | 1.421 | |
| Non-nuclear | 1502 | 1.467 | 1.454 | |
| *Ideal vs. actual number of children* | | | | 0.059 |
| Less than living | 613 | 1.736 | 1.572 | |
| Equal to living | 507 | 1.483 | 1.391 | |
| More than living | 1764 | 1.320 | 1.404 | |
| *Accessibility to family planning facilities* | | | | 0.055 |
| Low | 732 | 1.279 | 1.444 | |
| Medium | 1290 | 1.473 | 1.497 | |
| High | 826 | 1.518 | 1.343 | |
| *Accessibility to educational facilities* | | | | 0.045 |
| Low | 829 | 1.193 | 1.355 | |
| Medium | 867 | 1.631 | 1.450 | |
| High | 1188 | 1.466 | 1.485 | |
| *Accessibility to communication centres* | | | | 0.025 |
| Low | 1599 | 1.382 | 1.453 | |
| Medium | 833 | 1.438 | 1.390 | |
| High | 452 | 1.631 | 1.469 | |
| *Accessibility to transportation centres* | | | | 0.051 |
| Low | 695 | 1.293 | 1.335 | |
| Medium | 996 | 1.419 | 1.447 | |
| High | 1193 | 1.536 | 1.489 | |
| *Accessibility to agricultural extension facilities* | | | | 0.010 |
| Low | 914 | 1.357 | 1.403 | |
| Medium | 1501 | 1.362 | 1.375 | |
| High | 469 | 1.934 | 1.703 | |
| *Community-level child mortality* | | | | 0.005 |
| Low | 1686 | 1.426 | 1.432 | |
| High | 1198 | 1.452 | 1.445 | |

Table 10.14 Commonality analysis of the effects of global community, programme and socio-economic variables on knowledge of efficient contraceptive methods (N = 2884)

| Unique and common effects[a] | | Variable type | | |
|---|---|---|---|---|
| | | Global community | Programme | Socio-economic |
| Unique global effects | U(c) | 0.014 | | |
| Unique programme effects | U(p) | | 0.153 | |
| Unique socio-economic effects | U(s) | 0.004 | | 0.025 |
| Common global and programme effects | C(cp) | 0.004 | 0.004 | |
| Common global and socio-economic effects | C(cs) | 0.009 | | 0.009 |
| Common programme and socio-economic effects | C(ps) | | 0.034 | 0.034 |
| Common global programme and socio-economic effects | C(cps) | 0.011 | 0.011 | 0.011 |
| Total for indicated variable type | | 0.038 | 0.202 | 0.079 |

[a]See footnote a to table 10.2

and knowledge and use of contraception point to the possibility that modernization (agricultural as well as socio-economic) influences contraceptive behaviour in a positive way. The mere presence or absence of these community characteristics and the proximity of these facilities to the village may not be important per se, but they may none the less have a modernizing influence on the key intermediate variables in that they legitimize discussion about contraception and its adoption, low fertility norms and late marriage. At the individual level we noted the importance of wife's education, wife's age at first marriage, and exposure to the family planning programme in predicting fertility-related behaviour.

Thus, it could be argued that these important community and individual level predictors need to be taken into account when planning policies and

Table 10.15 MCA and AID summary statistics for six best predictors of ever use of contraception: an additive model (N = 2884)

| Predictors | MCA ETA$^2$ | MCA BETA$^2$ | AID BETA$^2$ |
|---|---|---|---|
| Exposure to family planning programme index | 0.264 | 0.245 | 0.263 |
| Ideal vs. actual number of children | 0.049 | 0.009 | 0.084 |
| Number of living sons | 0.040 | 0.008 | 0.024 |
| Accessibility to educational facilities | 0.003 | 0.002 | 0.016 |
| Ethnic group | 0.006 | 0.002 | 0.013 |
| Accessibility to transportation centres | 0.001 | 0.000 | 0.010 |

MCA $R^2$ (unadjusted) = 0.295
MCA $R^2$ (adjusted) = 0.291
MCA R (adjusted) = 0.539
AID $R^2$ = 0.409.

contraceptive programmes, and creating favourable conditions for lower fertility. Clearly the policy implication of these relationships is that in order to be most effective, both the infrastructure development (agricultural extension services, transportation and communication centres, and educational facilities for girls) and family planning activities should go hand in hand.

This analysis also suggests that wife's education and accessibility of educational facilities are significantly and positively related with contraceptive knowledge and use, both at the individual and community levels. Hence, provision of education, particularly for the female population, which is a desirable goal in its own right, may also facilitate contraceptive acceptance and lower the desired family size.

The most significant finding of this research is the strong relationship of family planning activities with contraceptive knowledge and use and with desire to cease childbearing. Exposure to the family planning programme index is, in fact, the single best predictor of knowledge and use of contraception. Both the AID and MCA analyses further revealed that both elements of the index, ie contact with family planning fieldworkers and knowledge of family planning centres, produce better results together than each individually. A practical implication of these findings is that strengthening the field structures for information, education and communication and the infrastructure for service outlets will produce the best possible returns from family planning investments.

The analysis suggests that, on the whole, global community-level variables demonstrate weaker relationships than the individual-level variables. This finding raises several questions about the theory and methodology followed in this research. Are we justified in concluding that community-level variables have only a slight bearing on individual fertility-related behaviour? Or is this lack of a strong relationship due to problems associated with the collection, compilation and measurement of the community-level variables? The answer to both these questions is probably yes. It is possible that we were not sufficiently specific about the theoretical relationship. The sociological theory of contextual/structural effects developed in the West may not be relevant to the actual conditions of a developing society like that of Pakistan. Or it may be that we are not capturing the requisite intermediate link which could mediate the influence of community factors on individual behaviour.

There are several possibilities as to the nature of this missing link. One possibility is the community's normative structure, which may well vary, especially on such matters as family size and contraceptive use. We have not measured this structure directly in this chapter, although the aggregation of individual responses was meant to provide indirectly the normative framework, in the sense of 'average'. Another possibility is suggested by the recent work in Korea (Lee 1977). The link may be provided by the communication network of the community, and the individual's involvement in it. A third possibility is the individual's degree of contact with the various activities associated with the institutions to which the community has access, an interpretation borne out by some of our findings. Exposure to the family planning programme index, which proved so important, measures this kind of dimension.

The last point suggests that the present research suffers from a serious measurement problem. All of the global community variables were measured by their presence or absence in the community, supplemented with some measure of distance if they were absent in the community itself. The measurement did not take into account the adequacy of a facility; or the proportion of the villagers who have access to it (except for exposure to family planning programme index). It has been observed that in Pakistan most of the so-called community facilities are utilized primarily by landlords or retired civil or military officials from better-off families (Myrdal 1968; Gough 1973). The measurement of community characteristics, therefore, fails to reflect a critical dimension of utilization of the facilities which were identified.

Another problem of measurement arose from the fact that we had only cross-sectional, and not longitudinal, data on our community variables (as well as individual variables). This fact prevented us from testing causal ordering among the variables measured at various levels. We had no way of showing at what point in their life cycle individuals had contact with the institutions and programmes which measure most of our global community characteristics. Clearly, some kind of longitudinal design would be appropriate for future investigation of cross-level influences on fertility-related behaviour.

In addition to these difficulties, we need to consider several other limitations of this analysis. The analyses presented above are subject both to the usual shortcomings of survey research in general and to the specific problems arising from investigations on fertility-related behaviour and contraceptive knowledge and use. The reliability of conclusions drawn from survey findings may be affected by errors in survey design, such as random errors due to sampling design (design effect) or non-sampling errors due to non-coverage, to non-response (or response bias), to field data collection and to office editing and data processing. The influence of non-sampling errors is arguably greater than the errors introduced by the sample design, but the nature and extent of the non-sampling errors are more difficult to measure.

Despite these problems, this analysis has attempted to provide insights into the intricate relationships of the community and individual level variables and their influence on fertility-related behaviour. The commonality analysis suggests that while community variables do not demonstrate strong unique relationships with fertility-related behaviour, there is evidence that, taken jointly with socio-economic and programme variables, they show significant associations. A longitudinal survey design with better levels of measurement and a well-defined specification of the theoretical relationship may be able to disentangle the relationships between community factors and individual behaviour, and further research may clarify some of the more elusive details of the contextual effects on the fertility-related behaviour of individuals.

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# 11 Infant and Child Mortality: Trends and Determinants

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## 11.1 INTRODUCTION

'It may turn out that the most significant contribution of WFS toward obtaining more accurate basic demographic estimates will be in the field of mortality – especially infant and child mortality – rather than in the field of fertility' (Demeny 1981).

The validity of this provocative claim in the case of Pakistan can be left to the judgement of readers of this volume but, without doubt, the PFS represents one of the richest sources of data on infant and child mortality that has ever been assembled in Pakistan. As we hope to demonstrate, the results are not only of interest to academic demographers but are also of considerable practical importance to all those concerned with health and family planning policies.

The analysis is based primarily on the birth histories collected in the PFS, in which details of 19 371 live births are recorded. Most attention is focussed on 13 525 births that occurred between the first and fifteenth year prior to the survey, which corresponds approximately to the period 1960–74. The method of analysis is straightforward and consists essentially of presenting the recorded mortality, up to age five, of birth cohorts, that is to say children born in specific periods. To exploit fully the experience of children in the five years before the survey would have required a life-table approach to handle the problem of incomplete exposure to risk. It was decided that on balance the additional computational complexity of using such a technique did not justify the probable gains. Mortality has been more or less constant in Pakistan since 1960 and there is no evidence that the data for the most recent births are markedly superior in quality than for less recent births. Thus a policy of discarding cases with incomplete exposure to risk (eg births in the 12 months before the survey in the computation of infant mortality) involves only a minor loss and was in fact the procedure that we adopted in the analysis.

Though the age at death was recorded in months by interviewers, the data were grouped at the coding stage into the following categories: 0 month, 1–2 months, 3–5 months, 6–11 months, 1 year, 2–4 years, 5–14 years and 15+ years. The measures of mortality used in this study are derived from these categories in the following way on the assumption that ages at death were recorded by interviewers as completed months or years:

| *Coding of age at death* | *Descriptive term* | *Life-table notation* |
|---|---|---|
| 0 month | Neo-natal mortality rate | – |
| 1–11 months | Post-neonatal mortality rate | – |
| 0–11 months | Infant mortality rate | ${}_1q_0$ |
| 1 year (12–23 months) | Toddler mortality | ${}_1q_1$ |
| 2–4 years (24–59 months) | Childhood mortality | ${}_3q_2$ |
| 1 year to 2–4 years | Probability of dying between age 1 and 5 | ${}_4q_1$ |
| 0 month to 2–4 years | Probability of dying by age 5 | ${}_5q_0$ |

The chapter starts with a review of other sources of mortality information in Pakistan which are then contrasted with the levels and trends in childhood mortality as evidenced by the PFS. The next three sections are devoted to an examination of differentials and determinants. These include maternal age, birth order, gender, birth spacing



Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey*: 187–209. Voorburg, Netherlands: International Statistical Institute.

patterns and socio-economic characteristics of the family. In the final substantive section, the focus of interest changes to a brief consideration of the impact of mortality on fertility.

## 11.2 REVIEW OF MORTALITY ESTIMATES FROM OTHER SOURCES

Estimation of mortality levels and trends in Pakistan is particularly difficult because, although the country has reasonably extensive census data, it is not so favourably endowed with other traditional sources of demographic data, such as vital registration. Officially a system of birth and death registration does exist, but the coverage is so incomplete that practically no attempt has been made to tabulate the data (Afzal 1974). Even the accuracy of census counts is doubtful. However, the lack of conventional data in the form of complete registration of vital events and accurate census counts has been compensated to a great extent by the data from several national socio-demographic sample surveys that have been undertaken since the early 1960s.

Since mortality levels for Pakistan in the years before 1961 are not available, one has to refer back to studies which have been conducted on the Indian subcontinent and assume that the same rates prevailed in regions now constituting Pakistan as were found for pre-Independence India. In table 11.1, estimates of crude death rates (CDRs) since 1901 are summarized. The figures suggest that the CDR was around 40 per 1000 during the early part of the 20th century (1901–21), mainly as a result of endemic diseases like smallpox, cholera, plague and tuberculosis, and the influenza epidemics of 1918 (Davis 1961; Robinson 1967). The CDR declined gradually to about 30 per 1000 by 1950, mainly as a result of these diseases being brought under control. By the middle 1960s, the CDR had declined to about 16 per 1000. The fast decline in death rates since the late 1940s has been associated with the introduction of chemo-therapeutic drugs, antibiotics, the mass eradication programme initiated in the 50s, and the post-partition general prosperity of the rural areas. Since that time, however, there is little convincing evidence of any change in the CDR.

Female mortality has been found to be consistently higher than male mortality in the Indian subcontinent. According to the adjusted Population Growth Experiment (PGE) estimates for 1962–5, the CDR was 20 per 1000 for females compared to 17 per 1000 for males. A clearer picture of the male–female mortality differential is shown by the ratio of male to female deaths at various ages in table 11.2. Among children aged less than 1 year, mortality is somewhat higher among males. After age 1, however, and almost throughout the reproductive period, the differential is reversed. For example, among children aged 1–4, females had consistently higher death rates in both the 1962–5 PGE and

**Table 11.1** Levels and trends in crude death rates, 1901–76

| Period | Source | Crude death rates | | |
|---|---|---|---|---|
| | | Both sexes | Males | Females |
| 1901–11 | Census[a] | 43 | NA | NA |
| 1911–21 | Census | 49 | NA | NA |
| 1921–31 | Census | 36 | NA | NA |
| 1931–41 | Census | 31 | NA | NA |
| 1941–51 | Census | 27 | NA | NA |
| 1962–65 | PGE[b] (Cross-sectional) | 11 | 11 | 11 |
| | (Adjusted) | 18 | 17 | 20 |
| 1968–71 | PGS[c] | 11 | 11 | 11 |
| 1976 | PGS[c] | 12 | 11 | 12 |

[a] The census estimates refer to undivided India with the exception of 1941–51 estimates which relate to post-partition India.
[b] Adjusted rates are Chandra–Deming estimates obtained after adjusting the numerator for events missed by the two systems of data collection: the longitudinal registration and cross-sectional (quarterly) surveys. The corresponding longitudinal registration rates were 15, 14 and 16 for both sexes, males and females, respectively.
[c] The PGS data collection procedure is similar to that of the cross-sectional component of the PGE.

Table 11.2 Age-specific death rates for Pakistan, based on the PGE (1962–5 cross-sectional and longitudinal average) and the PGS (1968–1971) and (1976)

| Age | PGE 1962–5 | | | PGS 1968–71 | | | PGS 1976 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Sex ratio | Male | Female | Sex ratio | Male | Female | Sex ratio |
| Under 1 | 195.5 | 192.0 | 102 | 171.2 | 139.8 | 122 | 153.0 | 135.7 | 113 |
| 1–4 | 22.5 | 33.5 | 67 | 16.1 | 18.9 | 85 | 12.5 | 15.8 | 79 |
| 5–9 | 3.0 | 3.5 | 85 | 3.1 | 3.2 | 97 | 5.1 | 4.4 | 116 |
| 10–14 | | | | 1.8 | 2.8 | 64 | 2.1 | 2.5 | 86 |
| 15–19 | | | | 1.9 | 2.4 | 79 | 2.5 | 3.2 | 79 |
| 20–24 | | | | 2.7 | 3.8 | 71 | 2.4 | 3.7 | 64 |
| 25–29 | 4.5 | 5.5 | 82 | 1.1 | 4.4 | 25 | 1.7 | 4.6 | 37 |
| 30–34 | | | | 2.4 | 4.3 | 56 | 3.8 | 3.2 | 119 |
| 35–39 | | | | 2.8 | 3.3 | 85 | 1.2 | 4.2 | 24 |
| 40–44 | | | | 4.7 | 4.3 | 109 | 8.3 | 4.9 | 171 |
| 45–49 | | | | 4.0 | 7.1 | 56 | 5.4 | 4.7 | 115 |
| 50–54 | | | | 10.4 | 8.6 | 121 | 6.6 | 14.6 | 45 |
| 55–59 | 25.5 | 24.5 | 104 | 9.8 | 7.2 | 136 | 12.3 | 5.8 | 212 |
| 60–64 | | | | 25.8 | 11.2 | 230 | 18.6 | 23.2 | 80 |
| 65 and over | | | | 40.3 | 40.3 | 100 | 52.4 | 52.0 | 101 |

1968–71 and the Population Growth Surveys 1976 (PGS), the ratios being 67, 85 and 79, respectively. The same pattern of high female mortality among children aged 1–4 years was found in rural and urban areas (Alam and Shah 1982). As a whole, mortality is higher for females aged 5–44, though the PGS (1976) ratios are somewhat erratic, perhaps due to poor reporting. After ages 5–44, however, the pattern of higher female mortality reverses and females have somewhat lower mortality than males. A major reason for higher female mortality during the childbearing ages is likely to be mortality related to confinement. Awan (1982) has calculated the maternal mortality rate in Pakistan to be 6–8 per 1000 live births. Among children aged 1–14, higher female mortality is probably indicative of the poorer health care and nutrition provided to female children. While no direct evidence of selective neglect of female children is available for Pakistan, the observed data suggest that female children are at a relative disadvantage compared to male children, in terms of amount and quality of food and medical care. We examine this possibility further in a later section.

Comparison of the PGE (1962–5) and the PGS (1968–71) suggests that male–female mortality differentials are gradually converging. In 1962–5, female life expectancy at birth was nearly 2.6 years lower than the male's. In 1968–71 it dropped to only 1.1 year (table 11.3). Though a substantial difference exists between urban and rural mortality, life expectancy at birth being about 4 years more in urban areas for both males and females, the sex differential of mortality persists in both sectors.

Generally, infants aged less than 1 year, followed by children aged 1–4 years, are subject to a much greater death risk than persons at any higher age, except for the oldest ages. It is evident

Table 11.3 Life expectancy at birth, based on the PGE (1962–5) and the PGS (1968–71)

| Source of estimate | | Male | Female |
|---|---|---|---|
| PGE (Longitudinal registration – 1962–65) | Total | 49.9 | 47.3 |
| PGS (1968–71) | Total | 52.9 | 51.8 |
| | Urban | 56.4 | 54.9 |
| | Rural | 52.1 | 51.3 |

Table 11.4 Infant mortality rates by sex, 1901–76, based on census data, the PGE (1962–5) and the PGS (1968–71) and (1976)

| Period | Source | Infant mortality rates | | |
|---|---|---|---|---|
| | | Both sexes | Male | Female |
| 1901–11 | Census | 222 | NA | NA |
| 1911–21 | Census | 211 | NA | NA |
| 1921–31 | Census | 176 | NA | NA |
| 1931–41 | Census | 68 | NA | NA |
| 1941–51 | Census | 148 | NA | NA |
| 1961 | National Impact Survey | 131 | NA | NA |
| 1962–65 | PGE (Cross-sectional) | 143 | 140 | 146 |
| | (Adjusted) | 136 | 137 | 135 |
| 1967 | National Impact Survey | 121 | NA | NA |
| 1968–71 | PGS | 113 | 153 | 85 |
| 1976 | PGS | 87 | 94 | 80 |

from table 11.4 that there has been a gradual decline in infant mortality since 1901, and for the most recent period for which the estimates are available, a level of around 87 per 1000 live births is recorded.[1] A closer look at the data, however, raises some doubts about the observed trends in recent years. It is generally observed that within the first year of life, the risk of mortality is highest during the first few days. It declines rapidly and by the end of the first four weeks a major portion of infant deaths has already occurred. The high risk in the first month is largely due to biological and birth-related factors and generally declines less in response to environmental and other improvements than mortality after the first month. In conditions of improving mortality, post-neonatal mortality usually declines first.

This differential response of neo-natal and post-neonatal mortality implies that the ratio of neo-natal to post-neonatal mortality will increase as mortality declines. In Pakistan a straightforward interpretation of the data suggests otherwise. According to the PGE and PGS estimates presented in table 11.5, the ratios have decreased from 1.33 in 1962–5 to 1.0 in 1976. This would suggest that during the last 15 years, the midwifery and other related services have improved considerably faster than overall health facilities and environmental conditions. All the available evidence regarding the improvements in health services does not support this connection (Awan 1982). In Pakistan most births are still delivered by the local 'dai', an indigenous midwife, who has very little or no knowledge of modern medicine. The rural areas, where nearly 75 per cent of the population still live, do not have the necessary medical assistance available in case of difficulties. Even in urban areas such facilities are mainly concentrated in a few major cities and even there are not easily accessible to the masses. Under these circumstances, it seems more likely that the observed trend is more an artifact of methodological differences between the three surveys than a reflection of reality. It is plausible that in the PGS, where the recording of births and deaths was done at three and six-monthly intervals, births which resulted in immediate deaths are under-reported. Such omissions might be particularly common in cases where the person reporting the vital events was not the mother but another member of the household or even a neighbour. Further evidence of serious

[1] The life-table probability of dying before age 1, customarily termed the infant mortality rate, is defined as the number of infant deaths among 1000 live births born during a specified period, generally a calendar year. In contrast the infant death rate is calculated by dividing the number of infant deaths in a specified period by the enumerated population under 1 year of age. The two rates, one a cohort and the other a period measure, should normally be similar. In Pakistan, this has not been the case because of a tendency, in both censuses and surveys, for children under 1 year of age and, to a lesser extent, those aged 1 and 2 years to be under-enumerated (Krotki 1963). For example, in the PGS of 1976, 2 525 692 births were recorded over the 12-month period, but the enumerated mid-year population under age 1 was only 1 518 628. Infant mortality from this survey is 87 but the corresponding age-specific death rate is biased upwards to 145 because of under-enumeration of the denominator.

Table 11.5 Neo-natal and post-neonatal mortality rates from the PGE and PGS

| Source | Infant mortality rates | | | |
|---|---|---|---|---|
| | Total | Neo-natal | Post-neonatal | Ratio neo-natal to post-neonatal |
| PGE (1962–65) | 136 | 77 | 58 | 1.33 |
| PGS (1968–71) | 113 | 56 | 57 | 0.98 |
| PGS (1976) | 87 | 44 | 43 | 1.02 |

defects in the PGS of 1968–71 and 1976 will be adduced in the next section, when the data from the PFS are examined.

## 11.3 LEVELS AND TRENDS OF INFANT AND CHILD MORTALITY RATES, BASED ON PFS DATA

While the PFS data do not permit the construction of a complete series of infant and child mortality rates at all maternal ages and birth orders for any but the last five years, they still provide a useful insight into the probable trends in infant and child mortality since 1950. One can largely overcome the problem of truncation by standardizing the rates for birth order and maternal age on the assumption that the relationship between these factors and mortality has remained constant over time. In Pakistan, as will be demonstrated below, birth order standardization is unlikely to make any difference, so we have chosen to standardize by maternal age.[2] In table 11.6 we have presented both direct and standardized rates. The truncation effect for most periods is negligible. Only before 1955, where there is a concentration of the high risk births at young maternal ages, is there any appreciable divergence between adjusted and unadjusted figures.

According to the PFS birth history data, declines in infant mortality were steep in the 1950s but more or less unchanged since then, with the hint of a slight rise for the most recent period. Further insight into the nature of the trend is provided by decomposing the infant mortality rate into neo-natal and post-neonatal rates, as shown in table 11.7. Neo-natal mortality has declined by only about 10 per cent between the years 1950–60 and since then has remained more or less constant at about 80. However, post-neonatal mortality declined from 84 in 1950–5 to 72 in the next quinquennium and to 60 in the years 1960–5, a fall of 30 per cent over the 15-year period. Since the early 1960s, little change is evident.

Though, in the context of Pakistan, steeper declines in post-neonatal than in neo-natal rates are to be expected, the PFS rates in tables 11.6 and 11.7 are highly sensitive to omission of dead children and to mis-reporting of ages at death, both of which can be expected to occur with increasing severity in relation to events in the more distant past. Indeed the evaluation of PFS

Table 11.6 Infant mortality rates, 1950–74 (PFS)

| | Birth cohort | | | | | |
|---|---|---|---|---|---|---|
| | 1970–74 | 1965–70 | 1960–55 | 1955–60 | 1950–55 | Total[a] |
| A. Observed | 145 | 136 | 136 | 158 | 191 | 152 |
| B. Adjusted for truncation | 145 | 137 | 140 | 156 | 178 | 147 |

[a] Includes births and infant deaths prior to 1950.

[2] The method of standardization is as follows:

$$\text{Adjusted IMR for period P} = \frac{\text{Observed IMR (10 to 49) for period a}}{\text{Observed IMR (10 to x) for period a}} \times \frac{\text{Observed IMR (15 to x) for period P}}{1}$$

where age (x) is successively 44, 39, 34, 29 for periods (a) 1965–70, 1960–5, 1955–60 and 1950–5.

Table 11.7 Neo-natal and post-neonatal mortality rates, 1950–74 (PFS), adjusted for truncation

| | 1970–74 | 1965–70 | 1960–65 | 1955–60 | 1950–55 | Total[a] |
|---|---|---|---|---|---|---|
| Neo-natal | 84 | 78 | 81 | 85 | 94 | 82 |
| Post-neonatal | 61 | 58 | 60 | 72 | 84 | 65 |
| Ratio of neo-natal to post-neonatal | 1.38 | 1.34 | 1.35 | 1.18 | 1.12 | 1.26 |

[a] Includes births and infant deaths prior to 1950.

data quality (see chapter 2) indicated the likelihood of omissions of infant deaths. It is thus probable that the PFS estimates, particularly of neo-natal mortality for the more distant periods, are too low and consequently the decline in the decade 1950–60 is really steeper than indicated in tables 11.6 and 11.7.

For births since 1960, comparison with other sources increases confidence in the PFS figures. As may be seen from the previous tables, the PFS estimates of both neo-natal and post-neonatal mortality for children born between 1960 and 1965 are almost identical to those produced by the PGE of 1962–5. As the PGE data are known to be of exceptionally high quality due to the rigorous methodology adopted, this consistency between the two sources is reassuring.

Comparison of the 1965–70 PFS data with the PGS (1968–71) estimates indicates a close similarity in post-neonatal rates but much higher figures for neo-natal mortality in the former than in the latter source. The final comparison with the PGS of 1976 suggests that both neo-natal and post-neonatal deaths have been omitted in the PGS.

We turn now to consider trends in mortality between ages 1 and 5 (table 11.8). The toddler mortality rate (the probability of dying between ages 12 and 23 months) shows a substantial decline, from 74 in 1950–5 to 30 in 1970–4. This decline is plausible and may reflect the overall changes in health care systems. Similar declines in mortality are observed at ages 2–5, though there appears to have been a slight increase in the recent past. Even in the period 1965–70, one in every five children died before reaching the fifth birthday. In the 1950s this ratio was one in every three children.

So far the PFS estimates of levels and trends in childhood mortality have been derived directly from the birth histories, in which the date of birth and age at death (where applicable) are recorded for all births. Comparable trend estimates can also be obtained from the summary data on the numbers of children ever born and surviving at the time of the survey for different age groups of women, using recent methodological advances in indirect techniques of estimation. At the outset it should be noted the results from the application of indirect techniques suffer equally from any omission of dead children as the direct estimates from birth histories, though they can adjust for gross distortions in reported ages at death, through the use of model life tables.

The comparison of birth history estimates of infant mortality, adjusted for truncation with those obtained from the Trussell technique,[3]

[3] The method is described in the forthcoming manual *Demographic Estimation: a Manual of Indirect Techniques,* prepared by the staff of the Committee on Population and Demography, National Research Council, National Academy of Sciences, Washington, USA The computer package for applying the method also came from the same source.

Table 11.8 Probabilities of death,[a] 1950–74 (PFS), adjusted for truncation

| Mortality measure | Birth cohort | | | | | |
|---|---|---|---|---|---|---|
| | 1970–74 | 1965–70 | 1960–65 | 1955–60 | 1950–55 | Total[b] |
| $_1q_1$ | 30 | 32 | 42 | 64 | 74 | 46 |
| $_3q_2$ | 48[c] | 43 | 40 | 56 | 72 | 52 |
| $_5q_0$ | 207[c] | 200 | 205 | 258 | 305 | 238 |

[a] Here and elsewhere, probabilities are shown per 1000 live births.
[b] Includes births and deaths prior to 1950.
[c] These estimates are period measures, taken from Rutstein (1983).

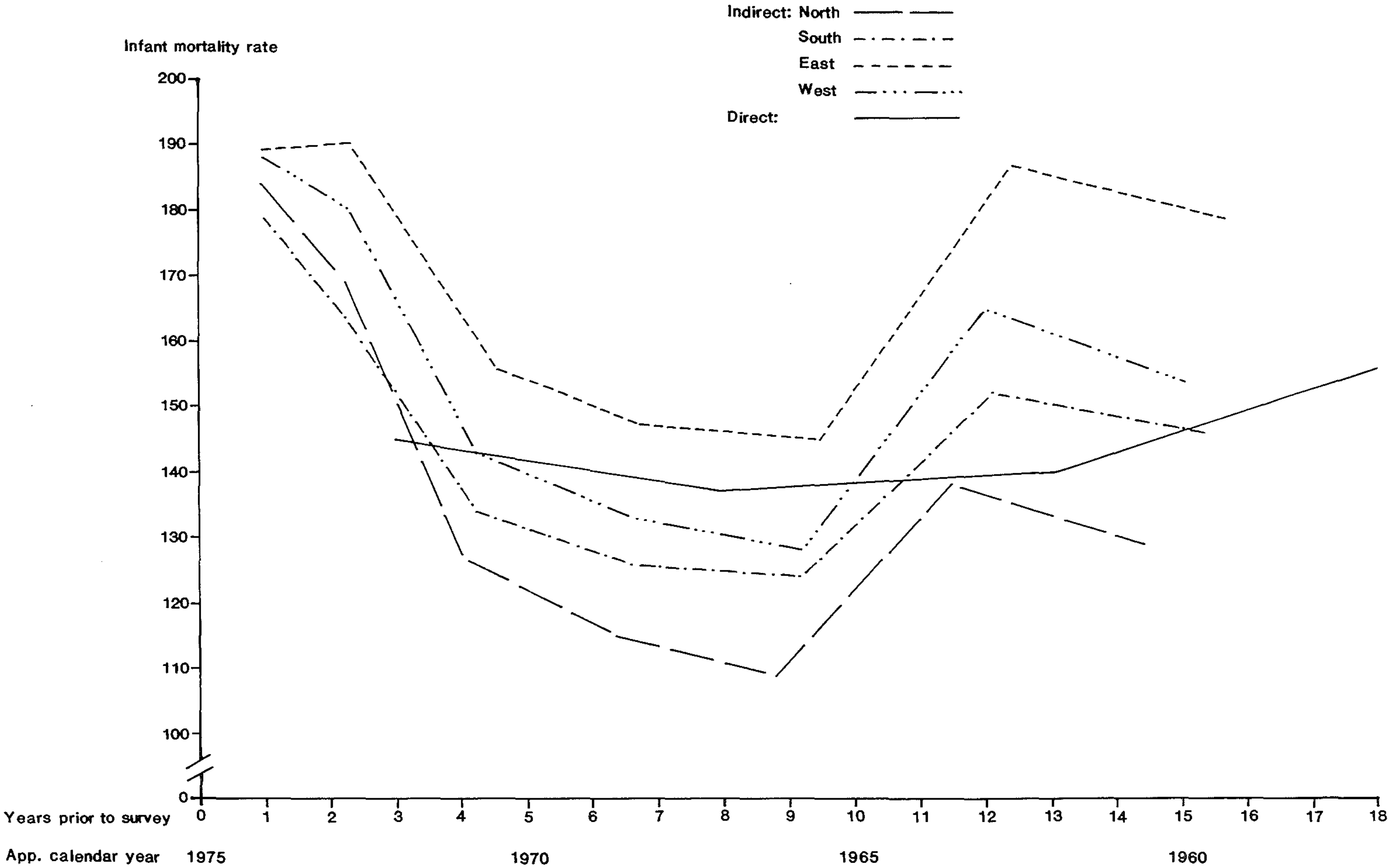


**Figure 11.1** Comparison of direct estimates of infant mortality (adjusted for truncation) from birth histories and indirect estimates based on a proportion of children dead by age group of mother

under the assumption of constant fertility, is shown in figure 11.1. The recent indirect estimates from all four regional model life tables, derived from the survivorship of children to women aged 15–19 and 20–24, are clearly too high, because of the positive association between young maternal age and the risk of death (see next section). For the period 1960–72, the indirect estimates (based on women aged 25–29, 30–34, 35–39 and 40–44) are reasonably consistent with the direct estimates, though the deficit of dead children for the cohorts aged 35–39 and 45–49 (see chapter 2) is evident. The main conclusion to be drawn from figure 11.1 is that indirect estimates, in this instance, are a poor substitute for the mortality rates derived directly from the birth histories, as the former are more sensitive to data defects in particular cohorts of women and are seriously distorted by the relationship between maternal age and mortality.

## 11.4 MORTALITY DIFFERENTIALS ACCORDING TO MATERNAL AGE, BIRTH ORDER AND GENDER

In this section we examine infant and child mortality in relation to age of the mother at the time of birth, the birth order of the child and its gender. In order to increase the size of the study population and thus reduce the sampling variability of the estimates, the results have been aggregated for all births occurring between one and fifteen years before the survey, which corresponds approximately to the period 1960–74. As shown earlier, there has been little change in mortality levels over those years and consequently there should be no confounding effect of period of occurrence on the observed relationships. Detailed examination of key tables for five-year periods confirmed this assumption. In subsequent tables, no adjustment for truncation by maternal age has been made, as it was shown earlier to be unnecessary for births in the last 14 years.

Estimates of neo-natal, post-neonatal and infant mortality are based upon the total number of births (13 525) over this fourteen-year period. Mortality estimates between age 1 and 2 ($_1q_1$) are based on 10 745 births occurring between two and fourteen years prior to the survey, while estimates of mortality between age 2 and 5 ($_3q_2$) are restricted to 7640 births occurring between five and fourteen years prior to the survey.

The relationship between maternal age and mortality is shown in table 11.9. As expected, children born at very young maternal ages have a greatly increased risk of dying before age 1. The infant mortality rate for the small number of births at maternal ages 10–14 is 229. This figure declines to 193, 138 and 120 for maternal ages 15–19, 20–24 and 25–29, respectively. Thereafter the infant mortality rate stays more or less constant at about 120 deaths per 1000 births.

The enhanced risk of death at young maternal ages is largely attributable to neo-natal mortality. For instance, the proportion of babies dying within the first month is nearly twice as high among mothers aged 15–19 than among those aged 25–29; post-neonatal mortality is only 20 per cent higher among the former group while at ages 1–5 there is no difference in mortality. This pattern indicates that the relationship between maternal age and mortality is not caused by environmental considerations of malnutrition or infectious disease but by such factors as prematurity, low birth weight, and complications of the delivery itself.

**Table 11.9** Probabilities of death by maternal age (births 1960–74)

| Age at maternity | Neo-natal | Post-neonatal | $_1q_0$ | $_1q_1$ | $_3q_2$ | $_5q_0$ | No of births |
|---|---|---|---|---|---|---|---|
| 10–14 | 150 | 80 | 229 | 61 | 39 | 299 | 107 |
| 15–19 | 122 | 71 | 193 | 34 | 45 | 250 | 2313 |
| 20–24 | 81 | 56 | 138 | 36 | 43 | 203 | 3721 |
| 25–29 | 62 | 59 | 120 | 34 | 39 | 184 | 3384 |
| 30–34 | 73 | 53 | 127 | 31 | 38 | 186 | 2425 |
| 35–39 | 60 | 54 | 115 | 34 | 43 | 179 | 1270 |
| 40–44 | 61 | 56 | 118 | 25 | 67 | 177 | 295 |
| 45–49 | * | * | * | * | * | * | 10 |

* Rates not shown because the number of births is less than 50.

Table 11.10 Infant mortality rates by maternal age and length of preceding birth interval (births 1960–74)

| Maternal age | Length of birth interval | | |
|---|---|---|---|
| | < 2 years | 2–3 years | 4+ years |
| 25–29 | 126 | 94 | 68 |
| 30–34 | 168 | 84 | 71 |
| 35+ | 153 | 81 | 67 |

This interpretation is strengthened by the persistence of the maternal age effect, when maternal education is controlled. For mothers with no schooling, the infant mortality rates at ages 15–19 and 20–24 are 199 and 143. For educated mothers, the corresponding rates are 144 and 106, an almost identical difference between the two groups.

While the link between young ages at maternity and higher mortality is to be expected, the absence of a similar link at very old ages is more surprising, though a similar finding has been reported for Bangladesh (Stoeckel and Chowdhury 1972) and Nepal (Thapa and Retherford 1982). It is unlikely that omission of births at older ages of maternity has biased the mortality rates downwards, because such births are recent in occurrence. One possibility is that birth spacing patterns have obscured the expected rise in mortality at old maternal ages. As will be shown in the next section, the length of the preceding birth interval is strongly associated with the survival chances of a child. Thus a wider spacing of births among older women could counterbalance any deleterious effect of high maternal age on survival. However a re-examination in table 11.10 of the relationship between maternal age and infant mortality, controlling for the length of the preceding interval, indicates that this is not the case.

The birth order of a child is closely related to the age of the mother at the time of birth. Thus mortality differentials by birth order, shown in table 11.11, parallel those by maternal age. Risks of death, particularly in the neo-natal period, are substantially higher for first-born children and slightly higher for the second born than for the third born; but thereafter there is no association between birth order and infant death.

The inter-relationships of birth order, maternal age and mortality are further explored in table 11.12. Once maternal age is controlled, the clear-cut mortality differential between order one, order two and higher order births disappears. At ages 15–19, the infant mortality rate for first births is only slightly higher than for second births; the high rate for third-order births is difficult to interpret because these births are highly selected for short preceding intervals. As will be shown later, preceding interval length is an important independent determinant of mortality. At the maternal ages 20–24, there is no appreciable difference between orders one, two and three. However, at maternal ages 25–29, the mortality gradient observed in table 11.11 is re-established. Selectivity may account for this last result. First-order and, to some extent, second-order births are relatively uncommon in Pakistan after age 24, and may reflect a previous history of

Table 11.11 Probabilities of death by birth order (births 1960–74)

| Birth order | Mortality measure | | | | | | No of births |
|---|---|---|---|---|---|---|---|
| | Neo-natal | Post-neonatal | $_1q_0$ | $_1q_1$ | $_3q_2$ | $_5q_0$ | |
| 1 | 110 | 65 | 175 | 25 | 32 | 224 | 2304 |
| 2 | 86 | 60 | 146 | 33 | 39 | 205 | 2121 |
| 3 | 70 | 53 | 123 | 36 | 50 | 188 | 1934 |
| 4 | 74 | 54 | 128 | 33 | 46 | 184 | 1719 |
| 5 | 67 | 62 | 129 | 44 | 49 | 202 | 1521 |
| 6 | 76 | 60 | 136 | 33 | 40 | 212 | 1286 |
| 7+ | 71 | 59 | 129 | 35 | 40 | 196 | 2640 |

Table 11.12 Infant mortality rates, by maternal age and birth order (births 1960–74) (number of births in parentheses)

| Maternal age | Birth order | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 10–14 | 248 (99) | * | * |
| 15–19 | 198 (1309) | 178 (706) | 203 (240) |
| 20–24 | 120 (711) | 129 (1016) | 112 (970) |
| 25–29 | 151 (153) | 134 (312) | 99 (565) |

* Rates not shown because number of births < 50.

miscarriages or still births, antecedents which are likely to be correlated with subsequent infant mortality. For these reasons, more weight can be attached to the rates at maternal ages 20–24, where problems of selectivity are least acute. This line of argument leads us to the tentative conclusion that the apparent association between birth order and infant mortality in Pakistan can be largely attributed to the young maternal ages at which first and second births occur.

In addition to providing evidence that birth order effects on mortality are minor, table 11.12 confirms the strong association between maternal age and risk to the child. First births to mothers aged less than 15 have a 25 per cent greater risk of dying in the first year than first births at ages 15–19 and twice the risk of first births at ages 20–24. Similarly, second-order births to mothers below age 20 have a higher risk than second-order births after age 20, though this difference may also reflect birth spacing effects.

We now turn to the last of the three birth characteristics to be examined in this section, namely the gender of the child. Both in developed and developing countries, infant mortality is nearly always higher for males than for females. Though this generalization holds for Pakistan, the difference is very small and well within the bounds of sampling and non-sampling error. This finding is similar to the adjusted PGE 1962–5 estimates, which show male and female infant mortality rates of 137 and 135, respectively. However it differs from the PGS of 1968–71 and 1976, both of which show markedly higher male mortality. As it is likely that female deaths are more commonly omitted than male deaths, this divergence supports the view that the PGS data on mortality are seriously defective. As shown in table 11.13, the virtual identity of male and female infant mortality is achieved by an offsetting of higher male neo-natal mortality by higher female post-neonatal mortality. Excess female mortality at the post-neonatal stage is maintained into childhood, with markedly higher values of ${}_1q_1$ and ${}_3q_2$ for girls than for boys. Such differences have been commonly found in countries of the Indian subcontinent and are ascribed to the higher value attached by parents to boys than to girls, but they are also found in other regions where there is less evidence of a preference for boys (United Nations 1982).

The hypothesis that a conscious or subconscious parental preference for boys may affect mortality levels is further examined in table 11.14, where male and female infant mortality for order three, four and five births are analysed by the sex composition of previous surviving children. If forces of selective neglect are operating, a systematic relationship between these two factors might be expected. In particular, the value of a female infant should fall and hence mortality should rise, as the number of older surviving sisters rises.

Table 11.13 Sex-specific probabilities of death (births 1960–74)

| Mortality measure | Male | Female | Ratio male/female |
|---|---|---|---|
| Neo-natal | 89 | 71 | 1.25 |
| Post-neonatal | 52 | 66 | 0.79 |
| ${}_1q_0$ | 141 | 137 | 1.03 |
| ${}_1q_1$ | 26 | 42 | 0.62 |
| ${}_3q_2$ | 37 | 47 | 0.79 |

Table 11.14 Male and female infant mortality rates for birth orders 3, 4 and 5 by number of gender composition of older surviving siblings (births 1960–74) (number of births in parentheses)

| Number and composition of previous surviving children | Male infant mortality | Female infant mortality |
|---|---|---|
| 2. 2 boys 0 girls | 123 (259) | 168 (238) |
| 1 boy 1 girl | 146 (469) | 127 (455) |
| 0 boy 2 girls | 82 (219) | 131 (206) |
| 3. 3 boys 0 girls | 136 (80) | 92 (97) |
| 2 boys 1 girl | 113 (237) | 126 (247) |
| 1 boy 2 girls | 120 (262) | 117 (236) |
| 0 boy 3 girls | 102 (67) | 98 (77) |
| 4. 3–4 boys 0 girls | 136 (129) | 165 (92) |
| 2 boys 2 girls | 130 (157) | 118 (121) |
| 0–1 boys 3–4 girls | 87 (120) | 148 (112) |

The rates in table 11.14 show no such relationship. The only pattern to emerge is that boys born to a family without any previous surviving sons appear to have lower infant mortality. This may be indicative of special parental care to a particularly precious child but, in the absence of any other evidence that the value of a child is related to mortality, no confident conclusion is warranted.

We conclude that the excess female post-neonatal and child mortality in Pakistan is independent of considerations about the precise balance of boys and girls in particular families. Rather, it is likely to reflect traditional differences in child care between boys and girls that are uniformly followed regardless of particular family compositions.[4] Such traditions may erode with increasing parental education. However, the PFS data suggest that this erosion is not yet taking place. The ratio of male to female infant mortality is in fact lower among families where the mother is educated (0.94) than where she is uneducated (1.12).

## 11.5 BIRTH SPACING AND MORTALITY

In this section we examine the relationships between birth spacing and mortality. In view of its potential importance both to family planning and maternal and child health programmes, there have been surprisingly few recent studies of this topic in developing countries, though exceptions include Rutstein (1983), Omran and Standley (1976 and 1981), Wolfers and Scrimshaw (1975) and Thapa and Retherford (1982). Reviews of this topic may be found in Wray (1971) and Winikoff (1982). The main focus of this analysis will be on the mortality of the nth child in relation to the length of the preceding birth interval (ie the interval between the $n-1$ birth and the nth birth). When analysing this relationship, we shall wish to control the survivorship of the preceding child ($n-1$ child) and the length of the adjacent earlier interval (ie between the $n-2$ and $n-1$ child) which we shall term the prior birth interval. First-order births are totally excluded from the analysis as they have no preceding birth interval; by the same token, second-order births are excluded when the length of the prior interval is introduced. Finally, multiple births have been omitted. During the period of interest, that of live births born between one and fourteen years before the survey, there were 107 multiple births with an extremely high infant mortality rate of 634, compared to 139 for all births.

The bottom panel of table 11.15 shows the relationship between mortality and the length of preceding interval, without any controls. At all ages up to 5 years, an extremely strong link is evident. Children born within two years of the preceding birth experience an infant mortality rate nearly two and a half times that experienced by children born after an interval of four or more years; their neo-natal rate is twice as high and

[4] The total length of breastfeeding for girls is not significantly shorter than for boys; thus this factor cannot be a source of maternal discrimination between the sexes.

post-neonatal rate three times as high. Differences in mortality between ages 1 and 5 are of a similar order of magnitude.

One factor that might give rise to a spuriously strong relationship between mortality and length of the preceding interval is early death of the preceding child. As is well known, the interval following an infant death tends to be shortened by an involuntary cessation of lactation and early resumption of ovulation. Furthermore, the deaths of successive children are likely to be correlated for a variety of reasons. Hence the higher observed mortality of children preceded by a short interval may simply reflect this correlation rather than any causal link with the interval length.

The top panel of table 11.15 indicates that the relationship between spacing and mortality cannot simply be attributed to this correlation. The classification of mortality by interval length for cases where the preceding child survived for at least two years[5] shows an association that is undiminished at ages 1–4 and only slightly weakened at the neo-natal and post-neonatal stage. The infant mortality rate for births preceded by an interval of less than two years is 146 compared to 95 for those with preceding intervals of two or three years and 70 for those with intervals of four or more years. By age 5, 23 per cent of the closely spaced births have died compared to only 11 per cent of the widely spaced group.

The middle panel completes the picture by presenting data for cases where the preceding child died before the age of 2. The first noteworthy feature is that neo-natal and post-neonatal mortality rates are about twice as high when the preceding child died as when he or she survived, thus confirming for Pakistan the common finding that deaths of successive children are correlated. Furthermore the correlation is independent of the length of the preceding interval. After age 1, the differences between rates in the top and middle panel almost disappear, which implies that the underlying causes are endogenous rather than exogenous in nature. The second feature, more important for present purposes, is the persistence of the strong association between mortality at all ages up to 5 and the preceding birth interval length. The important implication of this result is that the link between birth spacing and mortality cannot be attributed entirely to the competition between two closely spaced infants for food and parental care.

In view of the strength of the associations evident in table 11.15, it is prudent, at this juncture, to consider whether the defects in the PFS birth history data could be responsible. Omission of deaths by certain respondents could certainly replicate the pattern in the top panel, by creating artifically long birth intervals and artificially low mortality. However omission is an implausible explanation for the data in the middle panel, on the grounds that a mother is unlikely to report some deaths but not others.

A tendency to misreport the birth dates of deceased (but not surviving) children in such a way that they are displaced backwards in time could also produce a spurious relationship similar to that in the top panel of table 11.15, but such a pattern of misreporting seems inherently unlikely and again could not account for the persistence of the relationship in the middle panel, where the preceding child died.

The tentative conclusion that poor data quality is not responsible for the observed interval/mortality association is further buttressed by the fact that it persists in undiminshed form when attention is confined to the most recent births in the period 1–4 years before the survey. The infant mortality rates for cases where the preceding child survived are 168, 100 and 65 for preceding interval lengths of less than 2 years, 2–4 years and 4 or more years, respectively. Event dating, and possibly completeness of death reporting, should be better in this period than in the previous decade and yet no attenuation of the link is observed.

Similarly the pattern persists among families where both parents are educated, for whom there are a priori reasons to assume better reporting. The infant mortality rates for births whose mother has received some education and whose father has at least seven years of schooling decrease from 90 to 72 and to 54 as the preceding birth interval length increases; the corresponding rates of the offspring of couples where neither mother nor father has attended school are 144, 102 and 71. While the excess mortality associated with short intervals is slightly less striking for educated families, the overall pattern is clearly the same for both groups.

From the foregoing evidence, it seems unlikely that poor data quality has distorted the

[5] Because of the way in which age at death was coded, the criterion of two or more years' survival was used instead of the preferable criterion of survival until the conception or birth of the child of interest.

Table 11.15 Probabilities of death by length of preceding birth interval and survivorship of preceding child (order 2+ births, 1960–74)

| | Mortality measure | | | | | | No of births |
|---|---|---|---|---|---|---|---|
| | Neo-natal | Post-neonatal | ${}_1q_0$ | ${}_1q_1$ | ${}_3q_2$ | ${}_5q_0$ | |
| A Preceding child survived 2+ years | | | | | | | |
| *Interval length* | | | | | | | |
| < 5 | 76 | 69 | 146 | 45 | 60 | 226 | 2736 |
| 2–3 years | 51 | 44 | 95 | 32 | 40 | 157 | 5449 |
| 4+ years | 44 | 26 | 70 | 17 | 28 | 114 | 965 |
| B Preceding child died in first 2 years | | | | | | | |
| *Interval length* | | | | | | | |
| < 2 years | 168 | 99 | 267 | 53 | 45 | 339 | 1116 |
| 2–3 years | 86 | 77 | 187 | 43 | 39 | 232 | 715 |
| 4+ years | 73 | 32 | 105 | 6 | 13 | 114 | 204 |
| C All preceding children | | | | | | | |
| *Interval length* | | | | | | | |
| < 2 years | 103 | 78 | 181 | 47 | 56 | 259 | 3852 |
| 2–3 years | 55 | 48 | 103 | 33 | 40 | 166 | 6164 |
| 4+ years | 49 | 26 | 74 | 15 | 26 | 114 | 1098 |

relationship between preceding birth interval length and mortality. Nevertheless it still remains possible that there is a confounding effect of maternal age, stemming from the fact that short birth intervals may be more common at young maternal ages, where mortality risks are high. Table 11.16 contains a three-way classification of infant mortality, by length of preceding interval (confined to cases where the preceding child survived two or more years), maternal age and

Table 11.16 Infant mortality rates by length of preceding birth interval, birth order and age at maternity, confined to cases where the preceding birth survived at least two years (births 1960–74) (number of births in parentheses)

| Birth order | Length of interval | Age at maternity | | | |
|---|---|---|---|---|---|
| | | < 20 | 20–24 | 25–34 | 35+ |
| 2 | < 2 years | 153 (224) | 138 (248) | 202 (60) | – |
| | 2–3 years | 130 (264) | 104 (517) | 120 (185) | – |
| | 4+ years | 0 (13) | 92 (98) | 72 (76) | – |
| 3–6 | < 2 years | 210 (112) | 153 (605) | 132 (780) | 148 (45) |
| | 2–3 years | 81 (84) | 97 (901) | 90 (2032) | 73 (175) |
| | 4+ years | 0 (4) | 43 (56) | 61 (422) | 60 (114) |
| 7+ | < 2 years | – | – | 133 (424) | 153 (234) |
| | 2–3 years | – | – | 89 (650) | 90 (639) |
| | 4+ years | – | – | 101 (56) | 98 (125) |

Table 11.17 Infant mortality rates by length of preceding and prior interval (order 3+ births, 1960–74) (number of births in parentheses)

| | Length of preceding interval | | |
|---|---|---|---|
| | < 2 years | 2–3 years | 4+ years |
| A Preceding child survived 2+ years | | | |
| *Length of prior interval* | | | |
| < 2 years | 160 (932) | 87 (1401) | 73 (178) |
| 2–3 years | 124 (1147) | 93 (2693) | 71 (433) |
| 4+ years | 208 (132) | 83 (383) | 57 (163) |
| B Preceding child died before age 2 | | | |
| *Length of prior interval* | | | |
| < 2 years | 267 (479) | 160 (234) | 0 (25) |
| 2–3 years | 270 (371) | 155 (306) | 57 (54) |
| 4+ years | 375 (26) | 198 (34) | 187 (13) |

birth order. The overall conclusion is that the interval effect persists at all combinations of maternal age and birth order, though the data suggest that at high orders and old maternal ages, there is little advantage in survivorship terms of long intervals over medium intervals of 2–3 years. Similar results were obtained for childhood mortality and for cases where the preceding child died.

Thus far, the deleterious effect of short preceding intervals on infant and child survival has proved remarkably resilient in the face of a number of socio-economic and demographic controls. The next major issue is to establish whether the association is attributable directly to effects of the preceding interval length or whether it derives from a common factor which gives rise both to higher mortality and closely spaced births. For instance, the habit of early weaning could produce a sequence of short intervals and above-average mortality. In such a case mortality would be causally unrelated to the preceding interval length, despite the strong statistical association.

In an attempt to address this issue, we have re-examined the relationship between preceding interval length and mortality, controlling for the length of the prior interval. Infant mortality rates are shown in table 11.17 and probabilities of death between ages 1 and 5 in table 11.18.

The rate denominators summed across the two panels in table 11.17 indicate a reasonably strong correlation between the lengths of prior and preceding intervals. Overall 34 per cent of preceding intervals are less than two years in length; the corresponding figures are 43, 30 and 21 per cent as the length of the prior interval increases from less than two years to over four years. Such a correlation between successive interval lengths lends credence to the common factor hypothesis. However it is clear from the infant mortality rates in table 11.17 that the preceding interval/mortality relationship is independent of the length of the prior interval. In other words, regardless of the prior interval length, short preceding intervals are associated with a severe excess mortality. Indeed no systematic relationship between the prior interval and mortality can be discerned. This is true both when the preceding child survived for at least two years and when he or she died, though several of the cell sizes in the latter situation are too small for serious consideration. This finding supports the view that the observed association between preceding interval length and infant mortality is direct and does not stem from a common factor.

With regard to mortality between ages 1 and 5 (table 11.18), the relationships appear to be more complex. The mortality gradient associated with the preceding interval persists but its steepness diminishes markedly as the length of the prior interval increases (see figure 11.2). This is true

**Table 11.18** Probabilities of death between exact age 1 and 5 for order 3+ births, by length of preceding and prior intervals (births 1960–74) (number of births in parentheses)

| | Length of preceding interval | | |
|---|---|---|---|
| | < 2 years | 2–3 years | 4+ years |
| A Preceding child survived 2+ years | | | |
| *Length of prior interval* | | | |
| < 2 years | 126 (507) | 90 (825) | 34 (109) |
| 2–3 years | 85 (655) | 70 (1669) | 42 (266) |
| 4+ years | 68 (73) | 62 (253) | 43 (116) |
| B Preceding child died before age 2 | | | |
| *Length of prior interval* | | | |
| < 2 years | 109 (228) | 95 (143) | 0 (21) |
| 2–3 years | 123 (172) | 81 (179) | 0 (38) |
| 4+ years | 89 (13) | 0 (20) | 0 (7) |

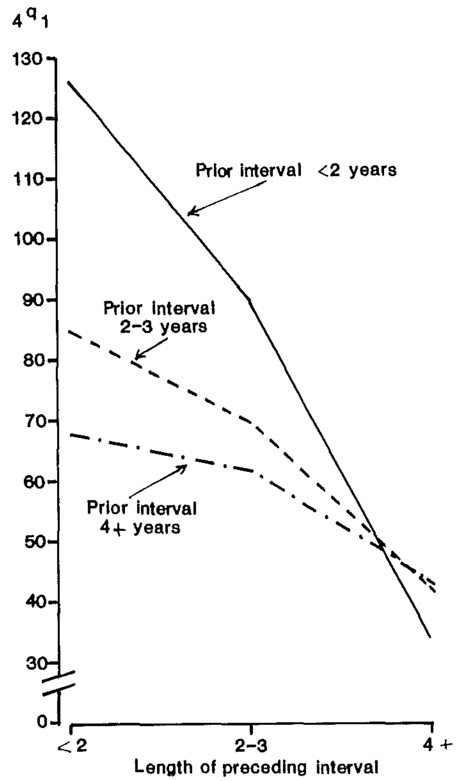


**Figure 11.2** Probability of dying between ages 1 and 4, by length of preceding and prior birth intervals

for cases where the preceding child survived but does not appear to hold when the preceding child died. It is also clear from the figure that, in contrast to the finding for infant mortality, the length of the prior interval itself is associated with mortality, but only when the preceding child survived for at least two years. This association is strong when the preceding interval is less than two years, weakens when the preceding interval is two or three years and disappears when the preceding interval lasted four or more years.

This interesting finding leads us directly to a discussion of the possible causal mechanisms that link preceding birth interval length to mortality. The results in table 11.18 and figure 11.2 suggest that the childhood mortality is increased by the presence of siblings who are only a few years older, presumably because of competition for relatively fixed resources of food and parental care. This mechanism accounts satisfactorily for the great increased risk to a child where both preceding and prior intervals are short and where the preceding child is surviving. When competition is reduced by early death of the preceding child or by a long preceding interval or (to a lesser extent) by a long prior interval, then childhood survival chances improve.

The competition thesis, however, cannot account for the fact that the length of the preceding interval is still strongly related to mortality when the preceding child died (table 11.15, middle panel). The causal link here probably concerns the effect on maternal health and nutrition of closely spaced births, the so-called maternal depletion effect, which is likely to result in low birth weights and complications of confinement. Such factors would obviously influence the neo-natal mortality rate but the findings from the PFS suggest that the effect also extends to the post-neonatal and childhood stages.

Clearly, a more epidemiological study is required to elucidate the mechanisms but, on the evidence of the PFS, it appears likely that short intervals induce a higher risk of death, both because of competition between infants and because of the damage to the mother. Whatever the relative importance of the possible causes, the data presented in this section are of very great practical relevance, for they suggest that a wider spacing of births, presumably by contraception, should bring about a dramatic improvement in infant and child mortality.

## 11.6 PARENTAL AND FAMILY BACKGROUND AND MORTALITY

In the previous two sections, differential mortality was examined in relation to characteristics of live births, such as gender, length of preceding birth interval and birth order. In this section we investigate the extent to which mortality varies with family and parental background. A total of six such characteristics are included, two relating to current place of residence of the family, three to the educational attainment of parents and one to the nature of the father's most recent or current occupation. The addition of mother's employment to this list was not feasible because of the homogeneity of the sample population in this respect. Less than 10 per cent of the women interviewed in the PFS had ever worked away from home since marriage.

In order to increase the size of the study population and thus reduce sampling variability of mortality estimates, the results are again aggregated for all births occurring between 1960 and 1974, the fourteen-year period preceding the survey. Births prior to 1960 are excluded to minimize the possibility of spurious associations, caused by omission of dead children. Even when attention is confined to the more recent past, for which data reliability should be relatively high, there can be no guarantee that differential completeness of reporting, for instance by mothers of varying educational background, has not distorted the observed associations; however in most instances, the effect will be to reduce the magnitude of associations rather than reverse their directions.

The results in table 11.19 are presented without demographic controls, such as maternal age, birth order or birth interval length. In the course of the investigation, the impact of these controls was examined but, with no appreciable exception, the effects of socio-economic background on childhood mortality were unaltered. In view of the homogeneity of fertility behaviour across different sections of the population, this is perhaps not surprising. Similarly socio-economic differentials in male and female mortality were examined separately for various socio-economic groups, but again no appreciable interactions were found and thus no purpose would have been served by presenting separate data on male and female mortality.

**Table 11.19** Probabilities of death by family background (births 1960–74)

| | Mortality measure | | | | | | No of births |
|---|---|---|---|---|---|---|---|
| | Neo-natal | Post-neonatal | $_1q_0$ | $_1q_1$ | $_3q_2$ | $_5q_0$ | |
| *Father's occupation* | | | | | | | |
| White collar | 80 | 51 | 131 | 23 | 40 | 188 | 997 |
| Sales and service | 73 | 62 | 135 | 34 | 37 | 205 | 2508 |
| Agriculture | 84 | 59 | 143 | 31 | 41 | 198 | 5875 |
| Skilled manual | 73 | 60 | 133 | 37 | 46 | 198 | 2529 |
| Unskilled manual | 86 | 58 | 144 | 46 | 49 | 226 | 1617 |
| *Father's education in years* | | | | | | | |
| None | 83 | 61 | 143 | 38 | 49 | 216 | 8439 |
| 1–7 years | 82 | 61 | 144 | 35 | 32 | 199 | 2304 |
| 8+ years | 71 | 53 | 124 | 24 | 30 | 167 | 2611 |
| *Mother's education* | | | | | | | |
| None | 81 | 60 | 141 | 37 | 44 | 209 | 12384 |
| Some | 63 | 48 | 111 | 14 | 20 | 133 | 1181 |
| *Joint education of parents* | | | | | | | |
| Both none | 83 | 61 | 144 | 38 | 48 | 214 | 8458 |
| Husband 1–7 years/wife none | 86 | 62 | 148 | 34 | 33 | 203 | 2061 |
| Husband 1–7 years/wife some[a] | 64 | 53 | 117 | 21 | 35 | 150 | 337 |
| Husband 8+ years/wife none | 75 | 53 | 128 | 29 | 38 | 181 | 1864 |
| Husband 8+ years/wife some | 60 | 45 | 105 | 12 | 12 | 122 | 806 |
| *Residence* | | | | | | | |
| Urban | 58 | 59 | 117 | 27 | 27 | 163 | 3685 |
| Rural | 88 | 59 | 148 | 37 | 48 | 216 | 9842 |
| *Region* | | | | | | | |
| Punjab | 81 | 61 | 142 | 37 | 42 | 205 | 9085 |
| Sind | 68 | 60 | 128 | 26 | 40 | 191 | 2923 |
| NWFP | 101 | 41 | 142 | 28 | 42 | 203 | 1330 |

[a] Includes a few cases where husband has no education.

Two inter-related measures of the father's socio-economic status are available from the PFS, occupation and education. Mortality differentiation by the former variable is surprisingly modest. Levels of neo-natal and post-neonatal mortality are more or less constant across the five categories; but between ages 1 and 5, the rates for the offspring of unskilled manual workers are higher than for other groups. However, as the contribution of toddler and childhood mortality to the overall risk of dying before age 5 is slight, there is little divergence between the four occupational groups in this summary measure. The probabilities of dying before age 5 are almost identical at about 200 per 1000 births for white collar, sales and service, agricultural and skilled manual categories but there is a slight rise to 226 for the unskilled manual group.

More pronounced differentials are observed by father's educational level. The children of those who have received secondary or higher education experience a lower risk of death at all ages than the children of fathers with no schooling, or primary schooling only, for whom the risks are similar. This difference between the secondary school category and the others is greater after than before age 1. Nevertheless the overall extent of divergence is not substantial; by age 5, 170 per 1000 children of fathers with secondary education have died, compared to 200 children with fathers in the primary or no schooling categories.

Whereas 17 and 24 per cent of husbands in the PFS had received primary and secondary or higher level education, respectively, only 11 per cent of wives had ever attended school. Thus maternal education could only be represented in the analysis as a dichotomy between those with no schooling and those with some. A previous analysis using WFS data for ten countries has revealed maternal education to be a more important determinant of infant and child mortality than the socio-economic level of the husband (Caldwell and McDonald 1981). The Pakistan data are consistent with this finding, though it should be emphasized that educated mothers in Pakistan are such a small and highly selected minority that it is difficult to interpret the implications of the result.

The children of educated women experience lower mortality at all ages than those of women of no schooling. The infant mortality rate for the former category is 141 as against 111 for the latter. After age 1, the contrast is much sharper, with toddler and child mortality rates twice as high for the uneducated group. The impact of maternal education is thus much greater than that of the father's socio-economic status and is achieved despite the earlier weaning practised by educated women (see Shah, chapter 8). The overall pattern of results suggests strongly that superior nutritional and health care of young children by more educated mothers is largely responsible for the better survival chances of their young children.

This interpretation is strengthened by examination of the relationship between mortality and education of both mother and father considered jointly. Because of the strong correlation between the educational attainment of mother and father, the number of combinations is limited but nevertheless the greater impact of maternal education is clearly established, both in families where the husband has 1–7 years' schooling and where he has 8 or more years of education.

Rural–urban differences in mortality are also pronounced. The rural neo-natal mortality rate is 88 compared to 58 in urban areas, though the post-neonatal rates are identical. This suggests that greater availability of maternity services to the urban population may be the key factor. However, rural mortality between ages 1 and 5 is also higher than urban mortality. As the majority of educated wives dwell in urban areas, maternal education and urban residence are highly correlated, the association of these two factors with mortality is examined jointly in table 11.20. For the whole sample, the chance of dying by age 5 is one-third higher for rural children than for urban children. This rural–urban difference is slightly reduced to one-fifth among families where the mother has no schooling. However, it increases to 58 per cent among women with some schooling, although caution should be exercised here because of the small sample of births to educated rural mothers. It is clear, then, that rural–urban mortality differentials cannot be attributed to concomitant differences in levels of parental education.

If the effect of type of place of residence on mortality is independent of parental education, does the effect of education persist in both rural and urban strata? In the urban stratum the answer is affirmative. Indeed the differences in post-neonatal mortality between the children of mothers with some and no education are even larger for

**Table 11.20** Probabilities of death, by urban–rural residence and maternal education (births 1960–74)

| | Neo-natal | Post-neonatal | $_1q_0$ | $_1q_1$ | $_3q_2$ | $_5q_0$ | No of births |
|---|---|---|---|---|---|---|---|
| *No education* | | | | | | | |
| Urban | 63 | 65 | 128 | 30 | 32 | 180 | 2646 |
| Rural | 88 | 59 | 147 | 38 | 49 | 218 | 9378 |
| *Some education* | | | | | | | |
| Urban | 47 | 42 | 89 | 16 | 18 | 115 | 812 |
| Rural | 98 | 62 | 161 | 9 | 27 | 182 | 365 |

the urban than for the whole sample. In rural areas, differences in childhood mortality according to maternal education also persist but the contrast in neo-natal and post-neonatal mortality is severely attenuated. The cautionary note about the small sample size of the rural educated category must be repeated, but the pattern is plausible. In urban cases, maternal education may effect a reduction in infant mortality through greater use of maternity-related services; in rural areas, where such services are very scarce, this path to lower mortality is blocked and hence the link between maternal education and infant mortality is scarcely discernible. In childhood, where the influences of hygiene and nutrition on survival are greater, the effect of education on survival is less dependent upon medical facilities and is thus re-asserted in rural areas.

The last variable to be considered is current region of residence. The probabilities of death by age 5 are remarkably similar for the three major regions. (Baluchistan is excluded because of the small sample size.) Infant mortality in Sind appears to be somewhat lower than in the other two regions, because of a lower neo-natal mortality rate. This finding may reflect the fact that Sind is the most urbanized of the regions. In the NWFP, very high neo-natal mortality but low post-neonatal mortality is recorded, though it is likely that this reflects misreporting of age at death rather than a genuine divergence from the other two regions.

In summary, the important conclusions from this examination of socio-economic differentials are that education and urban residence are the two factors associated most strongly with reduced risk of death. The fact that the mother's education is more closely related to mortality than the socio-economic status of the family, as measured by the occupation or education of the husband, is a finding of practical value for it implies that mortality could be reduced more quickly by encouraging changes in child care practices than by a general increase in economic standards of living.

## 11.7 THE EFFECT OF MORTALITY ON FERTILITY

In this section the focus of interest shifts completely to a brief consideration of the effect of infant and child mortality on fertility behaviour and attitudes.

Mortality can influence fertility in three main ways, through (1) a non-volitional biological effect due to curtailment of breastfeeding and early resumption of ovulation following an infant death, which leads to a shorter subsequent birth interval than would have obtained had the child survived; (2) a replacement effect whereby parents consciously replace children who have died with an additional birth that they otherwise would not have had; (3) an insurance effect whereby parents have a larger number of children than they really desire, as a precaution against the possibility of loss. The biological and replacement mechanisms clearly operate at the level of the individual family, in response to the experience of death. The insurance effect, however, is as likely to be a response to the perceived general level of risk in a community as to be a response to a particular bereavement.

The existence of the biological effect can be easily demonstrated by comparing the length of the interval to the next birth for cases where the earlier child died and when he or she survived. As shown in table 11.21, the birth interval following a death in the first two months is 7–10 months shorter than when the child survived for at least one year. Though this difference is large, its impact on overall fertility is negligible. If all infant deaths were miraculously eradicated, the average mean closed interval length would increase by only about one month, from about $27\frac{1}{2}$ to $28\frac{1}{2}$ months. Assuming a mean age at first birth of nearly 20 years and a reproductive span of 15–20 years (ie a mean age at last birth of 35–40 years), the effect on the total fertility rate of an average increase of one month in closed interval lengths is

**Table 11.21** Median lengths of closed birth intervals by survival status and age at death of the birth which starts the interval (number of intervals in parentheses)

| Age at death | Birth interval | | | | |
|---|---|---|---|---|---|
| | 1–2 | 2–3 | 3–4 | 4–5 | 5–6 |
| < 2 months | 20.9 (381) | 19.7 (272) | 19.4 (187) | 21.2 (146) | 18.9 (127) |
| 2–11 months | 22.1 (272) | 22.1 (196) | 23.1 (157) | 20.8 (139) | 21.8 (111) |
| Survived 1 year | 28.7 (2823) | 28.4 (2495) | 28.6 (2131) | 28.7 (1739) | 28.7 (1350) |

**Table 11.22** Fertility preferences and contraceptive practice, by number of ever born and deceased children and by number of surviving and deceased children

| | | Number of children ever born | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7+ |
| A Percentage of currently married, fecund women who desire no more children | | | | | | | | | |
| No of deaths | 0 | 1 | 7 | 29 | 40 | 62 | 73 | 84 | 92 |
| | 1 | – | 0 | 9 | 24 | 54 | 58 | 71 | 89 |
| | 2+ | – | – | 0 | 5 | 19 | 36 | 57 | 81 |
| B Percentage of currently married women who are currently using any method | | | | | | | | | |
| No of deaths | 0 | 0 | 2 | 6 | 9 | 8 | 11 | 18 | 19 |
| | 1 | – | 1 | 2 | 2 | 5 | 6 | 9 | 13 |
| | 2+ | – | – | 0 | 0 | 1 | 4 | 6 | 8 |
| C Of currently married, fecund women who have never used any method, the percentage who intend to use in the future | | | | | | | | | |
| No of deaths | 0 | 75 | 71 | 65 | 64 | 60 | 59 | 64 | 60 |
| | 1 | – | 71 | 70 | 64 | 64 | 62 | 64 | 60 |
| | 2+ | – | – | 67 | 69 | 60 | 64 | 62 | 59 |
| | | Number of living children | | | | | | | |
| A Percentage of currently married, fecund women who desire no more children | | | | | | | | | |
| No of deaths | 0 | 1 | 7 | 29 | 40 | 62 | 73 | 84 | 92 |
| | 1 | 0 | 9 | 24 | 54 | 58 | 71 | 88 | 90 |
| | 2+ | 0 | 8 | 26 | 46 | 70 | 79 | 95 | 91 |
| B Percentage of currently married women who are currently using any method | | | | | | | | | |
| No of deaths | 0 | 0 | 2 | 6 | 9 | 8 | 11 | 18 | 19 |
| | 1 | 1 | 2 | 2 | 5 | 6 | 9 | 13 | 13 |
| | 2+ | 0 | 3 | 2 | 2 | 8 | 9 | 7 | 11 |
| C Of currently married, fecund women who have never used any method, the percentage who intend to use in the future | | | | | | | | | |
| No of deaths | 0 | 75 | 71 | 65 | 64 | 60 | 59 | 64 | 60 |
| | 1 | 71 | 70 | 64 | 64 | 62 | 64 | 66 | 53 |
| | 2+ | 70 | 56 | 63 | 61 | 61 | 55 | 64 | 63 |

of the order of 0.3 births per woman. A less than complete eradication of infant deaths would have correspondingly less impact on fertility.

We turn now to a consideration of the replacement effect by citing the results of a detailed study of breastfeeding in Pakistan (Page, Lesthaeghe and Shah 1982). They demonstrate that, once duration of breastfeeding is controlled, there is no relationship between the death of an infant or child and the length of the interval to the next birth. Indeed if the child dies, the next birth comes slightly later rather than sooner, when the length of breastfeeding is taken into account. Thus there is no evidence of any tendency to increase the tempo of reproduction in order to replace a dead child. An examination of parity progression ratios also failed to detect any effect of child loss. In an essentially non-contracepting society, the absence of a replacement effect is to be expected, though, in principle at least, increased coital frequency could achieve this aim.

Though there appears to be no effect of mortality on fertility behaviour at the level of the individual family, apart from the involuntary biological path, the possibility remains that attitudes to reproduction are influenced by the experience of child loss. The topic is examined in table 11.22. The top panel shows the percentage of women desiring no more children, the percentage currently using contraception and the percentage of never users who intend to use in the future, cross-classified by number of children ever born and the number who have died. While there is no association between number of dead children and intention to use, an impact of child loss on attitude to more children and on contraceptive use is clearly evident. Though this effect is confounded with the educational and residential background of couples, it is so strong in the case of stated desire to have no more children that controlling for these two factors could weaken but not eliminate it. Thus at the attitudinal level, a replacement mechanism appears to operate.

The lower half of table 11.22 repeats the cross-classification with number of living children instead of number of children ever born. Any effect on contraceptive use or attitudes would point towards an insurance, as opposed to a replacement, motivation. The data indicate no such insurance effect on desire for children or intention to use contraception. However, the level of current use of contraception decreases, at larger family sizes, as the number of child deaths increase; but the association is slight and could well reflect the negative association between education, urban residence and child loss.

To summarize, we have identified a clear biological link between infant death and birth interval length but its influence on total fertility is negligible. No behavioural response to mortality has been identified, though there is some evidence that mortality may act as a deterrent to contraceptive use. However, the stated propensity to limit family size is determined by the number of living children rather than the number ever born and is thus obviously responsive to child loss.

Though the findings as a whole have been rather negative, it should be stressed that the analysis has been confined to the individual level and no attempt made to take into account community-level influences. In a country where one-fifth of children die before the age of 5, it would be surprising if a sense of the fragility of life does not enter, consciously or subconsciously, people's attitudes towards reproduction, whether or not they themselves have experienced the death of a child.

## 11.8 DISCUSSION OF THE MAIN FINDINGS

The most important finding to have emerged from this analysis of the PFS mortality data is that infant and child mortality appears to have stabilized around 1960 at a high level. Between 1960 and 1975, the infant mortality has been a little under 150 deaths per 1000 live births and the probability of dying by age 5 has been about 200 per 1000 births. Unfortunately there is little epidemiological data in Pakistan to throw light on the causes of such a high death rate. An ambitious national survey of 19 158 births was conducted in 1978 to collect baseline data on morbidity and mortality associated with six major childhood diseases: measles, poliomyelitis, tetanus, whooping cough, diphtheria and tuberculosis (Ahmad *et al* 1979). Of these, tetanus emerged as the most common cause of death to chldren under age 2, followed by measles. However the long recall period of 15 years resulted in data of dubious quality and a series of more intensive disease-specific surveys are now under way. The first of these, focussing on tetanus neo-natorum, was based on a sample of 13 858 live births in three ecological strata in Punjab

(Planning Commission, undated). A neo-natal mortality rate of 52 per 1000 cases was recorded and an astonishing 60 per cent of all neo-natal deaths were attributed to tetanus. Though this latter figure may be an over-estimate it suggests that tetanus is one of the major causes of infant deaths.

The Micro-Nutrient Survey of 1976–7, with a national sample of 1105 households, provides a wealth of information of direct relevance to any discussion of infant and child mortality in Pakistan (Planning and Development Division 1978 and 1979). Among the more important findings to emerge were that there had been no improvement in the nutritional status of children over the previous ten years; height for weight measurements indicated that 17 per cent of the pre-school children were suffering from severe or moderately severe growth failure. This situation could be caused in part by inadequate supplementary feeding of infants. Less than half of the children surveyed received solid food supplements in the first year and 10 per cent were still not receiving solids by the end of the second year.

Apart from data on disease patterns and nutrition, two futher factors of great importance emerge clearly from most health-related surveys. The first factor concerns the low level of immunization. The 1978 Baseline Survey survey, found that only 10 per cent of children surveyed had a BCG vaccination and the prevalence of DPT and polio vaccinations was much lower. The second factor is the low level of use of government health facilities. A detailed analysis, which involved the mapping of health institutions, examination of patient flows and staffing patterns, reached the conclusion that, while 86 per cent of the total population lived within five miles of some health facility, only 17 per cent of the population used this or any other government health facility (Health Section, Planning and Development Division 1978). The Micro-Nutrient Survey found that 74 per cent of pregnant women receive no ante-natal care at all and only 6 per cent saw a medically qualified person. The vast majority of deliveries (92.5 per cent) took place at home. More detailed studies in Punjab confirm this general picture. In a survey of 633 families in two villages, 10–12 miles from Lahore, only 48 and 25 per cent of the inhabitants made use of public health facilities, though these were situated within two miles of each village (Institute of Hygiene and Preventive Medicine 1975). Similarly, a survey of 1000 couples from 20 Punjab villages indicate that 80 per cent received no ante-natal care and 95 per cent delivered with the assistance of a dai only (Anwar and Naeem 1980).

The static nutritional levels and the failure of modern medicine to spread much beyond the major urban centres are paralled by economic progress in the period 1960–75. Though there was some improvement in overall living conditions, the percentage of the population below the poverty line did not decline because of uneven distribution of economic gains (Irfan 1981). This inter-related constellation of economic, nutritional and health factors goes a long way towards explaining the failure of infant and child mortality levels to improve since 1960.

While the new information on levels and trends is the most important finding of the analysis, the insights into determinants and correlates of mortality are also of considerable interest. Strong negative associations with mortality were found for maternal education and urban residence and positive associations for young maternal age and, at the post-neonatal and childhood stages, for female as opposed to male births. However, in terms both of practical relevance and magnitude of effect, birth spacing, in our opinion, emerged as the most striking determinant. Effects of the magnitude observed in the PFS have only rarely been found elsewhere, Nepal being one of the few exceptions (Thapa and Retherford 1982), yet they were robust and consistent in the fact of a number of checks. We believe that they provide a strong justification for the new Population Welfare Programme, in which, for the first time, a genuine attempt will be made to provide integrated maternal and child health and family planning services.

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# 12 Concluding Remarks

Iqbal Alam

The growing scientific interest in the structure, characteristics and dynamics of world's population has created an unprecedented demand for internationally comparable demographic data. However, as one soon discovers, such data are neither widely available nor readily accessible for any meaningful analysis. The World Fertility Survey has, to a large extent, succeeded in generating and making available such data for the first time. The present volume, based on data from the Pakistan Fertility Survey, is an experimental effort to create wider interest in these data sets.

Obviously, the data generated through the PFS or other similar exercises provide only a short-term solution to the problem of availability of reliable demographic data and are by no means a substitute for the official national vital registration system. Efforts to develop an official registration system must continue. However, as an interim arrangement, the experiences gained through the PFS can provide guidelines for the continuation of such exercises every few years. The Repeat Fertility Survey conducted in Pakistan in 1979–80 is an example of an exercise of this type and is the latest for Pakistan.

The authors of the various papers included in this volume have highlighted some of the demographic and ecological implications of their findings. These concluding remarks draw attention to the socio-economic implications of the findings, the most startling of which is the near-failure of the country's Population Planning Programme to achieve its goal. Although a large majority of married women are now familiar with birth control methods, practice remains at a very low level of around 6 per cent of all fertile couples. The gap between knowledge and use remains very high; while 75 per cent of the PFS respondents knew about at least one efficient contraceptive method, 5.2 per cent were 'currently using' a contraceptive and 10.2 per cent had 'ever used' any contraceptive method. The average age of a contraceptive user in the PFS was 34 years, and most of these were high-parity women. The adoption rate in rural areas was very low as compared to that in urban areas. The more educated women (ie those educated to above the primary level), with access to family planning services, were found to be more inclined to use contraceptives than uneducated women. Most surprising of all is the finding that of all the ever-users, nearly one-third reported that they did not intend to use any method in the future for a variety of reasons, including fear of side effects and objections by husband and others.

Under these circumstances, it was not surprising to find that the fertility level had not changed much. Some decline which has taken place is mainly due to changes in the nuptiality pattern in recent years: the mean age at marriage has been rising. Furthermore, the determinants of fertility commonly observed elsewhere seem to be less applicable to Pakistan. For example, in Pakistan, marital fertility is somewhat higher in urban areas than in rural areas, a fact attributable to changing breastfeeding practices. (In urban areas, women breastfeed their children for shorter periods than in the past, thereby exposing themselves to the risk of another pregnancy at more frequent intervals.) Again, rising educational levels are generally associated with a decline in fertility, a relationship which is, however, very weak in Pakistan. More important is the strong preference for boys which is found to be an important determinant of fertility differentials in Pakistan, resulting from societal pressures.

Readers may find it surprising that with so much investment in health care and delivery of supplies the infant and child mortality levels still remain high: nearly one-fifth of children die before reaching their fifth birthday. Unfortunately, our understanding of the determinants of infant



Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey*: 211–212. Voorburg, Netherlands: International Statistical Institute.

and child mortality is very low. The improvement in health technology and its availability to the general population during the last 20 years has been very skewed, benefiting mainly the urban middle and upper classes. Then again, most of the deliveries of medical supplies are still handled by local indigenous health personnel (commonly known as 'dais') and even though the government has been able to establish basic health units in rural areas, most of these units are without trained personnel. Above all, the most important element – maternal education – has remained unchanged during the last 20 years, and female literacy is still very low.

There are undoubtedly distinct limits to which cross-sectional data, such as those on which findings of this volume are based, can be used to identify determinants of fertility and infant and child mortality with a simplistic explanation, for in such data, some socio-economic characteristics, such as education, current place of residence, use of contraception and income may be highly correlated with the age of women. Clearly, some of the policies that may be formulated in respect of fertility decision-making on the basis of these findings may not be relevant to many of those couples who have provided the data for the findings of the PFS. They may already have far exceeded the limits to family size that such policies may seek to set. Such limitations notwithstanding, it is possible to make a few simple statements about the subject discussed in this book.

It appears that largely for two reasons, family planning efforts have failed to achieve their goals. First, Pakistan's Family Planning Programme did not succeed in disseminating sufficiently knowledge about contraceptives; and secondly, the programme laid heavy emphasis on the supply of contraceptives and ignored the question of demand, with the result that not many couples were motivated enough to adopt contraception. The positive association that appears to exist between high parity and use of contraceptives clearly shows that demand is as important as supply in fertility control, perhaps more so. There appears to be a weak inverse correlation between education and fertility in Pakistan, due possibly to the type of data collected in the PFS. In Pakistan, as indeed in most countries where education has only recently been introduced and education levels are low and highly selective in terms of class and age, it is mainly the younger cohorts that have received an education. Women in older cohorts are mostly without the benefit of any formal education. Women in the younger cohorts who have had some education have characteristics (such as higher income, urban residence, better job opportunities) which by themselves tend to depress fertility, making it difficult to determine the role of education as a factor in fertility differentials. It should therefore be recognized that increasing the level of education without bringing about changes in the socio-economic structure of society will not in itself lead to fertility decline. The fact that, contrary to the generally observed pattern, marital fertility is higher in urban than in rural areas may be due to changing attitudes towards breastfeeding among urban women as well as to the differentials in the degree and type of urbanization experienced by them. Moreover, since most urban centres have grown out of large villages, their urban population differs but little from the original rural population in its perception of children as a source of help and security in old age. Anti-natalist attitudes prevalent among the urban populations of developed countries are thus still very weak in the urban population of Pakistan which still adheres to the job structure and values of their rural ancestors. For an analysis of fertility differentials in Pakistan, therefore, we need to consider such factors as the fertility preferences, socio-economic conditions and the reproductive behaviour of parents. The PFS unfortunately gathered no data on income, wages, landholdings and other assets of households. Hence its limited value for fertility analysis. The Repeat Survey of 1979–80 is expected to be more helpful in providing insight into fertility behaviour as it has collected data on many aspects that were ignored by the PFS. As such the Repeat Survey has more policy relevance than the PFS.

# Appendix Pakistan Fertility Survey: Sampling Errors for Selected Estimates

John McDonald

## A1 THE SAMPLE

The geographical coverage of the Pakistan Fertility Survey sample was restricted. Certain areas were excluded because they are inhabited by unsettled nomadic and tribal populations or are sparsely populated and highly inaccessible. The sample represents all ever-married women aged 10–49 living in private households in all urban and rural areas of Punjab, Sind, the North-West Frontier Province (NWFP) and Baluchistan, except:

1 All the rural areas of Kalat, Mekran, Loralai, Zhob, and Kharan districts of Baluchistan.
2 The restricted cantonment areas.
3 The former states and tribal areas of the NWFP (Swat, Dir, Chitral, Malakand Agency, Kurran Agency and the Khyber Agency).

The population covered by the sample represents 93.2 per cent of the population of Pakistan.

A multi-stage cluster sample design was used with main strata defined by urban and rural areas. The urban population represents approximately 25 per cent of the study population but was considered to be more heterogeneous than the rural population, so that 40 per cent of the sample was allocated to the urban areas. Hence the sampling fractions for urban and rural areas were different. Within each main stratum, the sample was self-weighting. Note that in order to compensate for the urban oversampling, weighting factors were computed and should always be used when making national estimates. The normalized weights for urban and rural areas are 0.6797 and 1.1973, respectively.

The national sampling frame for urban areas was used for Punjab, Sind, NWFP, and that part of Baluchistan covered by the frame. A stratified two-stage design with probability proportional to size (PPS) selection was used in these areas. This frame consists of a listing of specially created enumeration blocks. For the urban area of Baluchistan not covered by the national frame, a stratified three-stage PPS design was used. In the rural areas, the sample frame consisted of the 'village list' of the Population Census Organization. A stratified two-stage PPS design was used for the rural areas. The sample design is more fully described in chapter 2 of the *Pakistan Fertility Survey: First Report* (1976).

Out of a total of 5246 households selected, 4901 were successfully interviewed, a completion rate of 93.4 per cent. In these households a total of 5046 eligible women were identified, of which 4996 were interviewed, a response rate of 99.1 per cent. After elimination of women reported 50 years old, the final effective sample amounts to 4952 women.

## A2 SAMPLING ERRORS FOR SELECTED ESTIMATES

### Introduction

*Interpretation of sampling errors*

The particular sample obtained in the survey is one of a large number of all possible probability samples which could have been selected using the given sample design. The estimates derived from different samples would differ from each other. However, apart from non-sampling errors and bias, all estimates considered in this study are approximately unbiased, meaning that the true population value of interest is approximated by an average of the estimates from the various possible samples. This average from different samples is called the 'expected value'. The sampling error or standard error of an estimate is a measure of the (absolute) difference between the observed



Alam, Iqbal and Betzy Dinesen, eds (1984). *Fertility in Pakistan: a Review of Findings from the Pakistan Fertility Survey*: 213–259. Voorburg, Netherlands: International Statistical Institute.

sample estimate and the expected value of the estimate. Apart from non-sampling errors, the standard error in the present context measures the size of the expected (absolute) deviation of the sample estimate from the true population value of interest.

A common and convenient criterion asserts that the true value lies within a range of twice the standard error on either side of the sample value. The range (sample value) ±2 (standard error) is called the '95 per cent confidence interval', and one can say that the odds are only one in twenty that the true value lies outside this range. If, for example, the observed sample mean for a variable is 3.5 and if the standard error (to an appropriate sample base) has been estimated as 0.2, then the '95 per cent confidence interval' is 3.5 ±2(0.2), ie 3.1 to 3.9, and for practical purposes, ie with 95 per cent confidence, one asserts that, apart from non-sampling errors, the true population value of interest lies in the range 3.1 to 3.9.

*Computation of sampling errors*

One of the advantages of a probability sample such as the present one is that the sampling errors can be estimated from the results of the one sample which is actually available.

The computational procedure must take into account the actual structure of the sample and in particular the fact that the sample is a stratified clustered sample. The results have been computed by using the WFS package program CLUSTERS. An outline of the procedure for estimating sampling errors is given later in this appendix.

*Sampling errors for subclasses and subclass differences*

To be useful in the interpretation of the substantive results presented in the form of detailed cross-tabulations, sampling errors for each of the important variables have to be computed over various subclasses of the sample. By subclass is meant a subset of the sample cases defined in terms of characteristics such as individual age or marriage duration groups, or groups by socio-economic background, etc. Due to the smaller sample bases involved, sampling errors for individual subclasses obviously tend to be larger than the error in an estimate based on the entire sample.

The computational formulae given below apply also for estimates computed over a particular subclass of the sample. Individuals or primary sampling units (PSUs) not belonging to the subclass are simply ignored in the computation. Interpretation of the standard error in terms of the '95 per cent confidence interval' given above applies equally to the whole sample as well as to any particular sample subclass.

Sampling errors for differences between subclass means can be particularly relevant in the interpretation of fertility and other differentials observed from the survey results. These determine the likelihood that an observed difference is real and not caused merely by sampling variation. Even for a relatively 'efficient' sample such as the present one, many observed differentials may not be statistically significant once the sample has been subdivided by the introduction of necessary control variables.

For differences between subclass means, we may regard an observed difference to be 'statistically significant' if the magnitude of the difference is not smaller than twice its standard error. 'Statistically significant', of course, does not necessarily mean substantively significant or meaningful; it implies rather that the observed difference is real in the sense that it is unlikely to be caused merely by sampling variation. If the magnitude of the observed difference is smaller than twice its standard error, we may take it to be statistically (and hence substantively) 'not significant', implying that it cannot be asserted that the observed difference is not caused merely by sampling variation.

If, for example, for two sample subclasses being compared, the observed subclass means for a variable are 3.0 and 3.5 respectively, and if for the difference of the two means (3.5 − 3.0 = 0.5), the standard error has been computed to be 0.1, then the '95 per cent confidence interval' for the difference is 0.5 ±2(0.1), that is, 0.3 to 0.7. In this example, one may assert that the true difference lies in the range 0.3 to 0.7. The observed difference is 'statistically significant' (the observed magnitude of the difference, 0.5, is greater than twice the standard error).[1] Now, if in the above example the standard error for the difference was 0.4, the '95 per cent confidence interval' for the difference would be 0.5 ±2(0.4), that is, −0.3

[1] This assertion can be made with 95 per cent confidence. Incidentally, it follows, with even greater confidence, that in the example the difference is not zero – in other words, that the two subclasses differ for the variable concerned. Sampling errors for differences are often used in this way to test whether two subclasses differ.

to 1.3. In this second case, it cannot be asserted that the observed difference is real, and not caused merely by sampling variation. Note that in the second example, the observed difference (0.5) is smaller than twice its standard error (0.8), which is the same as the observation that the '95 per cent confidence interval' includes the value zero.

*Effect of clustering of the sample*

In the present sample, the individuals interviewed are clustered into a number of sample areas. Compared to a sample of individuals selected entirely at random, clustering tends to reduce efficiency of the sample (ie increase associated sampling errors, for a given sample size). This is because individuals from within a cluster tend to be more uniform compared to individuals in the sample (or the population) as a whole. In a sense, less new information is obtained by interviewing a number of individuals from the same sample area as compared to that obtained from an entirely random sample of the same size.

A measure comparing the standard error of an estimate from the actual clustered sample with what the error would have been had the sample been selected entirely at random is called the 'design factor' or DEFT.

$$\text{DEFT} = \text{SE/SR} \qquad (1)$$

where SE is the standard error for the clustered sample (computed from equation (2) given below), and SR is the standard error computed as if the sample had been selected entirely at random (equation (3)).

For a particular sample design, cluster size, and variable, DEFT is a measure of the loss of sampling precision due to clustering of the sample. The two main factors on which its magnitude depends are the average cluster size and the relative homogeneity (corresponding to a particular variable) within these clusters. For samples (or subclasses thereof) with very small clusters, or for variables with little within-cluster homogeneity, DEFT can be expected to approach unity, which implies that little sampling precision has been lost through clustering.

The last point mentioned above is of particular relevance in the present context where sampling errors for sample subclasses or subclass differences, rather than for the sample as a whole, are the main concern. The effective cluster sizes for sample subclasses, and specially for their differences, can be much smaller than the cluster sizes for the total sample, making DEFT smaller (nearer unity), that is, making the loss in sampling efficiency due to clustering generally less significant than would be the case if estimates based on the total sample were the main objective of the survey.

## Discussion of the main results

The WFS package program CLUSTERS has been used to compute sampling errors for variables of substantive interest. For each variable, sampling errors were computed over the whole sample, as well as for various subclasses and differences for pairs of subclasses.

*Definition of the variables*

Sampling errors have been computed for the following variables based on the individual questionnaire:

1 *Age at first marriage* – Mean age at first marriage for ever-married women aged 15–49.[2]

2 *Age at first marriage* (< *20*) – Mean age at first marriage for women aged 20–49 who married before age 20.[2]

3 *First marriage dissolved* – Percentage of ever-married women whose first marriage was dissolved.

4 *Time spent in union* – Percentage of time spent in union since first marriage.

5 *Currently married* – Percentage of women who are currently married.

6 *Births in first five years* – Mean number of births before or during the first five years of first marriage, for women married at least five years ago.

7 *Births in past five years* – Mean number of births during the past five years, for women who have been continuously married in the past five years.

8 *Currently pregnant* – Percentage of currently married women who are currently pregnant.

[2] This mean has been computed from individual ages at first marriage in completed years. For mean in 'exact years', add 0.5 to all values shown.

9 *Children ever born* — Mean number of children ever born to women.

10 *Living children* — Mean number of living children born to women.

11 *Months breastfed in closed interval* — Mean number of months breastfed in the last closed pregnancy interval ('until child died' cases excluded from base).

12 *Wants no more children* — Percentage of currently married, fecund women who want no more children.

13 *Additional number wanted* — Mean additional number of children wanted by currently married, fecund women.

14 *Desired family size* — Mean total of children desired by currently married women.

15 *Knows effective methods* — Percentage of women who have heard of at least one effective method of contraception.

16 *Ever used contraceptives* — Percentage of women who have ever used any method of contraception.

17 *Ever used effective methods* — Percentage of women who have ever used any effective method of contraception.

18 *Currently using (exposed)* — Percentage of non-pregnant, currently married, fecund or contraceptively sterilized women who are currently using any method of contraception.

19 *Using effective (exposed)* — Percentage of non-pregnant, currently married, fecund or contraceptively sterilized women who are currently using any effective method of contraception.

20 *Wants no more children and using effective methods (exposed)* — Of non-pregnant, currently married, fecund or contraceptively sterilized women who want no more children, the percentage who are currently using any effective method of contraception.

21 *Never used contraception* — Percentage of ever-married women who have never used contraception.

22 *Used in past* — Percentage of ever-married women who have used contraception in the past.

23 *Currently using* — Percentage of ever-married women who are currently using contraception.

Table 1 shows sampling errors computed over the total sample for the variables based on the individual questionnaire. For each variable the following quantities are shown.

r = the ratio, mean, proportion or percentage estimated for the whole sample. Note that estimates given as proportions may be changed to percentages by shifting the decimal point two places to the right. In such cases, the standard errors given for the proportions must be multiplied by 100 to correspond to percentages. Similarly, estimates given as percentages may be changed to proportions by shifting the decimal point two places to the left. In such cases, the standard errors given for the percentages must be divided by 100 to correspond to proportions.

SE = standard error for the actual clustered sample (defined by equation (2) given below).

95% CON. INT. = the '95 per cent confidence interval', defined earlier as $r \pm 2SE$.

n = the appropriate unweighted sample base. The sample for Pakistan consists of 4952 completed individual interviews. However, only a minority of the variables are defined for the entire sample of 4952 women. Many of the variables are relevant only for subpopulations satisfying certain criteria; for example, the variable 'births in past five years' has been defined only for the 3672 women who have been continuously married for the past five years.

s = standard deviation, defined as $s = SR\sqrt{n}$, where SR is the standard error computed on the assumption that the sample of individuals was selected entirely at random. Though s is estimated from the sample results, it is a characteristic of the study population, not of a particular sample design or sample size.

DEFT = the Design Factor DEFT = SE/SR (as equation (1) above). It measures the sampling efficiency lost due to clustering of the sample. DEFT values near unity imply that little has been lost by clustering of respondents into sample areas.

b = the average 'cluster size', ie the (unweighted) average number of interviews per PSU. For the sample as a whole, b = 4952/271 = 18.3. The value is smaller if a variable is not applicable to all individuals in the sample. (Note that the average cluster size can be used to calculate rates of homogeneity — see equation (6) below.)

For the total sample, sampling errors for variables taken from the individual questionnaire are relatively small — under 8 per cent of the mean.[3] However, the DEFT values encountered are relatively small. DEFT for desired family size and knowledge of effective methods of contraception are relatively large.

## Some technical considerations

*Computational formulae*

In outline, the procedure used for estimating sampling errors for a stratified clustered sample is as follows.

Consider a ratio statistic $r = y/x$, where y and x are two variables the ratio of which is being estimated. (The procedure also applies to estimates like means, proportions or percentages which can be regarded as special cases of ratios.) Let the suffix 'j' represent an individual, suffix 'i' the PSU to which the individual belongs, and suffix 'h' the stratum in which the PSU lies. Hence,

$y_{hij}$ = value of variable y for the individual j, in PSU i and stratum h

$w_{hij}$ = sample weight for the individual

$y_{hi} = \sum_j w_{hij} \cdot y_{hij}$, the weighted sum of y's for all individuals in the PSU

$y_h = \sum_i y_{hi}$, the sum of $y_{hi}$ for all PSUs in the stratum

$y = \sum_h y_h$, the sum of $y_h$ for all strata in the sample.

Similar expressions can be defined for variable x.

The variance (= $SE^2$, square of the standard error) of the ratio estimate $r = y/x$ is estimated as

$$SE^2 = \text{var}(r)$$

$$= \frac{1-f}{x^2} \sum_{h=1}^{H} \left[ \left( \frac{m_h}{m_h - 1} \sum_{i=1}^{m_h} z_{hi}^2 - \frac{z_h^2}{m_h} \right) \right] \qquad (2)$$

where

f = overall sampling fraction, here negligible

$m_h$ = number of PSUs in the stratum h

H = number of strata in the sample

r = ratio of the two sample aggregates y and x

$z_{hi} = y_{hi} - r \cdot x_{hi}$

$z_h = \sum_i z_{hi} = y_h - r \cdot x_h$

Equation (2) applies also for estimates computed over a particular subclass of the sample. Individuals or PSUs or strata not belonging to the subclass are simply ignored in the computation. The summations '$\Sigma$' are taken over only the units belonging to the subclass being considered.

SR, the standard error of a ratio estimate r corresponding to an equivalent sample selected entirely at random, is required to estimate DEFT = SE/SR, and is given by

$$SR^2 = \frac{1-f}{n-1} \left( \Sigma w_{hij} z_{hij}^2 / \Sigma w_{hij} \right) \qquad (3)$$

where

$$z_{hij} = y_{hij} - r \cdot x_{hij}$$

and r is the ratio estimate,

$$r = y/x = \Sigma w_{hij} y_{hij} / \Sigma w_{hij} x_{hij}$$

n is the total sample size, and '$\Sigma$' is the sum for all individuals over the sample. As before, means, proportions, or percentages are merely special cases of ratios.

The variance of the difference of two subclass

[3] Of the twenty-three variables considered, the standard error over the sample is under 1 per cent of the mean for six, between 1–3 per cent for eight, between 3–5 per cent for four and above 5 per cent for five.

means for a stratified clustered sample is given by the following formulae. Denoting the second subclass in the pair by a prime ($'$),

$$SE^2_{r-r'} = \text{var}(r-r') = \text{var}(r) + \text{var}(r') - 2\,\text{cov}(r, r') \qquad (4)$$

where var (r) and var (r′) are given by equation (2) and the covariance is given by

$$\text{cov}(r, r') = \frac{1-f}{xx'} \sum_{h=1}^{H} \left[ \frac{m_h}{m_h - 1} \left( \sum_{i=1}^{m_h} z_{hi} \cdot z'_{hi} - \frac{z_h z'_h}{m_h} \right) \right] \qquad (5)$$

Usually cov (r, r′) is positive due to positive correlation between individuals in the two subclasses who belong to the same cluster in the sample.

Rates of homogeneity (ROH), which indicate to what extent responses for a particular variable are more homogeneous within PSUs than in the sample as a whole, may be calculated from the average PSU size and DEFT. ROH is calculated as:

$$\text{ROH} = \frac{\text{DEFT}^2 - 1}{b - 1} \qquad (6)$$

where b is the mean PSU size.

*Strata needed for the sampling errors computations*

Before selection of a sample, the population is usually divided into a number of parts called strata which are expected to be homogeneous in some way, and PSUs are then selected from each stratum independently. The aim of stratification is to reduce sampling errors, or sometimes to permit a change in sample design or sampling rate between strata. It should be noted that the strata used for computation of sampling errors are not necessarily identical to the original explicit strata used in sample selection. The difference between the two may arise for two main reasons.

1 Whenever PSUs are selected by systematic sampling from an ordered list, ie selection at a fixed interval from a list starting from a randomly determined point, neighbouring selected PSUs should be grouped, two at a time if possible, three if not, within explicit strata to form new smaller 'implicit' strata which are used for sampling error computations. In the case of an explicit stratum in which an odd number of PSUs (greater than 3) have been selected by systematic sampling, there will be a choice to be made as to where in the ordered list to make the grouping of three. A simple rule for this is as follows. Look for the smallest sized PSU. If this is at the beginning (end) of the list in that explicit stratum, make the group of three the first (last) three members of the list. Otherwise, make the group of the three around the smallest PSU and the smaller of its two neighbours, bearing in mind that the first member of any group (whether of two or of three) must be odd-numbered as counted from the beginning of the list in that explicit stratum.

2 Sampling error computations require that there be at least two PSUs per stratum. Any strata from each of which only one PSU has been selected must be collapsed together to form pairs (or other groups) of PSUs. Such grouping is done on the basis of characteristics of the whole strata population (pairing most similar strata), and not on the characteristics of selected PSUs. Collapsing of strata in this way tends to lead to slight overestimation of the sampling error.

For CLUSTERS, the strata to be defined are obviously those which are to be used for sampling error computations and these strata are identified on the WFS standard recode tapes. The original explicit strata, if they differ from the above, are of no interest.

*Approximating standard errors when standard errors are not given*

*Approximating standard errors for sample subclasses.* Under the assumption that only the size of a subclass, not its nature, affects the sampling error, the standard error for a subclass of any size is well approximated from the results computed over the total sample as follows. We use the suffix 't' to refer to the total sample (of size $n_t$) and the suffix 's' to refer to any subclass (of size $n_s$). The approximate relationship (empirically valid in an approximate sense)

$$SE_s = f_s \cdot SE_t \qquad (7)$$

where $f_s$ is a factor determined semi-empirically as

$$f_s = \left[ \left(\frac{n_t}{n_s}\right) + \left(\frac{n_t}{n_s}\right)^{2/3} \cdot (\text{DEFT}_t^2 - 1) \right]^{1/2} \Big/ \text{DEFT}_t \qquad (8)$$

can be used to approximate the standard error for a sample subclass. Note that $f_s$ depends only on the results for the total sample and the proportion of the sample belonging to the subclass. Note that the above equations are applied separately to each of the substantive variables of interest. For certain variables, eg the mean number of children ever born, these equations were found inadequate for predicting SEs for certain subclasses and the values determined from the above equations required some adjustment to make them correspond better to the results actually computed. Those variables strongly related to the lifecycle, ie to age or marriage duration, have a standard error which is obviously related to the mean or proportion being estimated, which in turn varies considerably from one subclass to another. Nevertheless we find that in these particular cases, the exceptional subclasses (with, say, an exceptionally low value of the mean or proportion for the variable) can be dealt with by multiplying SEs by a simple adjustment factor such as 0.5.

*Approximating standard errors for subclass differences.* The standard error for subclass differences can be approximated by assuming that the standard error for the difference is mid-way between two limits: the higher limit assuming that there is no covariance term in equation (4) (actually the covariance is generally positive), and the lower limit assuming that there is no effect at all of clustering of the sample. The procedure is based on the assumption that equations (7) and (8) are valid also for the standard error of the difference of two subclass means if $n_s$ in (8) is replaced by $n_d$, half the harmonic mean of the two subclass sizes, ie

$$n_d = \frac{n_1 \cdot n_2}{n_1 + n_2} \qquad (9)$$

Note that the upper and lower limits are usually not widely apart in practice, since $n_d$ tends to be much smaller than $n_s$.

*Variation of DEFT with subclass size.* Under the assumption that only the size of a subclass, not its nature, affects the sampling error, equations (7) and (8) are equivalent to:

$$\frac{DEFT_s^2 - 1}{DEFT_t^2 - 1} = (n_s/n_t)^{1/3} \qquad (10)$$

Equation (10) implies that for small subclasses, ie subclasses with size $n_s$ much smaller than $n_t$, DEFT for the subclass tends to one. In other words, loss in sampling precision due to clustering of the sample tends to become smaller for smaller subclasses. In the present context, this means that where survey estimates for relatively small subclasses such as five-year age of marriage cohorts are of major interest, the effect of clustering of the sample tends to be relatively less important. For example, for a subclass with $n_s/n_t = 0.1$ and $DEFT_t = 2.0$, the corresponding $DEFT_s$ is around 1.5.

## LIST OF TABLES


1 Sampling errors over the total sample 223
2a Sampling errors by current age 224
3a Sampling errors by age at first marriage 227
4a Sampling errors by years since first marriage 229
5a Sampling errors by number of living children 231
5b Sampling errors for differences between number of living children subclasses 234
6a Sampling errors by woman's education 237
6b Sampling errors for differences between woman's education subclasses 238
7a Sampling errors by woman's pattern of work 239
8a Sampling errors by husband's occupation 240
9a Sampling errors by type of place of residence 242
9b Sampling errors for differences between type of place of residence subclasses 243
10a Sampling errors by region of residence 244
10b Sampling errors for differences between region subclasses 245
11a Sampling errors by region for rural areas 246
11b Sampling errors for differences between region subclasses for rural areas 247
12a Sampling errors by region for urban areas 248
12b Sampling errors for differences between region subclasses for urban areas 249
13a Sampling errors by current age for women with no schooling 250
14a Sampling errors by current age for women with some schooling 253
15a Sampling errors by years since first marriage for women with no schooling 256
16a Sampling errors by years since first marriage for women with some schooling 258


NOTE: These tables, and their numbering, correspond broadly to the system used in the First Country Reports of other countries participating in the WFS programme.

Table 1 Sampling errors over the total sample

| Variable name | Mean or per cent | SE | Mean or per cent −2SE | Mean or per cent +2SE | n | s | DEFT | b |
|---|---|---|---|---|---|---|---|---|
| Age at first marriage | 15.98 | .05 | 15.87 | 16.09 | 4952 | 3.23 | 1.20 | 15.6 |
| Age at first marriage (<20) | 15.14 | .04 | 15.06 | 15.21 | 3714 | 2.17 | 1.07 | 11.7 |
| First marriage dissolved | 9.82 | .47 | 8.88 | 10.76 | 4952 | 29.76 | 1.11 | 15.6 |
| Time spent in union | 96.45 | .23 | 95.98 | 96.92 | 4952 | 16.84 | .98 | 15.6 |
| Currently married | 94.26 | .39 | 93.47 | 95.04 | 4952 | 23.27 | 1.19 | 15.6 |
| Births in first 5 years | 1.46 | .02 | 1.42 | 1.49 | 3975 | .96 | 1.18 | 12.5 |
| Births in past 5 years | 1.31 | .02 | 1.28 | 1.35 | 3672 | 1.04 | 1.05 | 11.5 |
| Currently pregnant | 16.89 | .57 | 15.75 | 18.04 | 4669 | 37.47 | 1.04 | 14.7 |
| Children ever born | 4.17 | .05 | 4.08 | 4.27 | 4952 | 3.18 | 1.02 | 15.6 |
| Living children | 3.19 | .04 | 3.12 | 3.26 | 4952 | 2.48 | 1.01 | 15.6 |
| Months breastfed closed interval | 15.88 | .16 | 15.56 | 16.20 | 3791 | 9.09 | 1.09 | 11.9 |
| Wants no more children | 42.67 | .83 | 41.02 | 44.33 | 4123 | 49.47 | 1.07 | 13.0 |
| Additional number wanted | 1.62 | .03 | 1.56 | 1.69 | 3937 | 1.85 | 1.17 | 12.4 |
| Desired family size | 4.17 | .03 | 4.11 | 4.23 | 4528 | 1.47 | 1.44 | 14.2 |
| Knows effective methods | 74.56 | .88 | 72.80 | 76.33 | 4952 | 43.55 | 1.43 | 15.6 |
| Ever used contraceptives | 9.87 | .43 | 9.02 | 10.73 | 4952 | 29.83 | 1.01 | 15.6 |
| Ever used effective methods | 8.35 | .39 | 7.58 | 9.13 | 4952 | 27.67 | .99 | 15.6 |
| Currently using (exposed) | 7.33 | .48 | 6.37 | 8.28 | 3326 | 26.06 | 1.06 | 10.5 |
| Using effective (exposed) | 5.27 | .39 | 4.50 | 6.05 | 3326 | 22.35 | 1.00 | 10.5 |
| Wants no more and using eff.(exp) | 10.93 | .81 | 9.31 | 12.55 | 1464 | 31.21 | .99 | 4.6 |
| Never used contraception | 90.13 | .43 | 89.28 | 90.98 | 4952 | 29.83 | 1.01 | 15.6 |
| Used in past | 4.94 | .29 | 4.35 | 5.53 | 4952 | 21.67 | .95 | 15.6 |
| Currently using | 4.93 | .33 | 4.28 | 5.58 | 4952 | 21.65 | 1.06 | 15.6 |

Table 2a Sampling errors by current age

| | <20 | | | | 20–24 | | | | 25–29 | | | | 30–34 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 14.87 | .08 | 618 | 1.10 | 15.96 | .10 | 849 | 1.08 | 16.66 | .12 | 923 | 1.06 | 16.51 | .14 | 821 | 1.12 |
| Age at first marriage (<20) | .00 | .00 | 0 | .00 | 15.35 | .08 | 746 | 1.06 | 15.48 | .08 | 754 | 1.03 | 15.24 | .08 | 676 | 1.01 |
| First marriage dissolved | 2.06 | .50 | 618 | .87 | 4.78 | .76 | 849 | 1.04 | 6.98 | .94 | 923 | 1.12 | 8.56 | .93 | 821 | .96 |
| Time spent in union | 99.09 | .43 | 618 | 1.04 | 98.82 | .28 | 849 | 1.07 | 98.02 | .35 | 923 | 1.08 | 97.81 | .37 | 821 | 1.00 |
| Currently married | 98.13 | .47 | 618 | .86 | 96.84 | .64 | 849 | 1.06 | 95.69 | .74 | 923 | 1.11 | 95.62 | .74 | 821 | 1.04 |
| Births in first 5 years | 1.19 | .15 | 51 | 1.02 | 1.55 | .04 | 543 | 1.04 | 1.53 | .03 | 840 | 1.02 | 1.52 | .03 | 804 | 1.02 |
| Births in past 5 years | 1.34 | .16 | 48 | 1.03 | 1.83 | .04 | 522 | 1.01 | 1.73 | .03 | 792 | 1.04 | 1.62 | .04 | 758 | 1.08 |
| Currently pregnant | 20.52 | 1.74 | 606 | 1.06 | 23.31 | 1.48 | 824 | 1.01 | 24.39 | 1.46 | 885 | 1.01 | 19.05 | 1.44 | 785 | 1.03 |
| Children ever born | .58 | .03 | 618 | 1.02 | 1.91 | .05 | 849 | .99 | 3.39 | .07 | 923 | 1.11 | 4.97 | .09 | 821 | 1.05 |
| Living children | .48 | .03 | 618 | 1.01 | 1.49 | .04 | 849 | .95 | 2.70 | .06 | 923 | 1.10 | 3.96 | .07 | 821 | 1.03 |
| Months breastfed closed interval | 11.79 | .78 | 115 | 1.02 | 13.36 | .39 | 526 | 1.03 | 15.14 | .32 | 784 | 1.01 | 16.59 | .34 | 753 | 1.11 |
| Wants no more children | 3.34 | .86 | 606 | 1.18 | 16.25 | 1.12 | 816 | .87 | 36.95 | 1.62 | 861 | .98 | 58.27 | 2.12 | 748 | 1.17 |
| Additional number wanted | 3.26 | .08 | 582 | 1.18 | 2.46 | .07 | 778 | 1.09 | 1.63 | .06 | 817 | 1.04 | 1.00 | .06 | 705 | 1.11 |
| Desired family size | 4.05 | .06 | 586 | .95 | 4.02 | .06 | 801 | 1.16 | 4.14 | .06 | 872 | 1.22 | 4.18 | .06 | 764 | 1.16 |
| Knows effective methods | 62.52 | 2.35 | 618 | 1.20 | 73.78 | 1.80 | 849 | 1.19 | 78.12 | 1.53 | 923 | 1.12 | 79.69 | 1.52 | 821 | 1.08 |
| Ever used contraceptives | .62 | .29 | 618 | .92 | 4.02 | .58 | 849 | .85 | 9.80 | .99 | 923 | 1.01 | 13.71 | 1.30 | 821 | 1.09 |
| Ever used effective methods | .41 | .24 | 618 | .96 | 3.62 | .52 | 849 | .81 | 8.38 | .93 | 923 | 1.01 | 11.70 | 1.22 | 821 | 1.09 |
| Currently using (exposed) | .14 | .14 | 477 | .81 | 2.64 | .64 | 619 | 1.00 | 7.08 | 1.01 | 646 | 1.01 | 8.80 | 1.11 | 601 | .96 |
| Using effective (exposed) | .00 | .00 | 477 | .00 | 2.20 | .57 | 619 | .96 | 5.42 | .87 | 646 | .98 | 6.28 | .96 | 601 | .97 |
| Wants no more and using eff.(exp) | .00 | .00 | 13 | .00 | 5.99 | 2.47 | 92 | .99 | 11.27 | 1.95 | 234 | .94 | 10.61 | 1.63 | 354 | .99 |
| Never used contraception | 99.38 | .29 | 618 | .92 | 95.98 | .58 | 849 | .85 | 90.20 | .99 | 923 | 1.01 | 86.29 | 1.30 | 821 | 1.09 |
| Used in past | .51 | .27 | 618 | .93 | 2.09 | .44 | 849 | .90 | 4.86 | .65 | 923 | .91 | 7.32 | 1.01 | 821 | 1.11 |
| Currently using | .11 | .11 | 618 | .82 | 1.93 | .47 | 849 | .99 | 4.95 | .71 | 923 | 1.00 | 6.39 | .82 | 821 | .95 |

Table 2a (*cont*)

| Variable name | 35-39 Mean or per cent | SE | n | DEFT | 40-44 Mean or per cent | SE | n | DEFT | 45-49 Mean or per cent | SE | n | DEFT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age at first marriage | 16.04 | .16 | 626 | 1.03 | 15.53 | .15 | 611 | 1.06 | 15.76 | .15 | 504 | 1.03 |
| Age at first marriage (<20) | 14.94 | .10 | 541 | 1.01 | 14.55 | .10 | 545 | 1.12 | 14.99 | .10 | 452 | 1.02 |
| First marriage dissolved | 14.17 | 1.37 | 626 | .98 | 15.91 | 1.45 | 611 | .98 | 22.39 | 1.95 | 504 | 1.05 |
| Time spent in union | 96.66 | .54 | 626 | 1.07 | 95.61 | .55 | 611 | .95 | 94.07 | .80 | 504 | 1.06 |
| Currently married | 93.45 | .99 | 626 | 1.00 | 90.00 | 1.24 | 611 | 1.02 | 86.44 | 1.60 | 504 | 1.05 |
| Births in first 5 years | 1.37 | .04 | 622 | 1.03 | 1.38 | .04 | 611 | 1.14 | 1.39 | .05 | 504 | 1.09 |
| Births in past 5 years | 1.21 | .04 | 576 | 1.07 | .78 | .04 | 543 | 1.03 | .18 | .02 | 433 | 1.07 |
| Currently pregnant | 11.46 | 1.46 | 585 | 1.11 | 7.03 | 1.13 | 549 | 1.04 | .55 | .39 | 435 | 1.09 |
| Children ever born | 6.05 | .12 | 626 | 1.09 | 6.97 | .14 | 611 | 1.11 | 6.87 | .16 | 504 | 1.15 |
| Living children | 4.80 | .10 | 626 | 1.04 | 4.99 | .11 | 611 | 1.09 | 4.89 | .11 | 504 | 1.02 |
| Months breastfed closed interval | 16.78 | .36 | 576 | .91 | 17.19 | .41 | 566 | 1.03 | 17.14 | .44 | 471 | 1.01 |
| Wants no more children | 72.28 | 1.79 | 535 | .92 | 83.12 | 2.08 | 391 | 1.10 | 85.87 | 2.79 | 166 | 1.03 |
| Additional number wanted | .60 | .05 | 510 | .99 | .43 | .07 | 382 | 1.10 | .31 | .08 | 163 | 1.05 |
| Desired family size | 4.24 | .06 | 565 | .96 | 4.40 | .09 | 524 | 1.24 | 4.31 | .07 | 416 | 1.00 |
| Knows effective methods | 77.30 | 1.94 | 626 | 1.16 | 75.38 | 1.88 | 611 | 1.08 | 71.79 | 2.08 | 504 | 1.04 |
| Ever used contraceptives | 17.67 | 1.52 | 626 | .99 | 13.74 | 1.40 | 611 | 1.01 | 10.80 | 1.35 | 504 | .98 |
| Ever used effective methods | 15.51 | 1.37 | 626 | .95 | 10.60 | 1.18 | 611 | .95 | 9.17 | 1.35 | 504 | 1.05 |
| Currently using (exposed) | 12.96 | 1.56 | 468 | 1.01 | 11.28 | 1.61 | 351 | .95 | 17.65 | 2.74 | 164 | .92 |
| Using effective (exposed) | 9.92 | 1.28 | 468 | .92 | 6.88 | 1.19 | 351 | .88 | 11.80 | 2.50 | 164 | .99 |
| Wants no more and using eff.(exp) | 13.93 | 1.78 | 338 | .94 | 8.32 | 1.44 | 292 | .89 | 13.77 | 2.90 | 141 | .99 |
| Never used contraception | 82.33 | 1.52 | 626 | .99 | 86.26 | 1.40 | 611 | 1.01 | 89.21 | 1.35 | 504 | .98 |
| Used in past | 7.99 | .97 | 626 | .89 | 7.18 | 1.03 | 611 | .99 | 5.06 | .93 | 504 | .96 |
| Currently using | 9.68 | 1.19 | 626 | 1.01 | 6.57 | .97 | 611 | .97 | 5.73 | .95 | 504 | .91 |

[*Table continues*]

Table 2a *(cont)*

| Variable name | <25 | | | | 25-34 | | | | 35-44 | | | | 45-49 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 15.49 | .07 | 1467 | 1.19 | 16.59 | .10 | 1744 | 1.16 | 15.79 | .12 | 1237 | 1.10 | 15.76 | .15 | 504 | 1.03 |
| Age at first marriage (<20) | 15.35 | .08 | 746 | 1.06 | 15.37 | .06 | 1430 | 1.06 | 14.74 | .07 | 1086 | 1.04 | 14.99 | .10 | 452 | 1.02 |
| First marriage dissolved | 3.62 | .51 | 1467 | 1.04 | 7.73 | .67 | 1744 | 1.05 | 15.03 | .95 | 1237 | .93 | 22.39 | 1.95 | 504 | 1.05 |
| Time spent in union | 98.88 | .24 | 1467 | 1.07 | 97.90 | .26 | 1744 | 1.04 | 96.08 | .39 | 1237 | 1.00 | 94.07 | .80 | 504 | 1.06 |
| Currently married | 97.39 | .43 | 1467 | 1.03 | 95.66 | .56 | 1744 | 1.16 | 91.73 | .80 | 1237 | 1.02 | 86.44 | 1.60 | 504 | 1.05 |
| Births in first 5 years | 1.51 | .04 | 594 | 1.08 | 1.52 | .02 | 1644 | 1.03 | 1.38 | .03 | 1233 | 1.12 | 1.39 | .05 | 504 | 1.09 |
| Births in past 5 years | 1.79 | .04 | 570 | 1.01 | 1.68 | .02 | 1550 | 1.01 | 1.00 | .03 | 1119 | 1.05 | .18 | .02 | 433 | 1.07 |
| Currently pregnant | 22.11 | 1.11 | 1430 | 1.01 | 21.87 | 1.06 | 1670 | 1.05 | 9.30 | .92 | 1134 | 1.06 | .55 | .39 | 435 | 1.09 |
| Children ever born | 1.34 | .04 | 1467 | .98 | 4.14 | .06 | 1744 | 1.07 | 6.50 | .10 | 1237 | 1.20 | 6.87 | .16 | 504 | 1.15 |
| Living children | 1.06 | .03 | 1467 | .96 | 3.30 | .05 | 1744 | 1.07 | 4.89 | .08 | 1237 | 1.18 | 4.89 | .11 | 504 | 1.02 |
| Months breastfed closed interval | 13.08 | .36 | 641 | 1.03 | 15.85 | .23 | 1537 | 1.06 | 16.98 | .25 | 1142 | .90 | 17.14 | .44 | 471 | 1.01 |
| Wants no more children | 10.67 | .75 | 1422 | .92 | 46.89 | 1.30 | 1609 | 1.04 | 76.92 | 1.47 | 926 | 1.06 | 85.87 | 2.79 | 166 | 1.03 |
| Additional number wanted | 2.81 | .06 | 1360 | 1.16 | 1.34 | .04 | 1522 | 1.01 | .52 | .04 | 892 | 1.09 | .31 | .08 | 163 | 1.05 |
| Desired family size | 4.03 | .04 | 1387 | 1.08 | 4.16 | .05 | 1636 | 1.30 | 4.31 | .06 | 1089 | 1.25 | 4.31 | .07 | 416 | 1.00 |
| Knows effective methods | 68.98 | 1.47 | 1467 | 1.22 | 78.86 | 1.23 | 1744 | 1.26 | 76.34 | 1.43 | 1237 | 1.19 | 71.79 | 2.08 | 504 | 1.04 |
| Ever used contraceptives | 2.57 | .36 | 1467 | .88 | 11.65 | .80 | 1744 | 1.04 | 15.71 | 1.04 | 1237 | 1.01 | 10.80 | 1.35 | 504 | .98 |
| Ever used effective methods | 2.25 | .33 | 1467 | .85 | 9.95 | .74 | 1744 | 1.03 | 13.06 | .91 | 1237 | .95 | 9.17 | 1.35 | 504 | 1.05 |
| Currently using (exposed) | 1.53 | .36 | 1096 | .98 | 7.91 | .78 | 1247 | 1.03 | 12.23 | 1.18 | 819 | 1.03 | 17.65 | 2.74 | 164 | .92 |
| Using effective (exposed) | 1.23 | .32 | 1096 | .95 | 5.83 | .68 | 1247 | 1.03 | 8.59 | .94 | 819 | .96 | 11.80 | 2.50 | 164 | .99 |
| Wants no more and using eff.(exp) | 5.10 | 2.08 | 105 | .97 | 10.87 | 1.30 | 588 | 1.01 | 11.27 | 1.22 | 630 | .97 | 13.77 | 2.90 | 141 | .99 |
| Never used contraception | 97.43 | .36 | 1467 | .88 | 88.35 | .80 | 1744 | 1.04 | 84.29 | 1.04 | 1237 | 1.01 | 89.21 | 1.35 | 504 | .98 |
| Used in past | 1.42 | .28 | 1467 | .91 | 6.02 | .58 | 1744 | 1.02 | 7.58 | .70 | 1237 | .92 | 5.06 | .93 | 504 | .96 |
| Currently using | 1.15 | .27 | 1467 | .98 | 5.63 | .56 | 1744 | 1.02 | 8.13 | .79 | 1237 | 1.02 | 5.73 | .95 | 504 | .91 |

Table 3a Sampling errors by age at first marriage

| Variable name | <15 | | | | 15-17 | | | | 18-19 | | | | 20-21 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 13.05 | .03 | 1756 | 1.08 | 15.84 | .02 | 1907 | 1.14 | 18.41 | .02 | 669 | 1.19 | 20.39 | .03 | 303 | 1.08 |
| Age at first marriage (<20) | 13.01 | .03 | 1489 | 1.11 | 15.86 | .02 | 1604 | 1.08 | 18.43 | .02 | 621 | 1.18 | .00 | .00 | 0 | .00 |
| First marriage dissolved | 14.54 | .86 | 1756 | 1.02 | 6.78 | .67 | 1907 | 1.17 | 7.96 | 1.15 | 669 | 1.10 | 5.06 | 1.41 | 303 | 1.12 |
| Time spent in union | 95.43 | .40 | 1756 | .95 | 97.34 | .39 | 1907 | 1.13 | 96.94 | .60 | 669 | .97 | 97.76 | .79 | 303 | .98 |
| Currently married | 93.26 | .64 | 1756 | 1.06 | 95.19 | .57 | 1907 | 1.17 | 94.13 | .98 | 669 | 1.08 | 96.67 | 1.21 | 303 | 1.17 |
| Births in first 5 years | 1.30 | .03 | 1540 | 1.02 | 1.51 | .03 | 1504 | 1.13 | 1.67 | .05 | 518 | 1.12 | 1.68 | .08 | 210 | 1.20 |
| Births in past 5 years | 1.20 | .03 | 1402 | 1.06 | 1.35 | .03 | 1414 | 1.03 | 1.51 | .05 | 478 | 1.06 | 1.40 | .08 | 198 | 1.07 |
| Currently pregnant | 14.82 | .96 | 1635 | 1.09 | 17.90 | .90 | 1817 | 1.00 | 18.21 | 1.39 | 633 | .90 | 18.23 | 2.51 | 292 | 1.11 |
| Children ever born | 4.75 | .09 | 1756 | 1.11 | 4.18 | .08 | 1907 | 1.10 | 3.78 | .13 | 669 | 1.11 | 3.25 | .16 | 303 | 1.02 |
| Living children | 3.51 | .07 | 1756 | 1.16 | 3.23 | .06 | 1907 | 1.13 | 3.00 | .10 | 669 | 1.03 | 2.65 | .13 | 303 | .98 |
| Months breastfed closed interval | 16.20 | .25 | 1430 | 1.02 | 15.88 | .25 | 1463 | 1.08 | 15.67 | .45 | 491 | 1.10 | 14.72 | .62 | 209 | 1.03 |
| Wants no more children | 46.84 | 1.42 | 1406 | 1.07 | 42.83 | 1.24 | 1617 | 1.01 | 38.54 | 2.15 | 570 | 1.06 | 38.11 | 2.94 | 268 | .99 |
| Additional number wanted | 1.51 | .05 | 1337 | 1.06 | 1.59 | .05 | 1551 | 1.15 | 1.71 | .08 | 537 | .98 | 1.84 | .13 | 258 | 1.07 |
| Desired family size | 4.29 | .05 | 1575 | 1.26 | 4.14 | .04 | 1770 | 1.21 | 4.22 | .07 | 615 | 1.07 | 3.80 | .10 | 285 | 1.16 |
| Knows effective methods | 71.65 | 1.30 | 1756 | 1.21 | 75.76 | 1.22 | 1907 | 1.24 | 77.75 | 1.81 | 669 | 1.13 | 75.70 | 2.91 | 303 | 1.18 |
| Ever used contraceptives | 9.06 | .65 | 1756 | .95 | 9.90 | .68 | 1907 | 1.00 | 10.54 | 1.07 | 669 | .90 | 12.95 | 1.84 | 303 | .95 |
| Ever used effective methods | 7.70 | .61 | 1756 | .95 | 8.52 | .59 | 1907 | .93 | 8.51 | 1.02 | 669 | .95 | 11.11 | 1.66 | 303 | .92 |
| Currently using (exposed) | 6.68 | .66 | 1158 | .90 | 7.23 | .72 | 1295 | 1.00 | 7.35 | 1.06 | 453 | .86 | 10.14 | 1.95 | 215 | .94 |
| Using effective (exposed) | 4.92 | .55 | 1158 | .87 | 5.27 | .57 | 1295 | .92 | 4.62 | .89 | 453 | .91 | 9.12 | 1.79 | 215 | .91 |
| Wants no more and using eff.(exp) | 9.57 | 1.04 | 560 | .84 | 11.51 | 1.29 | 578 | .97 | 9.99 | 2.11 | 178 | .94 | 18.80 | 4.01 | 80 | .91 |
| Never used contraception | 90.94 | .65 | 1756 | .95 | 90.10 | .68 | 1907 | 1.00 | 89.46 | 1.07 | 669 | .90 | 87.05 | 1.84 | 303 | .95 |
| Used in past | 4.61 | .51 | 1756 | 1.01 | 5.00 | .50 | 1907 | 1.00 | 5.55 | .81 | 669 | .91 | 5.83 | 1.35 | 303 | 1.00 |
| Currently using | 4.45 | .43 | 1756 | .88 | 4.90 | .49 | 1907 | .99 | 4.99 | .73 | 669 | .87 | 7.13 | 1.39 | 303 | .94 |

*[Table continues]*

Table 3a (*cont*)

| Variable name | 22-24 | | | | 25-29 | | | | 30+ | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 22.85 | .06 | 218 | 1.08 | 26.19 | .15 | 81 | 1.03 | 31.84 | .55 | 18 | .99 |
| Age at first marriage (<20) | .00 | .00 | 0 | .00 | .00 | .00 | 0 | .00 | .00 | .00 | 0 | .00 |
| First marriage dissolved | 11.39 | 2.25 | 218 | 1.04 | 4.10 | 2.12 | 81 | .96 | 18.94 | 9.11 | 18 | .96 |
| Time spent in union | 96.23 | 1.01 | 218 | .85 | 97.74 | 1.33 | 81 | .85 | 93.39 | 4.04 | 18 | .99 |
| Currently married | 90.63 | 2.12 | 218 | 1.07 | 95.90 | 2.12 | 81 | .96 | 93.69 | 6.12 | 18 | 1.04 |
| Births in first 5 years | 1.56 | .08 | 147 | 1.04 | 1.45 | .13 | 44 | 1.01 | 1.23 | .21 | 12 | .91 |
| Births in past 5 years | 1.42 | .10 | 129 | 1.08 | 1.07 | .15 | 41 | .96 | 1.16 | .25 | 10 | .94 |
| Currently pregnant | 19.42 | 2.82 | 198 | 1.00 | 17.37 | 4.43 | 77 | 1.02 | 10.57 | 7.44 | 17 | .97 |
| Children ever born | 2.67 | .17 | 218 | 1.07 | 2.23 | .25 | 81 | 1.01 | 1.69 | .40 | 18 | 1.01 |
| Living children | 2.13 | .13 | 218 | .99 | 1.75 | .19 | 81 | .94 | 1.22 | .36 | 18 | 1.01 |
| Months breastfed closed interval | 16.75 | .73 | 140 | .96 | 12.66 | 1.44 | 48 | .99 | 9.36 | 2.17 | 10 | .92 |
| Wants no more children | 33.39 | 3.69 | 181 | 1.05 | 27.35 | 5.37 | 67 | .98 | 33.70 | 13.38 | 14 | 1.02 |
| Additional number wanted | 2.03 | .15 | 174 | 1.09 | 2.31 | .23 | 66 | 1.00 | 1.69 | .49 | 14 | 1.19 |
| Desired family size | 3.96 | .10 | 193 | 1.10 | 3.76 | .14 | 75 | .95 | 3.96 | .39 | 15 | .90 |
| Knows effective methods | 78.66 | 2.86 | 218 | 1.03 | 70.54 | 5.70 | 81 | 1.12 | 68.44 | 10.69 | 18 | .95 |
| Ever used contraceptives | 10.88 | 1.82 | 218 | .86 | 10.14 | 3.01 | 81 | .89 | .00 | .00 | 18 | .00 |
| Ever used effective methods | 8.53 | 1.70 | 218 | .89 | 9.28 | 2.93 | 81 | .90 | .00 | .00 | 18 | .00 |
| Currently using (exposed) | 10.02 | 2.11 | 140 | .83 | 8.08 | 3.28 | 53 | .87 | .00 | .00 | 12 | .00 |
| Using effective (exposed) | 5.26 | 1.82 | 140 | .96 | 5.38 | 2.70 | 53 | .86 | .00 | .00 | 12 | .00 |
| Wants no more and using eff.(exp) | 12.48 | 4.67 | 50 | .99 | 10.35 | 7.12 | 14 | .84 | .00 | .00 | 4 | .00 |
| Never used contraception | 89.12 | 1.82 | 218 | .86 | 89.86 | 3.01 | 81 | .89 | 100.00 | .00 | 18 | .00 |
| Used in past | 4.43 | 1.26 | 218 | .90 | 4.97 | 2.22 | 81 | .91 | .00 | .00 | 18 | .00 |
| Currently using | 6.45 | 1.38 | 218 | .83 | 5.17 | 2.12 | 81 | .86 | .00 | .00 | 18 | .00 |

**Table 4a** Sampling errors by years since first marriage

| | <5 | | | | 5–9 | | | | 10–14 | | | | 15–19 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 17.07 | .13 | 977 | 1.13 | 16.76 | .15 | 899 | 1.26 | 16.24 | .12 | 807 | 1.07 | 15.75 | .12 | 729 | 1.01 |
| Age at first marriage (<20) | 17.36 | .09 | 203 | 1.01 | 15.80 | .08 | 691 | 1.05 | 15.38 | .09 | 697 | 1.08 | 14.97 | .08 | 655 | .96 |
| First marriage dissolved | 3.21 | .55 | 977 | .97 | 5.14 | .80 | 899 | 1.09 | 6.67 | .96 | 807 | 1.09 | 10.14 | 1.07 | 729 | .95 |
| Time spent in union | 98.67 | .38 | 977 | 1.18 | 98.51 | .30 | 899 | 1.03 | 98.09 | .35 | 807 | 1.03 | 97.75 | .35 | 729 | .99 |
| Currently married | 97.17 | .51 | 977 | .96 | 96.48 | .61 | 899 | .99 | 96.13 | .75 | 807 | 1.10 | 94.73 | .89 | 729 | 1.07 |
| Births in first 5 years | .00 | .00 | 0 | .00 | 1.58 | .04 | 899 | 1.21 | 1.55 | .04 | 807 | 1.11 | 1.46 | .03 | 729 | .92 |
| Births in past 5 years | .00 | .00 | 0 | .00 | 1.82 | .04 | 856 | 1.08 | 1.66 | .03 | 762 | .96 | 1.51 | .04 | 680 | 1.03 |
| Currently pregnant | 22.54 | 1.44 | 951 | 1.07 | 23.52 | 1.47 | 869 | 1.02 | 20.89 | 1.43 | 775 | .98 | 17.44 | 1.67 | 690 | 1.15 |
| Children ever born | .63 | .02 | 977 | .98 | 2.46 | .05 | 899 | 1.10 | 4.08 | .07 | 807 | 1.04 | 5.46 | .10 | 729 | 1.07 |
| Living children | .53 | .02 | 977 | .93 | 1.96 | .05 | 899 | 1.17 | 3.27 | .06 | 807 | 1.08 | 4.30 | .08 | 729 | 1.04 |
| Months breastfed closed interval | 11.14 | .52 | 208 | .98 | 14.02 | .34 | 731 | 1.05 | 15.80 | .35 | 734 | 1.07 | 16.62 | .38 | 675 | 1.12 |
| Wants no more children | 5.14 | .86 | 946 | 1.20 | 25.20 | 1.38 | 857 | .93 | 43.67 | 2.10 | 749 | 1.16 | 64.40 | 2.05 | 641 | 1.08 |
| Additional number wanted | 3.18 | .06 | 913 | 1.09 | 2.03 | .06 | 813 | 1.02 | 1.40 | .07 | 707 | 1.15 | .78 | .06 | 599 | 1.08 |
| Desired family size | 3.93 | .05 | 923 | 1.04 | 4.01 | .06 | 848 | 1.17 | 4.32 | .07 | 760 | 1.27 | 4.21 | .06 | 671 | 1.06 |
| Knows effective methods | 67.72 | 1.72 | 977 | 1.15 | 75.46 | 1.54 | 899 | 1.07 | 78.38 | 1.71 | 807 | 1.18 | 78.72 | 1.58 | 729 | 1.04 |
| Ever used contraceptives | 2.25 | .38 | 977 | .80 | 7.14 | .82 | 899 | .95 | 10.50 | 1.04 | 807 | .96 | 14.52 | 1.20 | 729 | .92 |
| Ever used effective methods | 1.71 | .35 | 977 | .85 | 6.20 | .76 | 899 | .94 | 9.22 | .97 | 807 | .95 | 12.63 | 1.19 | 729 | .97 |
| Currently using (exposed) | 1.73 | .38 | 726 | .78 | 3.96 | .73 | 646 | .94 | 6.47 | .98 | 590 | .97 | 10.88 | 1.27 | 524 | .93 |
| Using effective (exposed) | 1.19 | .35 | 726 | .87 | 3.13 | .70 | 646 | 1.02 | 4.67 | .89 | 590 | 1.03 | 8.28 | 1.15 | 524 | .95 |
| Wants no more and using eff.(exp) | 9.02 | 5.21 | 28 | .94 | 7.94 | 2.17 | 154 | .99 | 10.14 | 1.86 | 263 | 1.00 | 12.50 | 1.79 | 338 | .99 |
| Never used contraception | 97.75 | .38 | 977 | .80 | 92.86 | .82 | 899 | .95 | 89.50 | 1.04 | 807 | .96 | 85.48 | 1.20 | 729 | .92 |
| Used in past | .96 | .27 | 977 | .87 | 4.28 | .62 | 899 | .92 | 5.77 | .72 | 807 | .88 | 6.78 | .94 | 729 | 1.01 |
| Currently using | 1.29 | .28 | 977 | .78 | 2.86 | .53 | 899 | .95 | 4.73 | .72 | 807 | .96 | 7.74 | .91 | 729 | .92 |

*[Table continues]*

**Table 4a** *(cont)*

| Variable name | 20-24 Mean or per cent | SE | n | DEFT | 25-29 Mean or per cent | SE | n | DEFT | 30+ Mean or per cent | SE | n | DEFT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age at first marriage | 15.49 | .12 | 516 | 1.00 | 14.84 | .10 | 611 | .96 | 14.84 | .10 | 611 | .96 |
| Age at first marriage (<20) | 14.90 | .10 | 473 | 1.06 | 14.56 | .09 | 582 | .95 | 14.56 | .09 | 582 | .95 |
| First marriage dissolved | 14.02 | 1.50 | 516 | .98 | 16.67 | 1.51 | 611 | 1.00 | 16.67 | 1.51 | 611 | 1.00 |
| Time spent in union | 96.80 | .54 | 516 | 1.04 | 95.35 | .65 | 611 | 1.05 | 95.35 | .65 | 611 | 1.05 |
| Currently married | 93.08 | 1.11 | 516 | 1.00 | 90.43 | 1.25 | 611 | 1.05 | 90.43 | 1.25 | 611 | 1.05 |
| Births in first 5 years | 1.42 | .04 | 516 | 1.08 | 1.30 | .04 | 611 | 1.13 | 1.30 | .04 | 611 | 1.13 |
| Births in past 5 years | 1.15 | .05 | 475 | 1.12 | .65 | .03 | 550 | .89 | .65 | .03 | 550 | .89 |
| Currently pregnant | 11.81 | 1.45 | 479 | .99 | 5.33 | 1.02 | 555 | 1.06 | 5.33 | 1.02 | 555 | 1.06 |
| Children ever born | 6.52 | .13 | 516 | 1.11 | 6.91 | .14 | 611 | 1.16 | 6.91 | .14 | 611 | 1.16 |
| Living children | 5.02 | .10 | 516 | 1.01 | 5.07 | .11 | 611 | 1.09 | 5.07 | .11 | 611 | 1.09 |
| Months breastfed closed interval | 16.82 | .42 | 487 | 1.00 | 17.23 | .38 | 565 | .97 | 17.23 | .38 | 565 | .97 |
| Wants no more children | 75.95 | 2.11 | 414 | 1.00 | 82.36 | 2.19 | 379 | 1.12 | 82.36 | 2.19 | 379 | 1.12 |
| Additional number wanted | .53 | .06 | 401 | 1.03 | .42 | .07 | 369 | 1.15 | .42 | .07 | 369 | 1.15 |
| Desired family size | 4.37 | .08 | 463 | 1.10 | 4.30 | .07 | 527 | 1.05 | 4.30 | .07 | 527 | 1.05 |
| Knows effective methods | 75.74 | 2.02 | 516 | 1.07 | 76.08 | 1.93 | 611 | 1.12 | 76.08 | 1.93 | 611 | 1.12 |
| Ever used contraceptives | 16.09 | 1.76 | 516 | 1.08 | 13.71 | 1.53 | 611 | 1.10 | 13.71 | 1.53 | 611 | 1.10 |
| Ever used effective methods | 13.36 | 1.58 | 516 | 1.05 | 11.34 | 1.37 | 611 | 1.07 | 11.34 | 1.37 | 611 | 1.07 |
| Currently using (exposed) | 14.75 | 1.92 | 357 | 1.02 | 10.61 | 1.72 | 348 | 1.04 | 10.61 | 1.72 | 348 | 1.04 |
| Using effective (exposed) | 10.64 | 1.61 | 357 | .99 | 6.95 | 1.30 | 348 | .95 | 6.95 | 1.30 | 348 | .95 |
| Wants no more and using eff.(exp) | 14.11 | 2.06 | 273 | .98 | 8.50 | 1.57 | 286 | .95 | 8.50 | 1.57 | 286 | .95 |
| Never used contraception | 83.91 | 1.76 | 516 | 1.08 | 86.29 | 1.53 | 611 | 1.10 | 86.29 | 1.53 | 611 | 1.10 |
| Used in past | 5.82 | 1.01 | 516 | .98 | 7.66 | 1.10 | 611 | 1.02 | 7.66 | 1.10 | 611 | 1.02 |
| Currently using | 10.27 | 1.35 | 516 | 1.01 | 6.05 | 1.01 | 611 | 1.05 | 6.05 | 1.01 | 611 | 1.05 |

**Table 5a** Sampling errors by number of living children

| | 0 | | | | 1 | | | | 2 | | | | 3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 16.77 | .12 | 822 | .93 | 16.37 | .16 | 687 | 1.20 | 16.33 | .15 | 687 | 1.12 | 15.80 | .12 | 640 | .98 |
| Age at first marriage (<20) | 15.70 | .14 | 292 | 1.01 | 15.57 | .12 | 383 | 1.11 | 15.31 | .10 | 534 | 1.03 | 15.08 | .09 | 560 | .98 |
| First marriage dissolved | 10.24 | 1.08 | 822 | 1.02 | 10.78 | 1.33 | 687 | 1.12 | 9.64 | 1.35 | 687 | 1.19 | 10.18 | 1.23 | 640 | 1.03 |
| Time spent in union | 87.92 | 2.06 | 822 | 1.18 | 90.54 | 1.47 | 687 | .98 | 95.89 | .66 | 687 | .92 | 96.01 | .76 | 640 | 1.02 |
| Currently married | 91.75 | .99 | 822 | 1.03 | 92.04 | 1.16 | 687 | 1.12 | 93.77 | 1.10 | 687 | 1.19 | 95.01 | .96 | 640 | 1.12 |
| Births in first 5 years | .32 | .05 | 265 | 1.10 | .99 | .04 | 367 | 1.00 | 1.41 | .03 | 595 | .93 | 1.57 | .04 | 632 | .99 |
| Births in past 5 years | .24 | .05 | 208 | 1.15 | 1.01 | .05 | 309 | 1.06 | 1.43 | .04 | 545 | 1.01 | 1.51 | .04 | 593 | 1.02 |
| Currently pregnant | 22.16 | 1.70 | 757 | 1.13 | 20.05 | 1.64 | 631 | 1.03 | 20.26 | 1.76 | 645 | 1.11 | 16.10 | 1.62 | 608 | 1.08 |
| Children ever born | .24 | .03 | 822 | 1.06 | 1.53 | .04 | 687 | 1.03 | 2.87 | .06 | 687 | 1.04 | 4.16 | .06 | 640 | 1.01 |
| Living children | .00 | .00 | 822 | .00 | 1.00 | .00 | 687 | .00 | 2.00 | .00 | 687 | .00 | 3.00 | .00 | 640 | .00 |
| Months breastfed closed interval | 2.88 | .65 | 54 | 1.00 | 11.58 | .57 | 302 | .96 | 15.78 | .38 | 686 | 1.06 | 16.17 | .36 | 639 | 1.06 |
| Wants no more children | .55 | .28 | 685 | 1.00 | 7.13 | 1.15 | 591 | 1.09 | 26.33 | 1.79 | 588 | .99 | 43.59 | 2.04 | 540 | .95 |
| Additional number wanted | 3.63 | .06 | 666 | 1.08 | 2.55 | .07 | 563 | 1.14 | 1.72 | .07 | 552 | 1.05 | 1.44 | .07 | 506 | .96 |
| Desired family size | 3.92 | .05 | 736 | 1.02 | 3.83 | .06 | 616 | 1.15 | 3.95 | .06 | 625 | 1.05 | 4.07 | .06 | 591 | 1.15 |
| Knows effective methods | 65.62 | 1.96 | 822 | 1.18 | 69.64 | 2.01 | 687 | 1.15 | 73.95 | 1.87 | 687 | 1.12 | 77.30 | 1.78 | 640 | 1.07 |
| Ever used contraceptives | .70 | .27 | 822 | .94 | 2.51 | .56 | 687 | .94 | 5.89 | 1.00 | 687 | 1.11 | 9.41 | 1.23 | 640 | 1.07 |
| Ever used effective methods | .70 | .27 | 822 | .94 | 1.98 | .51 | 687 | .95 | 4.14 | .86 | 687 | 1.13 | 8.16 | 1.14 | 640 | 1.06 |
| Currently using (exposed) | .26 | .19 | 511 | .82 | 2.25 | .66 | 464 | .96 | 4.41 | .87 | 455 | .90 | 7.20 | 1.25 | 440 | 1.01 |
| Using effective (exposed) | .26 | .19 | 511 | .82 | 1.86 | .60 | 464 | .96 | 2.85 | .74 | 455 | .95 | 5.39 | 1.09 | 440 | 1.01 |
| Wants no more and using eff.(exp) | 100.00 | .00 | 1 | .00 | 7.31 | 4.94 | 19 | .81 | 7.04 | 2.34 | 113 | .97 | 11.25 | 2.42 | 183 | 1.03 |
| Never used contraception | 99.30 | .27 | 822 | .94 | 97.49 | .56 | 687 | .94 | 94.11 | 1.00 | 687 | 1.11 | 90.59 | 1.23 | 640 | 1.07 |
| Used in past | .54 | .25 | 822 | .97 | .99 | .36 | 687 | .96 | 2.96 | .77 | 687 | 1.20 | 4.43 | .79 | 640 | .97 |
| Currently using | .17 | .12 | 822 | .82 | 1.52 | .45 | 687 | .96 | 2.93 | .58 | 687 | .90 | 4.98 | .87 | 640 | 1.02 |

[*Table continues*]

**Table 5a** *(cont)*

| | 4 | | | | 5 | | | | 6 | | | | 7 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 15.82 | .14 | 599 | 1.07 | 15.49 | .13 | 523 | 1.05 | 15.25 | .12 | 434 | 1.00 | 15.26 | .15 | 270 | 1.05 |
| Age at first marriage (<20) | 14.99 | .11 | 525 | 1.14 | 14.92 | .11 | 479 | 1.08 | 14.86 | .10 | 406 | .98 | 14.96 | .12 | 256 | 1.02 |
| First marriage dissolved | 12.06 | 1.36 | 599 | 1.02 | 9.35 | 1.36 | 523 | 1.07 | 8.38 | 1.37 | 434 | 1.03 | 7.78 | 1.75 | 270 | 1.07 |
| Time spent in union | 97.03 | .45 | 599 | 1.06 | 98.34 | .34 | 523 | 1.00 | 98.68 | .32 | 434 | .99 | 98.95 | .30 | 270 | 1.10 |
| Currently married | 94.53 | .95 | 599 | 1.02 | 95.64 | .87 | 523 | .98 | 96.16 | 1.00 | 434 | 1.08 | 96.21 | 1.25 | 270 | 1.07 |
| Births in first 5 years | 1.64 | .04 | 599 | 1.10 | 1.59 | .04 | 523 | .92 | 1.68 | .05 | 434 | 1.03 | 1.70 | .05 | 270 | .93 |
| Births in past 5 years | 1.43 | .04 | 558 | .96 | 1.35 | .05 | 499 | 1.06 | 1.34 | .05 | 415 | .98 | 1.39 | .06 | 258 | 1.00 |
| Currently pregnant | 17.21 | 1.43 | 564 | .90 | 15.33 | 1.88 | 500 | 1.16 | 9.81 | 1.42 | 417 | .97 | 9.38 | 1.96 | 260 | 1.08 |
| Children ever born | 5.37 | .07 | 599 | 1.12 | 6.43 | .07 | 523 | 1.10 | 7.49 | .08 | 434 | 1.05 | 8.38 | .08 | 270 | 1.05 |
| Living children | 4.00 | .00 | 599 | .00 | 5.00 | .00 | 523 | .00 | 6.00 | .00 | 434 | .00 | 7.00 | .00 | 270 | .00 |
| Months breastfed closed interval | 16.96 | .37 | 598 | 1.04 | 17.39 | .42 | 521 | 1.05 | 17.01 | .43 | 431 | 1.09 | 16.64 | .53 | 270 | 1.06 |
| Wants no more children | 62.27 | 2.31 | 484 | 1.05 | 73.64 | 2.20 | 421 | 1.02 | 89.31 | 1.68 | 358 | 1.03 | 90.31 | 2.08 | 222 | 1.05 |
| Additional number wanted | .92 | .07 | 459 | .98 | .57 | .07 | 401 | 1.06 | .20 | .04 | 349 | 1.06 | .27 | .07 | 218 | 1.08 |
| Desired family size | 4.34 | .07 | 550 | 1.16 | 4.43 | .06 | 481 | 1.03 | 4.39 | .08 | 406 | 1.08 | 4.64 | .13 | 251 | 1.17 |
| Knows effective methods | 74.98 | 1.87 | 599 | 1.06 | 78.00 | 2.11 | 523 | 1.16 | 83.68 | 2.14 | 434 | 1.21 | 81.10 | 2.83 | 270 | 1.19 |
| Ever used contraceptives | 12.72 | 1.24 | 599 | .91 | 14.63 | 1.64 | 523 | 1.06 | 20.17 | 1.74 | 434 | .90 | 20.36 | 2.39 | 270 | .98 |
| Ever used effective methods | 10.49 | 1.14 | 599 | .91 | 12.65 | 1.53 | 523 | 1.05 | 18.15 | 1.71 | 434 | .93 | 15.85 | 2.00 | 270 | .90 |
| Currently using (exposed) | 8.90 | 1.43 | 384 | .98 | 12.06 | 1.73 | 346 | .99 | 13.73 | 1.94 | 317 | 1.00 | 16.55 | 2.62 | 198 | .99 |
| Using effective (exposed) | 5.89 | 1.07 | 384 | .89 | 9.20 | 1.53 | 346 | .98 | 10.90 | 1.87 | 317 | 1.07 | 10.04 | 2.14 | 198 | 1.00 |
| Wants no more and using eff.(exp) | 9.37 | 1.70 | 240 | .90 | 12.41 | 2.07 | 253 | 1.00 | 11.67 | 2.00 | 283 | 1.05 | 11.18 | 2.38 | 180 | 1.01 |
| Never used contraception | 87.28 | 1.24 | 599 | .91 | 85.37 | 1.64 | 523 | 1.06 | 79.83 | 1.74 | 434 | .90 | 79.64 | 2.39 | 270 | .98 |
| Used in past | 6.98 | 1.07 | 599 | 1.02 | 6.70 | 1.03 | 523 | .94 | 10.19 | 1.42 | 434 | .98 | 8.23 | 1.64 | 270 | .98 |
| Currently using | 5.75 | .94 | 599 | .98 | 7.93 | 1.20 | 523 | 1.01 | 9.98 | 1.43 | 434 | 1.00 | 12.13 | 1.92 | 270 | .96 |

**Table 5a** *(cont)*

| | 8 | | | | 9+ | | | |
|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 15.27 | .22 | 154 | 1.10 | 15.11 | .20 | 136 | .93 |
| Age at first marriage (<20) | 15.01 | .19 | 149 | 1.18 | 14.78 | .19 | 130 | 1.03 |
| First marriage dissolved | 7.36 | 2.45 | 154 | 1.16 | 3.99 | 1.82 | 136 | 1.08 |
| Time spent in union | 99.21 | .27 | 154 | 1.12 | 99.63 | .20 | 136 | .95 |
| Currently married | 97.96 | 1.21 | 154 | 1.06 | 100.00 | .00 | 136 | .00 |
| Births in first 5 years | 1.77 | .07 | 154 | 1.02 | 1.97 | .07 | 136 | .97 |
| Births in past 5 years | 1.24 | .08 | 151 | .90 | 1.55 | .11 | 136 | 1.10 |
| Currently pregnant | 7.17 | 2.13 | 151 | 1.01 | 9.50 | 2.59 | 136 | 1.02 |
| Children ever born | 9.59 | .13 | 154 | 1.04 | 10.67 | .12 | 136 | .92 |
| Living children | 8.00 | .00 | 154 | .00 | 9.51 | .08 | 136 | 1.00 |
| Months breastfed closed interval | 16.17 | .62 | 154 | .91 | 14.58 | .66 | 136 | 1.04 |
| Wants no more children | 93.66 | 2.38 | 118 | 1.06 | 87.15 | 3.56 | 116 | 1.14 |
| Additional number wanted | .08 | .05 | 114 | 1.08 | .20 | .09 | 109 | 1.07 |
| Desired family size | 4.75 | .16 | 141 | 1.05 | 4.95 | .26 | 131 | 1.38 |
| Knows effective methods | 79.03 | 4.14 | 154 | 1.26 | 84.29 | 3.89 | 136 | 1.24 |
| Ever used contraceptives | 21.26 | 3.32 | 154 | 1.00 | 32.44 | 4.31 | 136 | 1.07 |
| Ever used effective methods | 18.21 | 3.22 | 154 | 1.03 | 30.38 | 4.28 | 136 | 1.08 |
| Currently using (exposed) | 14.38 | 3.09 | 107 | .91 | 15.31 | 3.39 | 104 | .96 |
| Using effective (exposed) | 9.37 | 2.70 | 107 | .96 | 11.72 | 3.22 | 104 | 1.02 |
| Wants no more and using eff.(exp) | 10.01 | 2.88 | 101 | .96 | 13.49 | 3.67 | 91 | 1.02 |
| Never used contraception | 78.74 | 3.32 | 154 | 1.00 | 67.56 | 4.31 | 136 | 1.07 |
| Used in past | 11.21 | 2.65 | 154 | 1.04 | 20.77 | 3.58 | 136 | 1.02 |
| Currently using | 10.05 | 2.21 | 154 | .91 | 11.67 | 2.70 | 136 | .98 |

Table 5b Sampling errors for differences between number of living children subclasses

| Variable name | (0) - (1) Mean or per cent | SE | n | DEFT | (1) - (2) Mean or per cent | SE | n | DEFT | (2) - (3) Mean or per cent | SE | n | DEFT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age at first marriage | .40 | .18 | 748 | .95 | .03 | .20 | 687 | 1.08 | .53 | .19 | 662 | 1.09 |
| Age at first marriage (<20) | .13 | .18 | 331 | 1.03 | .26 | .15 | 446 | 1.06 | .23 | .14 | 546 | 1.07 |
| First marriage dissolved | -.54 | 1.63 | 748 | 1.03 | 1.15 | 1.95 | 687 | 1.19 | -.55 | 1.68 | 662 | 1.02 |
| Time spent in union | -2.62 | 2.57 | 748 | 1.12 | -5.35 | 1.53 | 687 | .92 | -.12 | .91 | 662 | .88 |
| Currently married | -.30 | 1.46 | 748 | 1.03 | -1.73 | 1.56 | 687 | 1.12 | -1.24 | 1.26 | 662 | 1.00 |
| Births in first 5 years | -.67 | .06 | 307 | .97 | -.42 | .05 | 453 | .96 | -.16 | .05 | 612 | .95 |
| Births in past 5 years | -.77 | .08 | 248 | 1.16 | -.43 | .06 | 394 | .98 | -.08 | .06 | 567 | 1.02 |
| Currently pregnant | 2.10 | 2.54 | 688 | 1.15 | -.21 | 2.31 | 637 | 1.03 | 4.16 | 2.30 | 625 | 1.06 |
| Children ever born | -1.29 | .05 | 748 | 1.01 | -1.33 | .07 | 687 | 1.05 | -1.29 | .08 | 662 | .99 |
| Living children | -1.00 | .00 | 748 | .00 | -1.00 | .00 | 687 | .00 | -1.00 | .00 | 662 | .00 |
| Months breastfed closed interval | -8.71 | .84 | 91 | .96 | -4.20 | .69 | 419 | 1.00 | -.39 | .54 | 661 | 1.09 |
| Wants no more children | -6.58 | 1.16 | 634 | 1.06 | -19.20 | 2.21 | 589 | 1.05 | -17.26 | 2.68 | 562 | .96 |
| Additional number wanted | 1.09 | .10 | 610 | 1.09 | .83 | .10 | 557 | 1.06 | .28 | .10 | 528 | .96 |
| Desired family size | .09 | .08 | 670 | 1.06 | -.12 | .08 | 620 | 1.06 | -.12 | .08 | 607 | 1.01 |
| Knows effective methods | -4.02 | 2.76 | 748 | 1.14 | -4.31 | 2.58 | 687 | 1.06 | -3.35 | 2.39 | 662 | 1.02 |
| Ever used contraceptives | -1.81 | .62 | 748 | .94 | -3.38 | 1.14 | 687 | 1.05 | -3.52 | 1.69 | 662 | 1.15 |
| Ever used effective methods | -1.28 | .57 | 748 | .95 | -2.16 | .97 | 687 | 1.05 | -4.02 | 1.53 | 662 | 1.16 |
| Currently using (exposed) | -1.98 | .69 | 486 | .95 | -2.16 | 1.04 | 459 | .87 | -2.79 | 1.53 | 447 | .98 |
| Using effective (exposed) | -1.59 | .63 | 486 | .95 | -1.00 | .94 | 459 | .94 | -2.54 | 1.31 | 447 | .99 |
| Wants no more and using eff.(exp) | 92.69 | 4.94 | 1 | .81 | .26 | 5.42 | 32 | .82 | -4.21 | 3.44 | 139 | 1.02 |
| Never used contraception | 1.81 | .62 | 748 | .94 | 3.38 | 1.14 | 687 | 1.05 | 3.52 | 1.69 | 662 | 1.15 |
| Used in past | -.45 | .44 | 748 | .96 | -1.97 | .85 | 687 | 1.13 | -1.47 | 1.21 | 662 | 1.17 |
| Currently using | -1.36 | .47 | 748 | .96 | -1.41 | .69 | 687 | .87 | -2.05 | 1.05 | 662 | .98 |

Table 5b (*cont*)

| | (3) - (4) | | | | (4) - (5) | | | | (5) - (6) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | -.02 | .17 | 618 | .98 | .33 | .20 | 558 | 1.11 | .24 | .19 | 474 | 1.06 |
| Age at first marriage (<20) | .09 | .15 | 541 | 1.08 | .07 | .15 | 500 | 1.10 | .06 | .14 | 439 | 1.02 |
| First marriage dissolved | -1.87 | 1.85 | 618 | 1.03 | 2.71 | 1.91 | 558 | 1.04 | .97 | 1.62 | 474 | .99 |
| Time spent in union | -1.02 | .93 | 618 | 1.09 | -1.30 | .54 | 558 | 1.00 | -.35 | .46 | 474 | .99 |
| Currently married | .48 | 1.43 | 618 | 1.13 | -1.10 | 1.26 | 558 | .98 | -.52 | 1.29 | 474 | 1.00 |
| Births in first 5 years | -.06 | .05 | 615 | 1.02 | .04 | .06 | 558 | 1.01 | -.09 | .05 | 474 | .93 |
| Births in past 5 years | .08 | .06 | 574 | .97 | .08 | .06 | 526 | .97 | .01 | .07 | 453 | .97 |
| Currently pregnant | -1.10 | 2.19 | 585 | 1.00 | 1.88 | 2.25 | 530 | .99 | 5.52 | 2.25 | 454 | 1.04 |
| Children ever born | -1.21 | .09 | 618 | 1.04 | -1.06 | .10 | 558 | 1.08 | -1.06 | .10 | 474 | .99 |
| Living children | -1.00 | .00 | 618 | .00 | -1.00 | .00 | 558 | .00 | -1.00 | .00 | 474 | .00 |
| Months breastfed closed interval | -.79 | .52 | 617 | 1.05 | -.43 | .60 | 556 | 1.12 | .38 | .63 | 471 | 1.12 |
| Wants no more children | -18.68 | 3.05 | 510 | .99 | -11.37 | 3.11 | 450 | 1.01 | -15.67 | 2.75 | 386 | 1.02 |
| Additional number wanted | .52 | .10 | 481 | .91 | .35 | .09 | 428 | .96 | .37 | .08 | 373 | 1.11 |
| Desired family size | -.27 | .08 | 569 | 1.00 | -.09 | .08 | 513 | .98 | .04 | .10 | 440 | 1.09 |
| Knows effective methods | 2.32 | 2.54 | 618 | 1.05 | -3.02 | 2.88 | 558 | 1.14 | -5.68 | 2.94 | 474 | 1.16 |
| Ever used contraceptives | -3.31 | 1.69 | 618 | .95 | -1.91 | 2.14 | 558 | 1.04 | -5.53 | 2.26 | 474 | .91 |
| Ever used effective methods | -2.33 | 1.63 | 618 | .99 | -2.16 | 1.95 | 558 | 1.02 | -5.50 | 2.14 | 474 | .91 |
| Currently using (exposed) | -1.70 | 1.95 | 410 | 1.02 | -3.16 | 2.33 | 364 | 1.02 | -1.67 | 2.68 | 330 | 1.03 |
| Using effective (exposed) | -.50 | 1.64 | 410 | 1.02 | -3.31 | 1.84 | 364 | .94 | -1.70 | 2.47 | 330 | 1.05 |
| Wants no more and using eff.(exp) | 1.88 | 3.20 | 207 | 1.06 | -3.04 | 2.64 | 246 | .94 | .74 | 2.93 | 267 | 1.04 |
| Never used contraception | 3.31 | 1.69 | 618 | .95 | 1.91 | 2.14 | 558 | 1.04 | 5.53 | 2.26 | 474 | .91 |
| Used in past | -2.55 | 1.25 | 618 | .94 | .28 | 1.54 | 558 | 1.02 | -3.49 | 1.69 | 474 | .93 |
| Currently using | -.77 | 1.33 | 618 | 1.04 | -2.19 | 1.58 | 558 | 1.04 | -2.04 | 1.93 | 474 | 1.03 |

[*Table continues*]

Table 5b (*cont*)

| | (6) - (7) | | | | (7) - (8) | | | | (8) - (9+) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | -.01 | .19 | 332 | 1.02 | -.01 | .26 | 196 | 1.06 | .16 | .32 | 144 | 1.07 |
| Age at first marriage (<20) | -.10 | .16 | 314 | 1.01 | -.05 | .23 | 188 | 1.15 | .22 | .26 | 138 | 1.05 |
| First marriage dissolved | .60 | 2.18 | 332 | 1.03 | .42 | 2.98 | 196 | 1.12 | 3.37 | 3.06 | 144 | 1.13 |
| Time spent in union | -.27 | .42 | 332 | 1.00 | -.25 | .43 | 196 | 1.17 | -.43 | .34 | 144 | 1.06 |
| Currently married | -.05 | 1.49 | 332 | 1.00 | -1.75 | 1.72 | 196 | 1.06 | -2.04 | 1.21 | 144 | 1.06 |
| Births in first 5 years | -.01 | .07 | 332 | .94 | -.07 | .09 | 196 | 1.03 | -.20 | .11 | 144 | 1.03 |
| Births in past 5 years | -.05 | .08 | 318 | .98 | .16 | .10 | 190 | .94 | -.31 | .14 | 143 | 1.07 |
| Currently pregnant | .43 | 2.37 | 320 | 1.02 | 2.21 | 2.94 | 191 | 1.06 | -2.33 | 3.22 | 143 | .98 |
| Children ever born | -.89 | .12 | 332 | 1.10 | -1.21 | .16 | 196 | 1.06 | -1.08 | .17 | 144 | .95 |
| Living children | -1.00 | .00 | 332 | .00 | -1.00 | .00 | 196 | .00 | -1.51 | .08 | 144 | 1.00 |
| Months breastfed closed interval | .37 | .71 | 332 | 1.11 | .47 | .73 | 196 | .87 | 1.59 | .85 | 144 | .91 |
| Wants no more children | -1.00 | 2.58 | 274 | 1.00 | -3.35 | 3.19 | 154 | 1.06 | 6.51 | 4.31 | 116 | 1.12 |
| Additional number wanted | -.07 | .08 | 268 | 1.06 | .19 | .09 | 149 | 1.10 | -.13 | .10 | 111 | 1.09 |
| Desired family size | -.25 | .15 | 310 | 1.14 | -.12 | .19 | 180 | 1.01 | -.19 | .31 | 135 | 1.29 |
| Knows effective methods | 2.58 | 3.38 | 332 | 1.14 | 2.08 | 4.88 | 196 | 1.20 | -5.27 | 6.00 | 144 | 1.32 |
| Ever used contraceptives | -.20 | 2.80 | 332 | .90 | -.89 | 4.09 | 196 | .99 | -11.18 | 5.51 | 144 | 1.06 |
| Ever used effective methods | 2.29 | 2.42 | 332 | .84 | -2.36 | 3.91 | 196 | 1.02 | -12.17 | 5.46 | 144 | 1.08 |
| Currently using (exposed) | -2.82 | 3.14 | 243 | .96 | 2.16 | 3.98 | 138 | .92 | -.93 | 4.55 | 105 | .92 |
| Using effective (exposed) | .85 | 2.86 | 243 | 1.03 | .67 | 3.25 | 138 | .92 | -2.34 | 4.49 | 105 | 1.06 |
| Wants no more and using eff. (exp) | .49 | 3.10 | 220 | 1.02 | 1.17 | 3.52 | 129 | .92 | -3.49 | 4.99 | 95 | 1.07 |
| Never used contraception | .20 | 2.80 | 332 | .90 | .89 | 4.09 | 196 | .99 | 11.18 | 5.51 | 144 | 1.06 |
| Used in past | 1.96 | 2.03 | 332 | .92 | -2.98 | 3.28 | 196 | 1.07 | -9.56 | 4.33 | 144 | 1.00 |
| Currently using | -2.16 | 2.30 | 332 | .94 | 2.08 | 2.83 | 196 | .90 | -1.62 | 3.46 | 144 | .94 |

**Table 6a** Sampling errors by woman's education

| Variable name | No schooling: Mean or per cent | SE | n | DEFT | Primary: Mean or per cent | SE | n | DEFT | Secondary and higher: Mean or per cent | SE | n | DEFT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age at first marriage | 15.77 | .06 | 4170 | 1.18 | 16.94 | .19 | 385 | 1.11 | 18.76 | .22 | 272 | .95 |
| Age at first marriage (<20) | 15.05 | .04 | 3220 | 1.03 | 15.86 | .17 | 250 | 1.21 | 16.38 | .17 | 145 | .94 |
| First marriage dissolved | 10.14 | .52 | 4170 | 1.10 | 8.24 | 1.66 | 385 | 1.18 | 5.82 | 1.74 | 272 | 1.22 |
| Time spent in union | 96.51 | .24 | 4170 | .95 | 96.83 | .85 | 385 | .97 | 94.80 | 1.75 | 272 | 1.10 |
| Currently married | 94.18 | .43 | 4170 | 1.18 | 94.42 | 1.28 | 385 | 1.09 | 96.26 | 1.25 | 272 | 1.09 |
| Births in first 5 years | 1.44 | .02 | 3412 | 1.14 | 1.57 | .06 | 273 | 1.03 | 1.76 | .11 | 181 | 1.44 |
| Births in past 5 years | 1.30 | .02 | 3151 | 1.04 | 1.45 | .07 | 255 | 1.02 | 1.30 | .13 | 166 | 1.32 |
| Currently pregnant | 16.50 | .63 | 3928 | 1.06 | 21.09 | 2.31 | 363 | 1.08 | 20.85 | 2.77 | 262 | 1.10 |
| Children ever born | 4.28 | .05 | 4170 | 1.03 | 3.36 | .16 | 385 | 1.05 | 2.83 | .14 | 272 | .93 |
| Living children | 3.24 | .04 | 4170 | 1.02 | 2.78 | .13 | 385 | 1.04 | 2.50 | .13 | 272 | .92 |
| Months breastfed closed interval | 16.24 | .17 | 3236 | 1.06 | 14.20 | .60 | 276 | 1.15 | 11.37 | .65 | 177 | .95 |
| Wants no more children | 42.15 | .92 | 3431 | 1.10 | 42.39 | 2.97 | 338 | 1.10 | 45.00 | 3.12 | 249 | .99 |
| Additional number wanted | 1.66 | .04 | 3267 | 1.17 | 1.49 | .09 | 326 | 1.05 | 1.52 | .11 | 244 | 1.07 |
| Desired family size | 4.27 | .03 | 3798 | 1.42 | 3.66 | .08 | 357 | 1.18 | 3.22 | .07 | 259 | 1.12 |
| Knows effective methods | 72.39 | .98 | 4170 | 1.42 | 86.64 | 2.02 | 385 | 1.17 | 92.44 | 1.68 | 272 | 1.05 |
| Ever used contraceptives | 7.60 | .39 | 4170 | .96 | 18.86 | 2.11 | 385 | 1.06 | 34.91 | 3.09 | 272 | 1.07 |
| Ever used effective methods | 6.37 | .36 | 4170 | .95 | 16.46 | 2.18 | 385 | 1.15 | 30.39 | 2.81 | 272 | 1.01 |
| Currently using (exposed) | 5.50 | .44 | 2777 | 1.03 | 12.89 | 2.02 | 264 | .98 | 29.06 | 3.55 | 195 | 1.09 |
| Using effective (exposed) | 3.86 | .37 | 2777 | 1.01 | 10.49 | 1.82 | 264 | .97 | 21.28 | 3.05 | 195 | 1.04 |
| Wants no more and using eff.(exp) | 8.43 | .81 | 1196 | 1.01 | 22.65 | 3.89 | 115 | .99 | 34.11 | 4.69 | 93 | .95 |
| Never used contraception | 92.40 | .39 | 4170 | .96 | 81.14 | 2.11 | 385 | 1.06 | 65.09 | 3.09 | 272 | 1.07 |
| Used in past | 3.92 | .29 | 4170 | .95 | 10.08 | 1.68 | 385 | 1.09 | 14.15 | 2.25 | 272 | 1.06 |
| Currently using | 3.68 | .30 | 4170 | 1.03 | 8.79 | 1.37 | 385 | .95 | 20.75 | 2.70 | 272 | 1.10 |

Table 6b Sampling errors for differences between woman's education subclasses

| | (No schooling) - (Primary) | | | | (Primary) - (Secondary and higher) | | | |
|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | -1.17 | .20 | 704 | 1.09 | -1.82 | .30 | 318 | 1.02 |
| Age at first marriage (<20) | -.82 | .17 | 463 | 1.17 | -.52 | .25 | 183 | 1.08 |
| First marriage dissolved | 1.90 | 1.79 | 704 | 1.21 | 2.42 | 2.45 | 318 | 1.22 |
| Time spent in union | -.32 | .88 | 704 | .97 | 2.03 | 2.01 | 318 | 1.11 |
| Currently married | -.24 | 1.36 | 704 | 1.11 | -1.84 | 1.82 | 318 | 1.11 |
| Births in first 5 years | -.13 | .06 | 505 | .99 | -.19 | .13 | 217 | 1.31 |
| Births in past 5 years | -.15 | .07 | 471 | 1.04 | .15 | .14 | 201 | 1.20 |
| Currently pregnant | -4.59 | 2.43 | 664 | 1.09 | .24 | 3.59 | 304 | 1.09 |
| Children ever born | .92 | .17 | 704 | 1.04 | .53 | .22 | 318 | .99 |
| Living children | .46 | .14 | 704 | 1.03 | .28 | .18 | 318 | .98 |
| Months breastfed closed interval | 2.04 | .62 | 508 | 1.14 | 2.84 | .84 | 215 | .97 |
| Wants no more children | -.24 | 3.19 | 615 | 1.13 | -2.61 | 4.60 | 286 | 1.11 |
| Additional number wanted | .17 | .10 | 592 | 1.08 | -.03 | .15 | 279 | 1.11 |
| Desired family size | .61 | .08 | 652 | 1.22 | .44 | .10 | 300 | 1.15 |
| Knows effective methods | -14.25 | 2.21 | 704 | 1.18 | -5.80 | 2.40 | 318 | 1.02 |
| Ever used contraceptives | -11.26 | 2.19 | 704 | 1.07 | -16.05 | 3.63 | 318 | 1.03 |
| Ever used effective methods | -10.09 | 2.23 | 704 | 1.16 | -13.93 | 3.44 | 318 | 1.02 |
| Currently using (exposed) | -7.39 | 2.13 | 482 | 1.01 | -16.17 | 3.92 | 224 | 1.02 |
| Using effective (exposed) | -6.64 | 1.92 | 482 | 1.00 | -10.79 | 3.27 | 224 | .94 |
| Wants no more and using eff.(exp) | -14.22 | 4.03 | 209 | 1.01 | -11.46 | 5.82 | 102 | .92 |
| Never used contraception | 11.26 | 2.19 | 704 | 1.07 | 16.05 | 3.63 | 318 | 1.03 |
| Used in past | -6.15 | 1.73 | 704 | 1.11 | -4.08 | 2.78 | 318 | 1.06 |
| Currently using | -5.11 | 1.43 | 704 | .97 | -11.97 | 2.79 | 318 | .98 |

Table 7a Sampling errors by woman's pattern of work

| Variable name | Before and after marriage: Mean or per cent | SE | n | DEFT | After marriage only: Mean or per cent | SE | n | DEFT | Before marriage only: Mean or per cent | SE | n | DEFT | Never worked: Mean or per cent | SE | n | DEFT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age at first marriage | 16.03 | .17 | 357 | .95 | 15.16 | .14 | 582 | 1.17 | 17.30 | .34 | 126 | .98 | 16.05 | .06 | 3887 | 1.21 |
| Age at first marriage (<20) | 15.18 | .14 | 263 | .99 | 14.64 | .10 | 510 | 1.06 | 15.92 | .31 | 73 | 1.13 | 15.20 | .04 | 2868 | 1.02 |
| First marriage dissolved | 12.46 | 1.74 | 357 | .99 | 16.39 | 1.63 | 582 | 1.06 | 6.87 | 2.23 | 126 | .98 | 8.69 | .50 | 3887 | 1.10 |
| Time spent in union | 96.58 | .86 | 357 | 1.10 | 93.19 | .92 | 582 | 1.04 | 98.19 | .67 | 126 | .91 | 97.03 | .28 | 3887 | 1.12 |
| Currently married | 92.30 | 1.48 | 357 | 1.04 | 88.51 | 1.43 | 582 | 1.08 | 98.81 | .84 | 126 | .87 | 95.15 | .40 | 3887 | 1.18 |
| Births in first 5 years | 1.46 | .07 | 283 | 1.11 | 1.42 | .05 | 544 | 1.09 | 1.60 | .13 | 82 | 1.08 | 1.46 | .02 | 3066 | 1.19 |
| Births in past 5 years | 1.34 | .07 | 255 | 1.08 | 1.26 | .05 | 473 | .99 | 1.59 | .13 | 78 | 1.02 | 1.31 | .02 | 2866 | .97 |
| Currently pregnant | 18.35 | 2.02 | 330 | .94 | 16.89 | 1.68 | 513 | 1.01 | 30.71 | 4.02 | 124 | .97 | 16.34 | .67 | 3702 | 1.11 |
| Children ever born | 3.89 | .16 | 357 | .90 | 5.16 | .14 | 582 | 1.05 | 3.34 | .26 | 126 | .98 | 4.08 | .05 | 3887 | 1.00 |
| Living children | 2.94 | .12 | 357 | .91 | 3.83 | .11 | 582 | 1.07 | 2.51 | .16 | 126 | .90 | 3.14 | .04 | 3887 | 1.01 |
| Months breastfed closed interval | 15.79 | .50 | 262 | .90 | 16.56 | .43 | 503 | 1.02 | 14.04 | 1.02 | 85 | 1.07 | 15.83 | .18 | 2941 | 1.05 |
| Wants no more children | 39.15 | 3.49 | 304 | 1.24 | 51.31 | 2.56 | 421 | 1.05 | 33.64 | 5.42 | 117 | 1.24 | 42.19 | .86 | 3281 | 1.00 |
| Additional number wanted | 1.86 | .14 | 295 | 1.21 | 1.26 | .09 | 406 | 1.10 | 1.88 | .20 | 111 | 1.17 | 1.64 | .04 | 3125 | 1.12 |
| Desired family size | 4.43 | .10 | 327 | 1.15 | 4.29 | .07 | 501 | 1.02 | 4.15 | .14 | 124 | 1.10 | 4.13 | .04 | 3576 | 1.50 |
| Knows effective methods | 69.54 | 2.74 | 357 | 1.12 | 72.56 | 2.24 | 582 | 1.21 | 74.85 | 4.04 | 126 | 1.04 | 75.32 | .97 | 3887 | 1.40 |
| Ever used contraceptives | 6.05 | 1.13 | 357 | .90 | 9.06 | .98 | 582 | .83 | 16.57 | 3.69 | 126 | 1.11 | 10.15 | .48 | 3887 | 1.00 |
| Ever used effective methods | 4.98 | .99 | 357 | .86 | 7.85 | .90 | 582 | .81 | 15.37 | 3.62 | 126 | 1.12 | 8.54 | .43 | 3887 | .96 |
| Currently using (exposed) | 4.22 | 1.14 | 241 | .88 | 8.11 | 1.46 | 335 | .98 | 7.40 | 2.97 | 79 | 1.00 | 7.52 | .54 | 2671 | 1.07 |
| Using effective (exposed) | 2.11 | .81 | 241 | .87 | 6.03 | 1.18 | 335 | .91 | 4.54 | 2.24 | 79 | .95 | 5.49 | .44 | 2671 | 1.00 |
| Wants no more and using eff. (exp) | 4.43 | 1.84 | 104 | .91 | 10.58 | 2.14 | 175 | .92 | 10.10 | 6.97 | 22 | 1.06 | 11.59 | .94 | 1163 | 1.00 |
| Never used contraception | 93.95 | 1.13 | 357 | .90 | 90.94 | .98 | 582 | .83 | 83.43 | 3.69 | 126 | 1.11 | 89.85 | .48 | 3887 | 1.00 |
| Used in past | 3.17 | .91 | 357 | .98 | 4.33 | .71 | 582 | .84 | 11.94 | 3.02 | 126 | 1.04 | 4.99 | .32 | 3887 | .92 |
| Currently using | 2.89 | .79 | 357 | .89 | 4.74 | .85 | 582 | .97 | 4.62 | 1.91 | 126 | 1.02 | 5.16 | .38 | 3887 | 1.07 |

Table 8a Sampling errors by husband's occupation

| Variable name | Prof., tech. & clerical | | | | Sales | | | | Agricultural | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 16.83 | .19 | 461 | 1.07 | 16.16 | .14 | 612 | 1.05 | 15.84 | .08 | 1839 | 1.09 |
| Age at first marriage (<20) | 15.21 | .15 | 308 | 1.17 | 15.20 | .11 | 472 | 1.06 | 15.07 | .06 | 1414 | 1.07 |
| First marriage dissolved | 8.26 | 1.30 | 461 | 1.02 | 5.96 | 1.01 | 612 | 1.05 | 9.92 | .83 | 1839 | 1.19 |
| Time spent in union | 97.04 | .50 | 461 | .85 | 97.88 | .44 | 612 | 1.06 | 96.74 | .41 | 1839 | 1.13 |
| Currently married | 95.06 | .98 | 461 | .97 | 96.57 | .73 | 612 | .99 | 94.18 | .70 | 1839 | 1.29 |
| Births in first 5 years | 1.57 | .06 | 355 | 1.11 | 1.54 | .05 | 505 | 1.08 | 1.43 | .03 | 1509 | 1.20 |
| Births in past 5 years | 1.33 | .06 | 325 | 1.00 | 1.38 | .06 | 481 | 1.08 | 1.27 | .03 | 1398 | 1.15 |
| Currently pregnant | 14.54 | 1.58 | 436 | .93 | 17.88 | 1.59 | 590 | 1.01 | 15.47 | .82 | 1729 | .94 |
| Children ever born | 3.86 | .15 | 461 | .97 | 4.56 | .11 | 612 | .88 | 4.28 | .07 | 1839 | 1.01 |
| Living children | 3.08 | .11 | 461 | .93 | 3.56 | .09 | 612 | .87 | 3.26 | .06 | 1839 | 1.02 |
| Months breastfed closed interval | 14.57 | .49 | 332 | 1.03 | 14.34 | .44 | 497 | 1.16 | 16.44 | .26 | 1434 | 1.09 |
| Wants no more children | 43.29 | 2.29 | 394 | .92 | 52.24 | 1.85 | 527 | .85 | 40.14 | 1.32 | 1503 | 1.05 |
| Additional number wanted | 1.60 | .09 | 386 | .97 | 1.26 | .07 | 507 | .94 | 1.69 | .05 | 1440 | 1.12 |
| Desired family size | 3.84 | .08 | 431 | 1.22 | 4.03 | .07 | 579 | 1.24 | 4.37 | .05 | 1683 | 1.33 |
| Knows effective methods | 83.78 | 2.06 | 461 | 1.20 | 82.85 | 1.84 | 612 | 1.20 | 70.05 | 1.46 | 1839 | 1.37 |
| Ever used contraceptives | 21.13 | 2.20 | 461 | 1.16 | 18.31 | 1.59 | 612 | 1.02 | 4.66 | .52 | 1839 | 1.05 |
| Ever used effective methods | 17.29 | 1.91 | 461 | 1.08 | 16.43 | 1.55 | 612 | 1.03 | 3.84 | .48 | 1839 | 1.06 |
| Currently using (exposed) | 16.15 | 2.00 | 327 | .98 | 13.03 | 1.72 | 423 | 1.05 | 3.25 | .51 | 1236 | 1.01 |
| Using effective (exposed) | 10.60 | 1.54 | 327 | .90 | 9.64 | 1.46 | 423 | 1.02 | 2.20 | .43 | 1236 | 1.03 |
| Wants no more and using eff.(exp) | 19.75 | 2.85 | 147 | .86 | 16.12 | 2.30 | 233 | .95 | 5.07 | 1.03 | 495 | 1.05 |
| Never used contraception | 78.87 | 2.20 | 461 | 1.16 | 81.69 | 1.59 | 612 | 1.02 | 95.34 | .52 | 1839 | 1.05 |
| Used in past | 9.57 | 1.55 | 461 | 1.13 | 9.36 | 1.29 | 612 | 1.10 | 2.47 | .35 | 1839 | .95 |
| Currently using | 11.55 | 1.47 | 461 | .99 | 8.95 | 1.17 | 612 | 1.02 | 2.19 | .35 | 1839 | 1.01 |

Table 8a (*cont*)

| Variable name | Service workers | | | | Manual workers | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 15.89 | .16 | 390 | 1.06 | 15.95 | .10 | 1299 | 1.20 |
| Age at first marriage (<20) | 15.17 | .15 | 288 | 1.16 | 15.29 | .08 | 989 | 1.09 |
| First marriage dissolved | 13.36 | 1.92 | 390 | 1.11 | 9.64 | .94 | 1299 | 1.15 |
| Time spent in union | 93.82 | 1.21 | 390 | 1.00 | 96.27 | .58 | 1299 | 1.14 |
| Currently married | 91.48 | 1.55 | 390 | 1.09 | 94.37 | .84 | 1299 | 1.32 |
| Births in first 5 years | 1.37 | .06 | 303 | 1.02 | 1.46 | .03 | 1038 | 1.03 |
| Births in past 5 years | 1.27 | .07 | 269 | 1.15 | 1.41 | .04 | 962 | 1.08 |
| Currently pregnant | 19.68 | 2.15 | 358 | 1.02 | 20.13 | 1.14 | 1229 | 1.00 |
| Children ever born | 3.75 | .17 | 390 | 1.04 | 4.11 | .09 | 1299 | 1.03 |
| Living children | 2.86 | .12 | 390 | 1.01 | 3.13 | .07 | 1299 | 1.02 |
| Months breastfed closed interval | 16.76 | .59 | 287 | 1.06 | 15.57 | .29 | 994 | 1.01 |
| Wants no more children | 39.57 | 2.71 | 325 | 1.00 | 43.64 | 1.66 | 1097 | 1.11 |
| Additional number wanted | 1.77 | .10 | 312 | .95 | 1.59 | .06 | 1031 | 1.12 |
| Desired family size | 3.90 | .07 | 351 | 1.05 | 4.13 | .05 | 1170 | 1.18 |
| Knows effective methods | 76.56 | 2.31 | 390 | 1.07 | 76.30 | 1.39 | 1299 | 1.18 |
| Ever used contraceptives | 9.56 | 1.46 | 390 | .98 | 11.40 | .92 | 1299 | 1.04 |
| Ever used effective methods | 7.96 | 1.35 | 390 | .98 | 9.53 | .83 | 1299 | 1.02 |
| Currently using (exposed) | 7.56 | 1.68 | 255 | 1.02 | 8.27 | .97 | 851 | 1.03 |
| Using effective (exposed) | 5.67 | 1.40 | 255 | .96 | 6.08 | .83 | 851 | 1.01 |
| Wants no more and using eff.(exp) | 14.32 | 3.51 | 105 | 1.02 | 12.89 | 1.80 | 378 | 1.05 |
| Never used contraception | 90.44 | 1.46 | 390 | .98 | 88.60 | .92 | 1299 | 1.04 |
| Used in past | 4.60 | 1.03 | 390 | .97 | 6.00 | .63 | 1299 | .95 |
| Currently using | 4.96 | 1.10 | 390 | 1.00 | 5.40 | .64 | 1299 | 1.02 |

Table 9a Sampling errors by type of place of residence

| Variable name | Urban | | | | Rural | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 16.26 | .10 | 1909 | 1.25 | 15.87 | .07 | 3043 | 1.14 |
| Age at first marriage (<20) | 15.21 | .07 | 1405 | 1.15 | 15.11 | .04 | 2309 | 1.00 |
| First marriage dissolved | 9.72 | .81 | 1909 | 1.20 | 9.86 | .56 | 3043 | 1.03 |
| Time spent in union | 95.96 | .43 | 1909 | 1.03 | 96.62 | .27 | 3043 | .91 |
| Currently married | 94.19 | .62 | 1909 | 1.15 | 94.28 | .48 | 3043 | 1.14 |
| Births in first 5 years | 1.60 | .03 | 1521 | 1.02 | 1.41 | .02 | 2454 | 1.17 |
| Births in past 5 years | 1.36 | .03 | 1403 | .97 | 1.29 | .02 | 2269 | 1.04 |
| Currently pregnant | 17.97 | .99 | 1800 | 1.09 | 16.50 | .70 | 2869 | 1.01 |
| Children ever born | 4.27 | .06 | 1909 | .79 | 4.14 | .06 | 3043 | 1.03 |
| Living children | 3.40 | .05 | 1909 | .86 | 3.11 | .04 | 3043 | 1.01 |
| Months breastfed closed interval | 14.38 | .22 | 1468 | .94 | 16.43 | .20 | 2323 | 1.08 |
| Wants no more children | 48.95 | 1.32 | 1590 | 1.05 | 40.39 | 1.00 | 2533 | 1.03 |
| Additional number wanted | 1.46 | .05 | 1513 | 1.08 | 1.68 | .04 | 2424 | 1.14 |
| Desired family size | 3.87 | .05 | 1741 | 1.45 | 4.28 | .04 | 2787 | 1.37 |
| Knows effective methods | 81.06 | 1.25 | 1909 | 1.39 | 72.20 | 1.12 | 3043 | 1.38 |
| Ever used contraceptives | 20.53 | .96 | 1909 | 1.04 | 6.00 | .42 | 3043 | .97 |
| Ever used effective methods | 17.65 | .89 | 1909 | 1.02 | 4.98 | .39 | 3043 | .98 |
| Currently using (exposed) | 17.12 | 1.25 | 1266 | 1.18 | 3.85 | .38 | 2060 | .91 |
| Using effective (exposed) | 12.30 | .99 | 1266 | 1.07 | 2.78 | .34 | 2060 | .93 |
| Wants no more and using eff.(exp) | 21.22 | 1.65 | 641 | 1.02 | 6.33 | .82 | 823 | .96 |
| Never used contraception | 79.47 | .96 | 1909 | 1.04 | 94.00 | .42 | 3043 | .97 |
| Used in past | 9.20 | .72 | 1909 | 1.10 | 3.39 | .30 | 3043 | .91 |
| Currently using | 11.33 | .89 | 1909 | 1.22 | 2.60 | .26 | 3043 | .91 |

Table 9b Sampling errors for differences between type of place of residence subclasses

| | (Urban) - (Rural) | | | |
|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT |
| Age at first marriage | .39 | .12 | 2346 | 1.21 |
| Age at first marriage (<20) | .10 | .08 | 1746 | 1.07 |
| First marriage dissolved | -.14 | .96 | 2346 | 1.11 |
| Time spent in union | -.67 | .49 | 2346 | .96 |
| Currently married | -.09 | .77 | 2346 | 1.13 |
| Births in first 5 years | .19 | .03 | 1878 | 1.09 |
| Births in past 5 years | .07 | .04 | 1733 | .99 |
| Currently pregnant | 1.47 | 1.22 | 2212 | 1.07 |
| Children ever born | .13 | .08 | 2346 | .88 |
| Living children | .29 | .07 | 2346 | .91 |
| Months breastfed closed interval | -2.05 | .30 | 1799 | .99 |
| Wants no more children | 8.56 | 1.65 | 1953 | 1.04 |
| Additional number wanted | -.23 | .07 | 1863 | 1.11 |
| Desired family size | -.41 | .06 | 2143 | 1.42 |
| Knows effective methods | 8.86 | 1.70 | 2346 | 1.40 |
| Ever used contraceptives | 14.54 | 1.04 | 2346 | 1.02 |
| Ever used effective methods | 12.67 | .96 | 2346 | 1.01 |
| Currently using (exposed) | 13.27 | 1.31 | 1568 | 1.15 |
| Using effective (exposed) | 9.52 | 1.04 | 1568 | 1.05 |
| Wants no more and using eff.(exp) | 14.89 | 1.83 | 720 | 1.00 |
| Never used contraception | -14.54 | 1.04 | 2346 | 1.02 |
| Used in past | 5.80 | .78 | 2346 | 1.06 |
| Currently using | 8.73 | .93 | 2346 | 1.19 |

Table 10a Sampling errors by region of residence

| Variable name | Punjab Mean or per cent | SE | n | DEFT | Sind Mean or per cent | SE | n | DEFT | NWFP Mean or per cent | SE | n | DEFT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age at first marriage | 16.20 | .07 | 3252 | 1.21 | 15.45 | .11 | 1195 | 1.17 | 15.71 | .17 | 426 | 1.02 |
| Age at first marriage (<20) | 15.33 | .04 | 2459 | 1.00 | 14.72 | .09 | 897 | 1.21 | 14.82 | .11 | 304 | .90 |
| First marriage dissolved | 10.41 | .62 | 3252 | 1.16 | 8.78 | .70 | 1195 | .86 | 8.62 | 1.58 | 426 | 1.16 |
| Time spent in union | 96.14 | .30 | 3252 | .96 | 97.38 | .35 | 1195 | 1.02 | 96.58 | .81 | 426 | .99 |
| Currently married | 93.71 | .51 | 3252 | 1.19 | 95.96 | .59 | 1195 | 1.03 | 94.12 | 1.51 | 426 | 1.32 |
| Births in first 5 years | 1.44 | .02 | 2638 | 1.24 | 1.46 | .03 | 956 | 1.05 | 1.59 | .06 | 324 | 1.06 |
| Births in past 5 years | 1.29 | .02 | 2429 | .94 | 1.34 | .05 | 893 | 1.30 | 1.40 | .07 | 298 | 1.11 |
| Currently pregnant | 16.93 | .70 | 3050 | 1.03 | 16.25 | 1.25 | 1142 | 1.14 | 16.79 | 1.77 | 402 | .95 |
| Children ever born | 4.23 | .06 | 3252 | 1.00 | 4.05 | .10 | 1195 | 1.11 | 4.15 | .15 | 426 | .95 |
| Living children | 3.21 | .04 | 3252 | .94 | 3.16 | .08 | 1195 | 1.11 | 3.22 | .15 | 426 | 1.26 |
| Months breastfed closed interval | 16.24 | .19 | 2499 | 1.04 | 14.18 | .33 | 915 | 1.15 | 17.50 | .69 | 321 | 1.18 |
| Wants no more children | 44.77 | .92 | 2648 | .95 | 38.62 | 2.12 | 1042 | 1.41 | 42.62 | 1.77 | 361 | .68 |
| Additional number wanted | 1.52 | .04 | 2550 | 1.10 | 1.73 | .09 | 975 | 1.43 | 1.83 | .08 | 349 | .74 |
| Desired family size | 4.00 | .03 | 2957 | 1.34 | 4.49 | .08 | 1109 | 1.61 | 4.43 | .13 | 393 | 1.47 |
| Knows effective methods | 77.77 | .96 | 3252 | 1.31 | 63.37 | 2.34 | 1195 | 1.67 | 80.46 | 2.78 | 426 | 1.45 |
| Ever used contraceptives | 10.00 | .55 | 3252 | 1.04 | 10.21 | .86 | 1195 | .98 | 9.28 | 1.11 | 426 | .79 |
| Ever used effective methods | 8.13 | .50 | 3252 | 1.04 | 9.27 | .78 | 1195 | .93 | 8.76 | 1.10 | 426 | .80 |
| Currently using (exposed) | 7.28 | .60 | 2122 | 1.07 | 7.85 | 1.01 | 857 | 1.09 | 7.38 | 1.28 | 294 | .84 |
| Using effective (exposed) | 4.90 | .45 | 2122 | .97 | 6.20 | .87 | 857 | 1.06 | 6.20 | 1.32 | 294 | .94 |
| Wants no more and using eff.(exp) | 9.64 | .93 | 965 | .98 | 14.08 | 1.88 | 359 | 1.02 | 13.25 | 2.95 | 129 | .99 |
| Never used contraception | 90.00 | .55 | 3252 | 1.04 | 89.79 | .86 | 1195 | .98 | 90.72 | 1.11 | 426 | .79 |
| Used in past | 5.24 | .40 | 3252 | 1.01 | 4.52 | .46 | 1195 | .76 | 4.18 | .76 | 426 | .78 |
| Currently using | 4.76 | .40 | 3252 | 1.07 | 5.69 | .74 | 1195 | 1.10 | 5.10 | .89 | 426 | .84 |

**Table 10b** Sampling errors for differences between region subclasses

| | (Punjab) - (Sind) | | | | (Sind) - (NWFP) | | | |
|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | .75 | .13 | 1747 | 1.18 | -.25 | .20 | 628 | 1.06 |
| Age at first marriage (<20) | .60 | .10 | 1314 | 1.15 | -.09 | .14 | 454 | .98 |
| First marriage dissolved | 1.62 | .94 | 1747 | .96 | .16 | 1.73 | 628 | 1.09 |
| Time spent in union | -1.24 | .47 | 1747 | 1.00 | .80 | .89 | 628 | 1.00 |
| Currently married | -2.25 | .78 | 1747 | 1.09 | 1.85 | 1.62 | 628 | 1.27 |
| Births in first 5 years | -.02 | .04 | 1403 | 1.09 | -.12 | .07 | 483 | 1.06 |
| Births in past 5 years | -.04 | .05 | 1305 | 1.21 | -.06 | .08 | 446 | 1.16 |
| Currently pregnant | .68 | 1.45 | 1661 | 1.13 | -.53 | 2.16 | 594 | 1.00 |
| Children ever born | .18 | .12 | 1747 | 1.09 | -.10 | .18 | 628 | .99 |
| Living children | .04 | .09 | 1747 | 1.07 | -.06 | .17 | 628 | 1.22 |
| Months breastfed closed interval | 2.05 | .38 | 1339 | 1.12 | -3.31 | .76 | 475 | 1.18 |
| Wants no more children | 6.15 | 2.31 | 1495 | 1.29 | -4.00 | 2.75 | 536 | .91 |
| Additional number wanted | -.21 | .09 | 1410 | 1.35 | -.10 | .12 | 514 | .94 |
| Desired family size | -.50 | .09 | 1613 | 1.56 | .06 | .15 | 580 | 1.50 |
| Knows effective methods | 14.41 | 2.53 | 1747 | 1.61 | -17.09 | 3.63 | 628 | 1.53 |
| Ever used contraceptives | -.21 | 1.02 | 1747 | 1.00 | .93 | 1.40 | 628 | .85 |
| Ever used effective methods | -1.13 | .92 | 1747 | .96 | .51 | 1.35 | 628 | .84 |
| Currently using (exposed) | -.56 | 1.17 | 1220 | 1.08 | .47 | 1.62 | 437 | .91 |
| Using effective (exposed) | -1.31 | .97 | 1220 | 1.03 | .00 | 1.58 | 437 | .97 |
| Wants no more and using eff.(exp) | -4.44 | 2.10 | 523 | 1.01 | .83 | 3.50 | 189 | .99 |
| Never used contraception | .21 | 1.02 | 1747 | 1.00 | -.93 | 1.40 | 628 | .85 |
| Used in past | .72 | .61 | 1747 | .85 | .34 | .89 | 628 | .78 |
| Currently using | -.94 | .83 | 1747 | 1.09 | .59 | 1.16 | 628 | .92 |

**Table 11a** Sampling errors by region for rural areas

| Variable name | Punjab | | | | Sind | | | | NWFP | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 16.12 | .08 | 2140 | 1.18 | 15.16 | .14 | 521 | 1.02 | 15.57 | .18 | 333 | 1.03 |
| Age at first marriage (<20) | 15.31 | .05 | 1637 | .96 | 14.55 | .12 | 398 | 1.08 | 14.81 | .12 | 242 | .85 |
| First marriage dissolved | 10.51 | .72 | 2140 | 1.08 | 7.88 | .77 | 521 | .65 | 9.32 | 1.75 | 333 | 1.10 |
| Time spent in union | 96.40 | .33 | 2140 | .90 | 97.96 | .47 | 521 | 1.03 | 96.26 | .93 | 333 | .95 |
| Currently married | 93.69 | .61 | 2140 | 1.16 | 97.12 | .68 | 521 | .93 | 93.69 | 1.72 | 333 | 1.29 |
| Births in first 5 years | 1.40 | .03 | 1748 | 1.24 | 1.34 | .05 | 421 | 1.01 | 1.58 | .07 | 251 | 1.14 |
| Births in past 5 years | 1.27 | .02 | 1610 | .93 | 1.34 | .07 | 400 | 1.39 | 1.41 | .08 | 228 | 1.12 |
| Currently pregnant | 16.22 | .82 | 2005 | 1.00 | 16.61 | 1.85 | 506 | 1.11 | 17.01 | 1.87 | 312 | .88 |
| Children ever born | 4.22 | .07 | 2140 | 1.01 | 3.89 | .16 | 521 | 1.15 | 4.14 | .16 | 333 | .94 |
| Living children | 3.15 | .05 | 2140 | .94 | 2.97 | .12 | 521 | 1.07 | 3.17 | .17 | 333 | 1.29 |
| Months breastfed closed interval | 16.66 | .23 | 1645 | 1.03 | 14.55 | .50 | 394 | 1.18 | 18.07 | .79 | 251 | 1.17 |
| Wants no more children | 43.37 | 1.12 | 1730 | .94 | 32.52 | 2.86 | 474 | 1.33 | 39.93 | 1.64 | 283 | .56 |
| Additional number wanted | 1.55 | .05 | 1666 | 1.11 | 1.89 | .12 | 446 | 1.38 | 1.94 | .08 | 273 | .67 |
| Desired family size | 4.08 | .04 | 1937 | 1.26 | 4.81 | .12 | 502 | 1.53 | 4.51 | .15 | 306 | 1.47 |
| Knows effective methods | 76.34 | 1.19 | 2140 | 1.30 | 52.74 | 3.41 | 521 | 1.56 | 78.35 | 3.16 | 333 | 1.40 |
| Ever used contraceptives | 6.75 | .55 | 2140 | 1.02 | 2.50 | .56 | 521 | .82 | 7.52 | 1.09 | 333 | .76 |
| Ever used effective methods | 5.39 | .51 | 2140 | 1.04 | 2.50 | .56 | 521 | .82 | 6.92 | 1.08 | 333 | .78 |
| Currently using (exposed) | 4.29 | .50 | 1405 | .92 | 1.28 | .57 | 390 | 1.00 | 6.09 | 1.31 | 230 | .83 |
| Using effective (exposed) | 2.86 | .41 | 1405 | .93 | 1.28 | .57 | 390 | 1.00 | 5.22 | 1.36 | 230 | .93 |
| Wants no more and using eff.(exp) | 6.19 | .96 | 599 | .97 | 3.17 | 1.52 | 126 | .97 | 11.96 | 3.40 | 92 | 1.00 |
| Never used contraception | 93.25 | .55 | 2140 | 1.02 | 97.50 | .56 | 521 | .82 | 92.48 | 1.09 | 333 | .76 |
| Used in past | 3.94 | .41 | 2140 | .97 | 1.54 | .40 | 521 | .73 | 3.31 | .43 | 333 | .44 |
| Currently using | 2.81 | .33 | 2140 | .93 | .96 | .42 | 521 | .97 | 4.21 | .90 | 333 | .82 |

**Table 11b** Sampling errors for differences between region subclasses for rural areas

| | (Punjab) - (Sind) | | | | (Sind) - (NWFP) | | | |
|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | .95 | .16 | 837 | 1.05 | -.40 | .23 | 406 | 1.02 |
| Age at first marriage (<20) | .76 | .13 | 640 | 1.06 | -.26 | .17 | 300 | .94 |
| First marriage dissolved | 2.63 | 1.05 | 837 | .78 | -1.45 | 1.92 | 406 | .96 |
| Time spent in union | -1.56 | .58 | 837 | .98 | 1.70 | 1.04 | 406 | .96 |
| Currently married | -3.43 | .91 | 837 | 1.01 | 3.43 | 1.85 | 406 | 1.21 |
| Births in first 5 years | .06 | .06 | 678 | 1.05 | -.23 | .09 | 314 | 1.09 |
| Births in past 5 years | -.08 | .07 | 640 | 1.31 | -.07 | .10 | 290 | 1.22 |
| Currently pregnant | -.39 | 2.03 | 808 | 1.10 | -.40 | 2.63 | 385 | .97 |
| Children ever born | .33 | .17 | 837 | 1.13 | -.25 | .23 | 406 | 1.03 |
| Living children | .19 | .13 | 837 | 1.05 | -.20 | .21 | 406 | 1.21 |
| Months breastfed closed interval | 2.12 | .55 | 635 | 1.15 | -3.53 | .93 | 306 | 1.17 |
| Wants no more children | 10.85 | 3.07 | 744 | 1.25 | -7.41 | 3.30 | 354 | .91 |
| Additional number wanted | -.33 | .13 | 703 | 1.33 | -.05 | .15 | 338 | .96 |
| Desired family size | -.73 | .12 | 797 | 1.49 | .30 | .19 | 380 | 1.49 |
| Knows effective methods | 23.60 | 3.60 | 837 | 1.52 | -25.61 | 4.65 | 406 | 1.48 |
| Ever used contraceptives | 4.25 | .79 | 837 | .90 | -5.02 | 1.23 | 406 | .77 |
| Ever used effective methods | 2.90 | .76 | 837 | .90 | -4.42 | 1.22 | 406 | .79 |
| Currently using (exposed) | 3.00 | .76 | 610 | .96 | -4.80 | 1.43 | 289 | .85 |
| Using effective (exposed) | 1.57 | .70 | 610 | .97 | -3.93 | 1.47 | 289 | .93 |
| Wants no more and using eff. (exp) | 3.02 | 1.80 | 208 | .97 | -8.78 | 3.72 | 106 | .99 |
| Never used contraception | -4.25 | .79 | 837 | .90 | 5.02 | 1.23 | 406 | .77 |
| Used in past | 2.40 | .57 | 837 | .83 | -1.77 | .59 | 406 | .52 |
| Currently using | 1.85 | .53 | 837 | .96 | -3.25 | .99 | 406 | .84 |

**Table 12a** Sampling errors by region for urban areas

| Variable name | Punjab | | | | Sind | | | | NWFP | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 16.48 | .12 | 1112 | 1.23 | 15.85 | .16 | 674 | 1.33 | 16.57 | .59 | 93 | 1.29 |
| Age at first marriage (<20) | 15.38 | .07 | 822 | .99 | 14.97 | .13 | 499 | 1.34 | 14.84 | .33 | 62 | 1.21 |
| First marriage dissolved | 10.07 | 1.12 | 1112 | 1.24 | 10.01 | 1.28 | 674 | 1.11 | 4.27 | 2.87 | 93 | 1.36 |
| Time spent in union | 95.27 | .63 | 1112 | 1.00 | 96.63 | .56 | 674 | 1.08 | 98.58 | 1.06 | 93 | 1.21 |
| Currently married | 93.78 | .80 | 1112 | 1.10 | 94.41 | 1.10 | 674 | 1.24 | 96.80 | 2.02 | 93 | 1.10 |
| Births in first 5 years | 1.58 | .04 | 890 | 1.09 | 1.62 | .04 | 535 | .96 | 1.64 | .07 | 73 | .56 |
| Births in past 5 years | 1.39 | .04 | 819 | .95 | 1.33 | .05 | 493 | 1.03 | 1.31 | .12 | 70 | .88 |
| Currently pregnant | 19.26 | 1.30 | 1045 | 1.07 | 15.75 | 1.56 | 636 | 1.08 | 15.43 | 4.71 | 90 | 1.23 |
| Children ever born | 4.28 | .07 | 1112 | .74 | 4.28 | .10 | 674 | .80 | 4.24 | .37 | 93 | 1.04 |
| Living children | 3.38 | .06 | 1112 | .78 | 3.43 | .10 | 674 | .96 | 3.55 | .27 | 93 | .92 |
| Months breastfed closed interval | 14.81 | .30 | 854 | .97 | 13.70 | .36 | 521 | .93 | 13.87 | .60 | 70 | .59 |
| Wants no more children | 49.33 | 1.40 | 918 | .85 | 47.51 | 2.68 | 568 | 1.28 | 59.67 | 6.18 | 78 | 1.11 |
| Additional number wanted | 1.42 | .05 | 884 | .87 | 1.50 | .11 | 529 | 1.33 | 1.14 | .17 | 76 | .89 |
| Desired family size | 3.74 | .06 | 1020 | 1.48 | 4.03 | .09 | 607 | 1.44 | 3.97 | .16 | 87 | .97 |
| Knows effective methods | 82.50 | 1.36 | 1112 | 1.19 | 77.70 | 2.77 | 674 | 1.73 | 93.60 | 2.23 | 93 | .87 |
| Ever used contraceptives | 20.70 | 1.30 | 1112 | 1.07 | 20.61 | 1.60 | 674 | 1.03 | 20.26 | 3.36 | 93 | .80 |
| Ever used effective methods | 17.18 | 1.20 | 1112 | 1.06 | 18.40 | 1.50 | 674 | 1.00 | 20.26 | 3.36 | 93 | .80 |
| Currently using (exposed) | 17.38 | 1.76 | 717 | 1.24 | 17.39 | 1.93 | 467 | 1.10 | 15.44 | 3.39 | 64 | .74 |
| Using effective (exposed) | 11.77 | 1.25 | 717 | 1.04 | 13.36 | 1.69 | 467 | 1.07 | 12.35 | 3.99 | 64 | .96 |
| Wants no more and using eff.(exp) | 19.43 | 2.07 | 366 | 1.00 | 24.46 | 2.98 | 233 | 1.06 | 18.92 | 5.21 | 37 | .80 |
| Never used contraception | 79.30 | 1.30 | 1112 | 1.07 | 79.39 | 1.60 | 674 | 1.03 | 79.74 | 3.36 | 93 | .80 |
| Used in past | 9.54 | 1.05 | 1112 | 1.19 | 8.54 | .91 | 674 | .85 | 9.60 | 4.67 | 93 | 1.52 |
| Currently using | 11.16 | 1.18 | 1112 | 1.25 | 12.07 | 1.47 | 674 | 1.17 | 10.67 | 2.85 | 93 | .89 |

Table 12b Sampling errors for differences between region subclasses for urban areas

| | (Punjab) - (Sind) | | | | (Sind) - (NWFP) | | | |
|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | .64 | .20 | 839 | 1.30 | -.72 | .61 | 163 | 1.29 |
| Age at first marriage (<20) | .41 | .15 | 621 | 1.21 | .13 | .36 | 110 | 1.22 |
| First marriage dissolved | .06 | 1.70 | 839 | 1.16 | 5.74 | 3.15 | 163 | 1.31 |
| Time spent in union | -1.36 | .84 | 839 | 1.03 | -1.95 | 1.20 | 163 | 1.18 |
| Currently married | -.63 | 1.35 | 839 | 1.18 | -2.39 | 2.30 | 163 | 1.13 |
| Births in first 5 years | -.04 | .05 | 668 | 1.01 | -.02 | .08 | 128 | .61 |
| Births in past 5 years | .07 | .06 | 615 | 1.00 | .01 | .13 | 122 | .90 |
| Currently pregnant | 3.52 | 2.06 | 790 | 1.09 | .32 | 4.96 | 157 | 1.21 |
| Children ever born | -.00 | .13 | 839 | .79 | .04 | .39 | 163 | 1.02 |
| Living children | -.05 | .12 | 839 | .91 | -.12 | .29 | 163 | .93 |
| Months breastfed closed interval | 1.11 | .47 | 647 | .96 | -.17 | .70 | 123 | .64 |
| Wants no more children | 1.82 | 3.05 | 701 | 1.14 | -12.17 | 6.68 | 137 | 1.12 |
| Additional number wanted | -.08 | .12 | 661 | 1.20 | .36 | .20 | 132 | .97 |
| Desired family size | -.30 | .11 | 761 | 1.45 | .06 | .19 | 152 | 1.03 |
| Knows effective methods | 4.81 | 3.08 | 839 | 1.56 | -15.91 | 3.55 | 163 | 1.18 |
| Ever used contraceptives | .09 | 2.08 | 839 | 1.05 | .34 | 3.73 | 163 | .83 |
| Ever used effective methods | -1.22 | 1.93 | 839 | 1.03 | -1.86 | 3.69 | 163 | .83 |
| Currently using (exposed) | -.01 | 2.60 | 565 | 1.15 | 1.95 | 3.90 | 112 | .80 |
| Using effective (exposed) | -1.59 | 2.08 | 565 | 1.05 | 1.01 | 4.34 | 112 | .98 |
| Wants no more and using eff.(exp) | -5.03 | 3.63 | 284 | 1.04 | 5.54 | 5.99 | 63 | .84 |
| Never used contraception | -.09 | 2.08 | 839 | 1.05 | -.34 | 3.73 | 163 | .83 |
| Used in past | 1.00 | 1.41 | 839 | 1.01 | -1.06 | 4.76 | 163 | 1.46 |
| Currently using | -.91 | 1.87 | 839 | 1.19 | 1.41 | 3.21 | 163 | .93 |

Table 13a Sampling errors by current age for women with no schooling

| Variable name | <20 | | | | 20–24 | | | | 25–29 | | | | 30–34 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 14.78 | .08 | 532 | 1.08 | 15.67 | .10 | 695 | 1.06 | 16.36 | .12 | 773 | 1.05 | 16.34 | .15 | 709 | 1.13 |
| Age at first marriage (<20) | .00 | .00 | 0 | .00 | 15.20 | .08 | 636 | 1.03 | 15.36 | .09 | 659 | 1.02 | 15.21 | .09 | 601 | 1.01 |
| First marriage dissolved | 1.78 | .58 | 532 | 1.01 | 5.15 | .82 | 695 | .98 | 7.04 | 1.04 | 773 | 1.13 | 8.50 | 1.06 | 709 | 1.01 |
| Time spent in union | 99.07 | .47 | 532 | 1.04 | 98.79 | .29 | 695 | 1.01 | 98.16 | .37 | 773 | 1.12 | 97.87 | .41 | 709 | 1.05 |
| Currently married | 98.43 | .54 | 532 | 1.00 | 96.64 | .68 | 695 | .99 | 95.48 | .84 | 773 | 1.12 | 95.80 | .81 | 709 | 1.08 |
| Births in first 5 years | 1.16 | .15 | 48 | 1.02 | 1.53 | .04 | 476 | 1.01 | 1.49 | .03 | 716 | .98 | 1.50 | .04 | 699 | 1.02 |
| Births in past 5 years | 1.32 | .16 | 45 | 1.04 | 1.83 | .04 | 456 | .97 | 1.70 | .04 | 676 | 1.04 | 1.63 | .04 | 660 | 1.12 |
| Currently pregnant | 19.00 | 1.79 | 523 | 1.04 | 22.98 | 1.54 | 673 | .95 | 23.87 | 1.63 | 740 | 1.04 | 19.12 | 1.52 | 679 | 1.01 |
| Children ever born | .59 | .03 | 532 | .99 | 1.98 | .05 | 695 | .97 | 3.46 | .08 | 773 | 1.09 | 5.00 | .10 | 709 | 1.12 |
| Living children | .49 | .03 | 532 | .99 | 1.52 | .04 | 695 | .94 | 2.73 | .06 | 773 | 1.08 | 3.94 | .08 | 709 | 1.09 |
| Months breastfed closed interval | 11.86 | .86 | 102 | 1.03 | 13.62 | .42 | 448 | 1.03 | 15.59 | .34 | 663 | 1.01 | 16.82 | .37 | 650 | 1.13 |
| Wants no more children | 3.19 | .92 | 523 | 1.19 | 14.94 | 1.23 | 666 | .89 | 35.99 | 1.77 | 717 | .99 | 56.70 | 2.27 | 646 | 1.17 |
| Additional number wanted | 3.35 | .09 | 501 | 1.18 | 2.55 | .08 | 633 | 1.09 | 1.66 | .07 | 678 | 1.03 | 1.02 | .07 | 606 | 1.09 |
| Desired family size | 4.12 | .06 | 505 | .96 | 4.15 | .07 | 652 | 1.18 | 4.25 | .06 | 727 | 1.18 | 4.23 | .06 | 659 | 1.14 |
| Knows effective methods | 60.44 | 2.54 | 532 | 1.20 | 70.88 | 2.04 | 695 | 1.18 | 75.91 | 1.73 | 773 | 1.12 | 78.34 | 1.66 | 709 | 1.07 |
| Ever used contraceptives | .46 | .28 | 532 | .94 | 2.50 | .53 | 695 | .89 | 6.77 | .87 | 773 | .96 | 10.59 | 1.31 | 709 | 1.13 |
| Ever used effective methods | .34 | .25 | 532 | .99 | 2.40 | .52 | 695 | .89 | 5.74 | .86 | 773 | 1.03 | 8.72 | 1.19 | 709 | 1.12 |
| Currently using (exposed) | .00 | .00 | 421 | .00 | 1.67 | .54 | 506 | .95 | 4.82 | .91 | 540 | .98 | 6.38 | 1.13 | 519 | 1.05 |
| Using effective (exposed) | .00 | .00 | 421 | .00 | 1.55 | .53 | 506 | .96 | 3.65 | .84 | 540 | 1.04 | 4.59 | .95 | 519 | 1.04 |
| Wants no more and using eff.(exp) | .00 | .00 | 11 | .00 | 6.45 | 2.91 | 70 | .98 | 8.15 | 2.04 | 188 | 1.02 | 8.00 | 1.65 | 295 | 1.04 |
| Never used contraception | 99.54 | .28 | 532 | .94 | 97.50 | .53 | 695 | .89 | 93.23 | .87 | 773 | .96 | 89.41 | 1.31 | 709 | 1.13 |
| Used in past | .46 | .28 | 532 | .94 | 1.27 | .38 | 695 | .89 | 3.39 | .63 | 773 | .97 | 5.95 | .99 | 709 | 1.11 |
| Currently using | .00 | .00 | 532 | .00 | 1.23 | .40 | 695 | .95 | 3.37 | .64 | 773 | .98 | 4.64 | .83 | 709 | 1.05 |

Table 13a *(cont)*

| | 35–39 | | | | 40–44 | | | | 45–49 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 15.82 | .16 | 555 | 1.07 | 15.42 | .15 | 565 | 1.03 | 15.68 | .15 | 466 | 1.04 |
| Age at first marriage (<20) | 14.90 | .10 | 493 | 1.00 | 14.51 | .09 | 509 | 1.08 | 14.95 | .10 | 421 | 1.02 |
| First marriage dissolved | 14.79 | 1.50 | 555 | .99 | 15.76 | 1.50 | 565 | .98 | 22.60 | 2.06 | 466 | 1.06 |
| Time spent in union | 96.58 | .57 | 555 | 1.06 | 95.70 | .56 | 565 | .94 | 94.20 | .81 | 466 | 1.04 |
| Currently married | 93.27 | 1.07 | 555 | 1.00 | 90.10 | 1.28 | 565 | 1.02 | 86.62 | 1.68 | 466 | 1.07 |
| Births in first 5 years | 1.35 | .04 | 551 | 1.06 | 1.39 | .04 | 565 | 1.11 | 1.39 | .05 | 466 | 1.06 |
| Births in past 5 years | 1.26 | .05 | 510 | 1.12 | .79 | .04 | 503 | 1.01 | .18 | .02 | 401 | 1.06 |
| Currently pregnant | 11.91 | 1.56 | 518 | 1.09 | 7.35 | 1.19 | 508 | 1.03 | .58 | .41 | 403 | 1.08 |
| Children ever born | 6.16 | .13 | 555 | 1.13 | 7.01 | .14 | 565 | 1.07 | 6.93 | .16 | 466 | 1.12 |
| Living children | 4.86 | .11 | 555 | 1.05 | 4.98 | .11 | 565 | 1.06 | 4.90 | .12 | 466 | 1.01 |
| Months breastfed closed interval | 16.90 | .38 | 514 | .93 | 17.44 | .43 | 526 | 1.05 | 17.29 | .46 | 435 | 1.01 |
| Wants no more children | 72.57 | 1.93 | 474 | .94 | 82.47 | 2.19 | 361 | 1.09 | 86.53 | 2.92 | 149 | 1.04 |
| Additional number wanted | .58 | .06 | 451 | 1.01 | .44 | .07 | 352 | 1.10 | .28 | .08 | 146 | 1.07 |
| Desired family size | 4.31 | .07 | 501 | 1.00 | 4.44 | .09 | 484 | 1.26 | 4.35 | .08 | 384 | .98 |
| Knows effective methods | 75.89 | 2.08 | 555 | 1.14 | 74.77 | 1.98 | 565 | 1.08 | 70.95 | 2.16 | 466 | 1.03 |
| Ever used contraceptives | 15.14 | 1.55 | 555 | 1.01 | 12.33 | 1.33 | 565 | .96 | 10.28 | 1.34 | 466 | .95 |
| Ever used effective methods | 13.12 | 1.40 | 555 | .98 | 9.42 | 1.14 | 565 | .93 | 8.84 | 1.33 | 466 | 1.01 |
| Currently using (exposed) | 11.54 | 1.57 | 412 | .99 | 9.43 | 1.55 | 322 | .95 | 16.36 | 2.87 | 147 | .94 |
| Using effective (exposed) | 8.49 | 1.29 | 412 | .94 | 4.89 | 1.11 | 322 | .92 | 11.39 | 2.61 | 147 | .99 |
| Wants no more and using eff.(exp) | 11.84 | 1.77 | 299 | .94 | 5.97 | 1.33 | 265 | .91 | 13.20 | 3.01 | 128 | 1.00 |
| Never used contraception | 84.86 | 1.55 | 555 | 1.01 | 87.67 | 1.33 | 565 | .96 | 89.72 | 1.34 | 466 | .95 |
| Used in past | 6.57 | 1.01 | 555 | .96 | 6.89 | 1.03 | 565 | .97 | 5.07 | .97 | 466 | .96 |
| Currently using | 8.56 | 1.18 | 555 | .99 | 5.44 | .92 | 565 | .96 | 5.21 | .96 | 466 | .93 |

[*Table continues*]

Table 13a (*cont*)

| Variable name | <25 | | | | 25-34 | | | | 35-44 | | | | 45-49 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 15.28 | .07 | 1227 | 1.17 | 16.35 | .10 | 1482 | 1.16 | 15.62 | .11 | 1120 | 1.06 | 15.68 | .15 | 466 | 1.04 |
| Age at first marriage (<20) | 15.20 | .08 | 636 | 1.03 | 15.29 | .06 | 1260 | 1.03 | 14.70 | .07 | 1002 | 1.00 | 14.95 | .10 | 421 | 1.02 |
| First marriage dissolved | 3.69 | .54 | 1227 | 1.00 | 7.74 | .75 | 1482 | 1.08 | 15.28 | 1.00 | 1120 | .93 | 22.60 | 2.06 | 466 | 1.06 |
| Time spent in union | 98.85 | .25 | 1227 | 1.02 | 97.99 | .29 | 1482 | 1.08 | 96.09 | .41 | 1120 | 1.00 | 94.20 | .81 | 466 | 1.04 |
| Currently married | 97.42 | .45 | 1227 | .99 | 95.63 | .64 | 1482 | 1.21 | 91.66 | .84 | 1120 | 1.01 | 86.62 | 1.68 | 466 | 1.07 |
| Births in first 5 years | 1.50 | .04 | 524 | 1.05 | 1.49 | .03 | 1415 | 1.02 | 1.37 | .03 | 1116 | 1.14 | 1.39 | .05 | 466 | 1.06 |
| Births in past 5 years | 1.79 | .04 | 501 | .99 | 1.67 | .03 | 1336 | 1.01 | 1.02 | .03 | 1013 | 1.08 | .18 | .02 | 401 | 1.06 |
| Currently pregnant | 21.23 | 1.14 | 1196 | .96 | 21.59 | 1.16 | 1419 | 1.06 | 9.65 | .96 | 1026 | 1.04 | .58 | .41 | 403 | 1.08 |
| Children ever born | 1.38 | .04 | 1227 | .96 | 4.20 | .06 | 1482 | 1.10 | 6.59 | .11 | 1120 | 1.20 | 6.93 | .16 | 466 | 1.12 |
| Living children | 1.07 | .03 | 1227 | .96 | 3.31 | .05 | 1482 | 1.10 | 4.92 | .08 | 1120 | 1.16 | 4.90 | .12 | 466 | 1.01 |
| Months breastfed closed interval | 13.30 | .39 | 550 | 1.05 | 16.20 | .25 | 1313 | 1.06 | 17.18 | .27 | 1040 | .93 | 17.29 | .46 | 435 | 1.01 |
| Wants no more children | 9.74 | .77 | 1189 | .90 | 45.82 | 1.44 | 1363 | 1.06 | 76.89 | 1.57 | 835 | 1.08 | 86.53 | 2.92 | 149 | 1.04 |
| Additional number wanted | 2.91 | .06 | 1134 | 1.16 | 1.36 | .05 | 1284 | 1.01 | .52 | .05 | 803 | 1.10 | .28 | .08 | 146 | 1.07 |
| Desired family size | 4.14 | .05 | 1157 | 1.10 | 4.24 | .05 | 1386 | 1.25 | 4.38 | .06 | 985 | 1.28 | 4.35 | .08 | 384 | .98 |
| Knows effective methods | 66.34 | 1.63 | 1227 | 1.21 | 77.08 | 1.36 | 1482 | 1.25 | 75.33 | 1.55 | 1120 | 1.20 | 70.95 | 2.16 | 466 | 1.03 |
| Ever used contraceptives | 1.61 | .33 | 1227 | .93 | 8.60 | .77 | 1482 | 1.06 | 13.72 | 1.03 | 1120 | 1.00 | 10.28 | 1.34 | 466 | .95 |
| Ever used effective methods | 1.51 | .32 | 1227 | .91 | 7.17 | .71 | 1482 | 1.06 | 11.24 | .91 | 1120 | .96 | 8.84 | 1.33 | 466 | 1.01 |
| Currently using (exposed) | .91 | .30 | 927 | .95 | 5.58 | .77 | 1059 | 1.09 | 10.60 | 1.17 | 734 | 1.03 | 16.36 | 2.87 | 147 | .94 |
| Using effective (exposed) | .84 | .29 | 927 | .96 | 4.11 | .66 | 1059 | 1.08 | 6.89 | .94 | 734 | 1.00 | 11.39 | 2.61 | 147 | .99 |
| Wants no more and using eff.(exp) | 5.41 | 2.46 | 81 | .97 | 8.06 | 1.34 | 483 | 1.08 | 9.04 | 1.21 | 564 | 1.00 | 13.20 | 3.01 | 128 | 1.00 |
| Never used contraception | 98.39 | .33 | 1227 | .93 | 91.40 | .77 | 1482 | 1.06 | 86.28 | 1.03 | 1120 | 1.00 | 89.72 | 1.34 | 466 | .95 |
| Used in past | .92 | .26 | 1227 | .95 | 4.62 | .57 | 1482 | 1.05 | 6.73 | .72 | 1120 | .97 | 5.07 | .97 | 466 | .96 |
| Currently using | .69 | .23 | 1227 | .95 | 3.98 | .55 | 1482 | 1.08 | 6.98 | .79 | 1120 | 1.03 | 5.21 | .96 | 466 | .93 |

Table 14a Sampling errors by current age for women with some schooling

| | <20 | | | | 20–24 | | | | 25–29 | | | | 30–34 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 15.59 | .18 | 95 | 1.08 | 17.46 | .22 | 170 | 1.09 | 18.38 | .27 | 173 | 1.00 | 17.57 | .28 | 141 | .88 |
| Age at first marriage (<20) | .00 | .00 | 0 | .00 | 16.27 | .18 | 123 | 1.04 | 16.41 | .20 | 114 | .96 | 15.68 | .24 | 101 | 1.13 |
| First marriage dissolved | 5.20 | 2.55 | 95 | 1.11 | 2.35 | 1.20 | 170 | 1.03 | 6.20 | 1.96 | 173 | 1.07 | 7.68 | 2.29 | 141 | 1.02 |
| Time spent in union | 99.02 | .55 | 95 | 1.15 | 99.21 | .44 | 170 | .97 | 97.36 | .98 | 173 | .95 | 97.86 | .86 | 141 | 1.10 |
| Currently married | 94.80 | 2.55 | 95 | 1.11 | 98.14 | 1.10 | 170 | 1.06 | 97.52 | 1.10 | 173 | .93 | 95.39 | 1.86 | 141 | 1.05 |
| Births in first 5 years | 1.67 | .72 | 3 | .82 | 1.66 | .12 | 78 | 1.08 | 1.77 | .10 | 145 | 1.10 | 1.71 | .08 | 134 | 1.11 |
| Births in past 5 years | 1.67 | .72 | 3 | .82 | 1.85 | .13 | 77 | 1.13 | 1.86 | .11 | 136 | 1.14 | 1.56 | .09 | 127 | .95 |
| Currently pregnant | 30.41 | 4.24 | 91 | .87 | 24.81 | 3.55 | 167 | 1.06 | 27.88 | 3.63 | 168 | 1.05 | 16.74 | 3.44 | 135 | 1.07 |
| Children ever born | .46 | .07 | 95 | 1.07 | 1.60 | .11 | 170 | 1.01 | 2.97 | .15 | 173 | 1.05 | 4.81 | .24 | 141 | 1.17 |
| Living children | .42 | .07 | 95 | 1.05 | 1.38 | .10 | 170 | 1.00 | 2.53 | .14 | 173 | 1.05 | 4.15 | .19 | 141 | 1.10 |
| Months breastfed closed interval | 11.10 | 2.02 | 13 | .99 | 11.73 | .98 | 90 | 1.04 | 11.89 | .66 | 140 | .91 | 14.15 | .80 | 130 | 1.07 |
| Wants no more children | 4.15 | 2.38 | 91 | 1.13 | 25.40 | 3.19 | 166 | .94 | 42.43 | 4.14 | 166 | 1.08 | 71.57 | 3.88 | 128 | .97 |
| Additional number wanted | 2.54 | .16 | 88 | 1.14 | 1.89 | .12 | 161 | .96 | 1.50 | .14 | 159 | 1.08 | .78 | .13 | 124 | 1.00 |
| Desired family size | 3.41 | .11 | 88 | .95 | 3.28 | .08 | 165 | 1.06 | 3.53 | .09 | 168 | .99 | 3.72 | .13 | 134 | 1.15 |
| Knows effective methods | 79.25 | 4.22 | 95 | 1.01 | 89.50 | 2.46 | 170 | 1.04 | 92.93 | 2.05 | 173 | 1.05 | 91.24 | 2.65 | 141 | 1.11 |
| Ever used contraceptives | 1.65 | 1.16 | 95 | .88 | 13.58 | 2.53 | 170 | .96 | 29.86 | 3.90 | 173 | 1.12 | 37.29 | 4.44 | 141 | 1.09 |
| Ever used effective methods | .83 | .82 | 95 | .88 | 11.11 | 2.17 | 170 | .90 | 26.39 | 3.66 | 173 | 1.09 | 33.14 | 4.33 | 141 | 1.09 |
| Currently using (exposed) | 1.25 | 1.25 | 63 | .88 | 8.80 | 2.58 | 125 | 1.01 | 22.09 | 3.88 | 121 | 1.03 | 25.95 | 4.37 | 105 | 1.02 |
| Using effective (exposed) | .00 | .00 | 63 | .00 | 6.09 | 2.03 | 125 | .94 | 17.06 | 3.47 | 121 | 1.01 | 18.42 | 3.90 | 105 | 1.02 |
| Wants no more and using eff.(exp) | .00 | .00 | 2 | .00 | 6.44 | 4.25 | 28 | .90 | 27.25 | 5.90 | 52 | .95 | 25.28 | 5.11 | 77 | 1.02 |
| Never used contraception | 98.35 | 1.16 | 95 | .88 | 86.42 | 2.53 | 170 | .96 | 70.14 | 3.90 | 173 | 1.12 | 62.71 | 4.44 | 141 | 1.09 |
| Used in past | .83 | .82 | 95 | .88 | 7.16 | 2.08 | 170 | 1.05 | 14.62 | 2.90 | 173 | 1.08 | 18.28 | 3.75 | 141 | 1.15 |
| Currently using | .83 | .83 | 95 | .88 | 6.41 | 1.88 | 170 | 1.00 | 15.24 | 2.80 | 173 | 1.02 | 19.01 | 3.29 | 141 | .99 |

*[Table continues]*

Table 14a (*cont*)

| Variable name | 35-39 | | | | 40-44 | | | | 45-49 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 17.92 | .52 | 89 | 1.03 | 17.02 | .70 | 57 | 1.10 | 16.66 | .42 | 57 | .83 |
| Age at first marriage (<20) | 15.46 | .26 | 64 | .98 | 14.91 | .43 | 44 | 1.06 | 15.61 | .30 | 48 | .93 |
| First marriage dissolved | 9.44 | 3.47 | 89 | 1.11 | 18.79 | 5.14 | 57 | .98 | 17.83 | 5.36 | 57 | 1.05 |
| Time spent in union | 97.15 | 1.33 | 89 | .99 | 93.06 | 2.53 | 57 | .92 | 91.88 | 3.42 | 57 | 1.14 |
| Currently married | 94.20 | 2.40 | 89 | .96 | 86.53 | 4.55 | 57 | 1.00 | 83.72 | 5.15 | 57 | 1.04 |
| Births in first 5 years | 1.56 | .12 | 89 | .98 | 1.37 | .10 | 57 | .99 | 1.47 | .13 | 57 | .98 |
| Births in past 5 years | .93 | .11 | 82 | 1.02 | .73 | .12 | 48 | .93 | .16 | .07 | 48 | 1.15 |
| Currently pregnant | 5.91 | 2.72 | 83 | 1.04 | 1.63 | 1.57 | 49 | .86 | .00 | .00 | 48 | .00 |
| Children ever born | 5.38 | .33 | 89 | 1.06 | 6.47 | .51 | 57 | 1.08 | 6.04 | .46 | 57 | 1.12 |
| Living children | 4.55 | .28 | 89 | 1.04 | 5.09 | .39 | 57 | 1.05 | 4.73 | .35 | 57 | .99 |
| Months breastfed closed interval | 14.52 | 1.20 | 79 | 1.06 | 14.20 | 1.16 | 50 | 1.03 | 14.59 | 1.58 | 53 | 1.15 |
| Wants no more children | 71.52 | 5.88 | 76 | 1.13 | 94.33 | 3.99 | 38 | 1.05 | 86.68 | 5.21 | 27 | .78 |
| Additional number wanted | .73 | .17 | 73 | 1.04 | .23 | .16 | 38 | 1.05 | .37 | .17 | 27 | .82 |
| Desired family size | 3.54 | .12 | 79 | .99 | 3.75 | .18 | 48 | .94 | 3.49 | .12 | 48 | 1.03 |
| Knows effective methods | 92.73 | 3.07 | 89 | 1.11 | 86.19 | 4.32 | 57 | .94 | 91.08 | 3.20 | 57 | .84 |
| Ever used contraceptives | 44.28 | 5.32 | 89 | 1.01 | 34.75 | 6.27 | 57 | .99 | 22.85 | 5.81 | 57 | 1.04 |
| Ever used effective methods | 41.38 | 5.10 | 89 | .97 | 25.18 | 5.76 | 57 | .99 | 18.20 | 5.48 | 57 | 1.06 |
| Currently using (exposed) | 25.88 | 5.76 | 71 | 1.10 | 34.17 | 8.33 | 37 | 1.05 | 39.15 | 8.10 | 27 | .85 |
| Using effective (exposed) | 23.47 | 5.24 | 71 | 1.03 | 25.78 | 7.52 | 37 | 1.03 | 25.83 | 8.21 | 27 | .96 |
| Wants no more and using eff.(exp) | 33.75 | 7.36 | 51 | 1.10 | 27.36 | 7.88 | 35 | 1.03 | 29.80 | 9.48 | 23 | .97 |
| Never used contraception | 55.72 | 5.32 | 89 | 1.01 | 65.25 | 6.27 | 57 | .99 | 77.15 | 5.81 | 57 | 1.04 |
| Used in past | 23.47 | 3.99 | 89 | .88 | 11.72 | 4.42 | 57 | 1.03 | 4.64 | 2.57 | 57 | .91 |
| Currently using | 20.80 | 4.80 | 89 | 1.11 | 23.03 | 5.90 | 57 | 1.05 | 18.20 | 5.11 | 57 | .99 |

Table 14a (*cont*)

| Variable name | <25 Mean or per cent | SE | n | DEFT | 25-34 Mean or per cent | SE | n | DEFT | 35-44 Mean or per cent | SE | n | DEFT | 45-49 Mean or per cent | SE | n | DEFT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age at first marriage | 16.76 | .16 | 265 | 1.05 | 18.02 | .21 | 314 | .98 | 17.56 | .47 | 146 | 1.18 | 16.66 | .42 | 57 | .83 |
| Age at first marriage (<20) | 16.27 | .18 | 123 | 1.04 | 16.07 | .16 | 215 | 1.09 | 15.23 | .23 | 108 | 1.01 | 15.61 | .30 | 48 | .93 |
| First marriage dissolved | 3.41 | 1.24 | 265 | 1.11 | 6.86 | 1.60 | 314 | 1.12 | 13.23 | 3.16 | 146 | 1.12 | 17.83 | 5.36 | 57 | 1.05 |
| Time spent in union | 99.17 | .37 | 265 | .99 | 97.65 | .66 | 314 | 1.05 | 95.21 | 1.45 | 146 | .98 | 91.88 | 3.42 | 57 | 1.14 |
| Currently married | 96.90 | 1.20 | 265 | 1.12 | 96.57 | 1.07 | 314 | 1.04 | 91.09 | 2.52 | 146 | 1.07 | 83.72 | 5.15 | 57 | 1.04 |
| Births in first 5 years | 1.66 | .12 | 81 | 1.08 | 1.75 | .07 | 279 | 1.19 | 1.49 | .08 | 146 | .94 | 1.47 | .13 | 57 | .98 |
| Births in past 5 years | 1.84 | .13 | 80 | 1.12 | 1.72 | .08 | 263 | 1.13 | .85 | .08 | 130 | .95 | .16 | .07 | 48 | 1.15 |
| Currently pregnant | 26.86 | 3.08 | 258 | 1.11 | 22.96 | 2.78 | 303 | 1.15 | 4.26 | 1.73 | 132 | .98 | .00 | .00 | 48 | .00 |
| Children ever born | 1.18 | .08 | 265 | .97 | 3.79 | .14 | 314 | 1.07 | 5.82 | .29 | 146 | 1.08 | 6.04 | .46 | 57 | 1.12 |
| Living children | 1.02 | .07 | 265 | .95 | 3.25 | .12 | 314 | 1.04 | 4.77 | .24 | 146 | 1.08 | 4.73 | .35 | 57 | .99 |
| Months breastfed closed interval | 11.65 | .86 | 103 | 1.00 | 12.97 | .49 | 270 | .93 | 14.39 | .87 | 129 | 1.08 | 14.59 | 1.58 | 53 | 1.15 |
| Wants no more children | 17.59 | 2.10 | 257 | .88 | 54.91 | 2.94 | 294 | 1.01 | 79.59 | 4.23 | 114 | 1.12 | 86.68 | 5.21 | 27 | .78 |
| Additional number wanted | 2.13 | .09 | 249 | .93 | 1.19 | .10 | 283 | 1.01 | .55 | .12 | 111 | 1.04 | .37 | .17 | 27 | .82 |
| Desired family size | 3.33 | .07 | 253 | 1.06 | 3.61 | .08 | 302 | 1.09 | 3.62 | .10 | 127 | .95 | 3.49 | .12 | 48 | 1.03 |
| Knows effective methods | 85.67 | 2.24 | 265 | 1.04 | 92.17 | 1.86 | 314 | 1.23 | 90.08 | 2.51 | 146 | 1.01 | 91.08 | 3.20 | 57 | .84 |
| Ever used contraceptives | 9.12 | 1.67 | 265 | .94 | 33.18 | 2.96 | 314 | 1.11 | 40.41 | 4.15 | 146 | 1.02 | 22.85 | 5.81 | 57 | 1.04 |
| Ever used effective methods | 7.27 | 1.42 | 265 | .89 | 29.41 | 2.82 | 314 | 1.10 | 34.80 | 3.90 | 146 | .99 | 18.20 | 5.48 | 57 | 1.06 |
| Currently using (exposed) | 6.15 | 1.78 | 188 | 1.01 | 23.87 | 3.03 | 226 | 1.07 | 28.90 | 4.70 | 108 | 1.07 | 39.15 | 8.10 | 27 | .85 |
| Using effective (exposed) | 3.96 | 1.35 | 188 | .95 | 17.69 | 2.71 | 226 | 1.07 | 24.31 | 4.41 | 108 | 1.06 | 25.83 | 8.21 | 27 | .96 |
| Wants no more and using eff.(exp) | 5.92 | 3.92 | 30 | .90 | 26.06 | 3.85 | 129 | .99 | 30.96 | 5.49 | 86 | 1.10 | 29.80 | 9.48 | 23 | .97 |
| Never used contraception | 90.88 | 1.67 | 265 | .94 | 66.82 | 2.96 | 314 | 1.11 | 59.59 | 4.15 | 146 | 1.02 | 77.15 | 5.81 | 57 | 1.04 |
| Used in past | 4.80 | 1.33 | 265 | 1.01 | 16.26 | 2.37 | 314 | 1.14 | 18.70 | 2.76 | 146 | .85 | 4.64 | 2.57 | 57 | .91 |
| Currently using | 4.33 | 1.24 | 265 | .99 | 16.92 | 2.34 | 314 | 1.10 | 21.71 | 3.63 | 146 | 1.06 | 18.20 | 5.11 | 57 | .99 |

Table 15a Sampling errors by years since first marriage for women with no schooling

| | <5 | | | | 5-9 | | | | 10-14 | | | | 15-19 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 16.77 | .14 | 774 | 1.11 | 16.49 | .15 | 748 | 1.25 | 16.04 | .12 | 697 | 1.10 | 15.69 | .12 | 657 | .98 |
| Age at first marriage (<20) | 17.30 | .09 | 160 | .98 | 15.66 | .08 | 592 | 1.03 | 15.32 | .09 | 617 | 1.11 | 14.92 | .08 | 592 | .95 |
| First marriage dissolved | 3.18 | .64 | 774 | 1.01 | 5.45 | .93 | 748 | 1.12 | 6.29 | 1.01 | 697 | 1.09 | 10.36 | 1.12 | 657 | .94 |
| Time spent in union | 98.63 | .43 | 774 | 1.16 | 98.52 | .33 | 748 | 1.04 | 98.25 | .37 | 697 | 1.05 | 97.68 | .38 | 657 | .98 |
| Currently married | 97.29 | .59 | 774 | 1.01 | 96.10 | .70 | 748 | .99 | 96.40 | .79 | 697 | 1.13 | 94.50 | .93 | 657 | 1.05 |
| Births in first 5 years | .00 | .00 | 0 | .00 | 1.55 | .04 | 748 | 1.13 | 1.53 | .04 | 697 | 1.11 | 1.45 | .03 | 657 | .91 |
| Births in past 5 years | .00 | .00 | 0 | .00 | 1.81 | .03 | 709 | 1.01 | 1.67 | .03 | 662 | .97 | 1.53 | .04 | 611 | 1.06 |
| Currently pregnant | 20.60 | 1.55 | 754 | 1.05 | 23.65 | 1.59 | 720 | 1.00 | 20.75 | 1.52 | 672 | .97 | 17.99 | 1.77 | 620 | 1.15 |
| Children ever born | .62 | .03 | 774 | 1.00 | 2.46 | .05 | 748 | 1.03 | 4.10 | .08 | 697 | 1.07 | 5.47 | .10 | 657 | 1.10 |
| Living children | .51 | .02 | 774 | .95 | 1.94 | .05 | 748 | 1.12 | 3.25 | .07 | 697 | 1.11 | 4.27 | .09 | 657 | 1.06 |
| Months breastfed closed interval | 11.53 | .58 | 157 | .95 | 14.38 | .37 | 608 | 1.04 | 15.96 | .36 | 635 | 1.06 | 16.83 | .41 | 607 | 1.13 |
| Wants no more children | 4.29 | .86 | 750 | 1.16 | 23.10 | 1.40 | 709 | .88 | 40.76 | 2.19 | 648 | 1.13 | 63.73 | 2.15 | 578 | 1.07 |
| Additional number wanted | 3.33 | .07 | 722 | 1.07 | 2.10 | .07 | 671 | 1.01 | 1.47 | .08 | 609 | 1.15 | .78 | .06 | 538 | 1.07 |
| Desired family size | 4.06 | .05 | 730 | 1.06 | 4.10 | .06 | 699 | 1.18 | 4.42 | .07 | 658 | 1.24 | 4.24 | .06 | 602 | 1.04 |
| Knows effective methods | 64.21 | 1.94 | 774 | 1.12 | 72.77 | 1.79 | 748 | 1.10 | 76.91 | 1.91 | 697 | 1.19 | 77.57 | 1.69 | 657 | 1.04 |
| Ever used contraceptives | 1.03 | .33 | 774 | .91 | 4.19 | .68 | 748 | .93 | 7.48 | .96 | 697 | .97 | 12.14 | 1.19 | 657 | .93 |
| Ever used effective methods | .63 | .27 | 774 | .95 | 3.54 | .69 | 748 | 1.02 | 6.52 | .86 | 697 | .91 | 10.59 | 1.15 | 657 | .96 |
| Currently using (exposed) | .72 | .27 | 592 | .78 | 2.55 | .68 | 531 | 1.00 | 4.65 | .98 | 511 | 1.05 | 8.59 | 1.23 | 468 | .95 |
| Using effective (exposed) | .41 | .25 | 592 | .94 | 2.19 | .65 | 531 | 1.03 | 3.55 | .88 | 511 | 1.07 | 6.47 | 1.06 | 468 | .93 |
| Wants no more and using eff.(exp) | 5.47 | 5.31 | 20 | 1.02 | 7.01 | 2.40 | 112 | .99 | 7.88 | 1.89 | 210 | 1.02 | 9.85 | 1.64 | 298 | .95 |
| Never used contraception | 98.97 | .33 | 774 | .91 | 95.81 | .68 | 748 | .93 | 92.52 | .96 | 697 | .97 | 87.86 | 1.19 | 657 | .93 |
| Used in past | .49 | .25 | 774 | 1.02 | 2.36 | .50 | 748 | .90 | 4.07 | .68 | 697 | .91 | 6.07 | .96 | 657 | 1.03 |
| Currently using | .55 | .21 | 774 | .79 | 1.83 | .49 | 748 | 1.00 | 3.41 | .72 | 697 | 1.05 | 6.07 | .89 | 657 | .95 |

Table 15a (*cont*)

| Variable name | 20–24 Mean or per cent | SE | n | DEFT | 25–29 Mean or per cent | SE | n | DEFT | 30+ Mean or per cent | SE | n | DEFT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age at first marriage | 15.48 | .13 | 463 | .99 | 14.77 | .10 | 568 | .99 | 14.77 | .10 | 568 | .99 |
| Age at first marriage (<20) | 14.90 | .11 | 427 | 1.06 | 14.50 | .09 | 543 | .95 | 14.50 | .09 | 543 | .95 |
| First marriage dissolved | 14.09 | 1.63 | 463 | 1.01 | 16.68 | 1.57 | 568 | 1.00 | 16.68 | 1.57 | 568 | 1.00 |
| Time spent in union | 96.95 | .57 | 463 | 1.06 | 95.34 | .66 | 568 | 1.05 | 95.34 | .66 | 568 | 1.05 |
| Currently married | 93.52 | 1.15 | 463 | 1.00 | 90.32 | 1.29 | 568 | 1.04 | 90.32 | 1.29 | 568 | 1.04 |
| Births in first 5 years | 1.40 | .05 | 463 | 1.10 | 1.30 | .05 | 568 | 1.10 | 1.30 | .05 | 568 | 1.10 |
| Births in past 5 years | 1.18 | .05 | 429 | 1.14 | .66 | .03 | 510 | .91 | .66 | .03 | 510 | .91 |
| Currently pregnant | 12.54 | 1.56 | 432 | .98 | 5.39 | 1.06 | 515 | 1.07 | 5.39 | 1.06 | 515 | 1.07 |
| Children ever born | 6.57 | .14 | 463 | 1.13 | 6.92 | .15 | 568 | 1.13 | 6.92 | .15 | 568 | 1.13 |
| Living children | 5.02 | .11 | 463 | 1.04 | 5.04 | .11 | 568 | 1.06 | 5.04 | .11 | 568 | 1.06 |
| Months breastfed closed interval | 16.91 | .45 | 439 | 1.02 | 17.43 | .39 | 525 | .97 | 17.43 | .39 | 525 | .97 |
| Wants no more children | 75.67 | 2.21 | 374 | .99 | 81.76 | 2.24 | 350 | 1.08 | 81.76 | 2.24 | 350 | 1.08 |
| Additional number wanted | .52 | .06 | 361 | .98 | .44 | .07 | 341 | 1.14 | .44 | .07 | 341 | 1.14 |
| Desired family size | 4.41 | .08 | 417 | 1.08 | 4.34 | .07 | 489 | 1.04 | 4.34 | .07 | 489 | 1.04 |
| Knows effective methods | 74.57 | 2.15 | 463 | 1.06 | 75.28 | 2.04 | 568 | 1.12 | 75.28 | 2.04 | 568 | 1.12 |
| Ever used contraceptives | 14.33 | 1.71 | 463 | 1.05 | 12.26 | 1.45 | 568 | 1.05 | 12.26 | 1.45 | 568 | 1.05 |
| Ever used effective methods | 11.49 | 1.57 | 463 | 1.06 | 10.23 | 1.29 | 568 | 1.01 | 10.23 | 1.29 | 568 | 1.01 |
| Currently using (exposed) | 12.31 | 1.87 | 319 | 1.01 | 9.14 | 1.66 | 321 | 1.03 | 9.14 | 1.66 | 321 | 1.03 |
| Using effective (exposed) | 8.01 | 1.58 | 319 | 1.04 | 5.86 | 1.25 | 321 | .95 | 5.86 | 1.25 | 321 | .95 |
| Wants no more and using eff.(exp) | 10.66 | 2.06 | 242 | 1.04 | 7.22 | 1.50 | 261 | .94 | 7.22 | 1.50 | 261 | .94 |
| Never used contraception | 85.67 | 1.71 | 463 | 1.05 | 87.74 | 1.45 | 568 | 1.05 | 87.74 | 1.45 | 568 | 1.05 |
| Used in past | 5.78 | 1.07 | 463 | .98 | 7.08 | 1.09 | 568 | 1.01 | 7.08 | 1.09 | 568 | 1.01 |
| Currently using | 8.55 | 1.30 | 463 | 1.00 | 5.18 | .96 | 568 | 1.04 | 5.18 | .96 | 568 | 1.04 |

Table 16a Sampling errors by years since first marriage for women with some schooling

| | <5 | | | | 5-9 | | | | 10-14 | | | | 15-19 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable name | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT | Mean or per cent | SE | n | DEFT |
| Age at first marriage | 18.46 | .24 | 219 | 1.01 | 18.25 | .30 | 169 | 1.12 | 17.64 | .39 | 136 | 1.10 | 16.33 | .30 | 96 | 1.01 |
| Age at first marriage (<20) | 17.58 | .18 | 45 | .97 | 16.71 | .19 | 115 | 1.11 | 15.95 | .23 | 102 | 1.03 | 15.50 | .20 | 85 | 1.02 |
| First marriage dissolved | 3.81 | 1.45 | 219 | 1.12 | 2.82 | 1.32 | 169 | 1.04 | 8.55 | 2.54 | 136 | 1.05 | 8.26 | 2.78 | 96 | .98 |
| Time spent in union | 98.84 | .56 | 219 | 1.09 | 98.68 | .64 | 169 | 1.01 | 97.28 | .94 | 136 | .95 | 98.17 | .75 | 96 | .97 |
| Currently married | 96.19 | 1.45 | 219 | 1.12 | 99.02 | .71 | 169 | .93 | 95.09 | 1.91 | 136 | 1.02 | 96.33 | 1.86 | 96 | .96 |
| Births in first 5 years | .00 | .00 | 0 | .00 | 1.77 | .10 | 169 | 1.24 | 1.77 | .08 | 136 | .99 | 1.52 | .09 | 96 | .93 |
| Births in past 5 years | .00 | .00 | 0 | .00 | 1.88 | .10 | 165 | 1.20 | 1.59 | .09 | 125 | 1.00 | 1.33 | .11 | 91 | .99 |
| Currently pregnant | 31.39 | 3.12 | 212 | .98 | 22.46 | 3.78 | 167 | 1.17 | 21.51 | 3.88 | 129 | 1.07 | 10.03 | 3.35 | 92 | 1.06 |
| Children ever born | .68 | .05 | 219 | .88 | 2.53 | .14 | 169 | 1.27 | 4.09 | .13 | 136 | .84 | 5.24 | .25 | 96 | 1.01 |
| Living children | .62 | .05 | 219 | .86 | 2.13 | .14 | 169 | 1.31 | 3.56 | .11 | 136 | .80 | 4.43 | .22 | 96 | .98 |
| Months breastfed closed interval | 9.41 | 1.11 | 54 | 1.09 | 11.84 | .76 | 137 | 1.00 | 14.27 | .91 | 124 | 1.13 | 13.83 | .88 | 90 | .96 |
| Wants no more children | 9.05 | 2.10 | 211 | 1.06 | 38.72 | 4.51 | 165 | 1.19 | 66.77 | 4.26 | 125 | 1.01 | 72.15 | 5.41 | 83 | 1.09 |
| Additional number wanted | 2.40 | .10 | 205 | 1.02 | 1.57 | .15 | 159 | 1.14 | .83 | .13 | 120 | .98 | .75 | .17 | 80 | 1.07 |
| Desired family size | 3.29 | .08 | 207 | 1.10 | 3.46 | .10 | 167 | 1.10 | 3.48 | .09 | 128 | .95 | 3.81 | .17 | 91 | 1.13 |
| Knows effective methods | 84.70 | 2.77 | 219 | 1.14 | 91.90 | 2.02 | 169 | .96 | 91.60 | 2.56 | 136 | 1.07 | 92.18 | 2.93 | 96 | 1.06 |
| Ever used contraceptives | 7.96 | 1.57 | 219 | .86 | 25.28 | 3.81 | 169 | 1.14 | 32.45 | 4.21 | 136 | 1.05 | 44.10 | 5.16 | 96 | 1.01 |
| Ever used effective methods | 6.44 | 1.51 | 219 | .91 | 22.83 | 3.41 | 169 | 1.05 | 29.28 | 4.21 | 136 | 1.07 | 36.98 | 5.29 | 96 | 1.07 |
| Currently using (exposed) | 7.54 | 1.69 | 145 | .77 | 12.91 | 3.26 | 128 | 1.09 | 18.55 | 3.95 | 98 | 1.00 | 34.60 | 6.03 | 74 | 1.08 |
| Using effective (exposed) | 5.22 | 1.54 | 145 | .83 | 9.64 | 2.81 | 128 | 1.07 | 11.48 | 3.30 | 98 | 1.02 | 27.38 | 5.72 | 74 | 1.10 |
| Wants no more and using eff.(exp) | 19.01 | 12.45 | 9 | .90 | 11.76 | 4.23 | 48 | .90 | 17.66 | 5.00 | 66 | 1.06 | 38.15 | 7.63 | 54 | 1.14 |
| Never used contraception | 92.04 | 1.57 | 219 | .86 | 74.72 | 3.81 | 169 | 1.14 | 67.55 | 4.21 | 136 | 1.05 | 55.90 | 5.16 | 96 | 1.01 |
| Used in past | 3.03 | 1.17 | 219 | 1.01 | 15.59 | 3.04 | 169 | 1.09 | 19.16 | 3.40 | 136 | 1.00 | 17.70 | 3.84 | 96 | .98 |
| Currently using | 4.93 | 1.11 | 219 | .76 | 9.69 | 2.58 | 169 | 1.13 | 13.29 | 2.74 | 136 | .94 | 26.40 | 4.60 | 96 | 1.02 |

Table 16a (*cont*)

| Variable name | 20-24 Mean or per cent | SE | n | DEFT | 25-29 Mean or per cent | SE | n | DEFT | 30+ Mean or per cent | SE | n | DEFT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age at first marriage | 15.87 | .43 | 69 | 1.19 | 16.07 | .35 | 51 | .90 | 16.07 | .35 | 51 | .90 |
| Age at first marriage (<20) | 14.98 | .35 | 59 | 1.23 | 15.57 | .32 | 46 | .91 | 15.57 | .32 | 46 | .91 |
| First marriage dissolved | 12.84 | 4.65 | 69 | 1.15 | 17.10 | 6.01 | 51 | 1.13 | 17.10 | 6.01 | 51 | 1.13 |
| Time spent in union | 95.70 | 1.76 | 69 | 1.06 | 95.78 | 2.16 | 51 | .99 | 95.78 | 2.16 | 51 | .99 |
| Currently married | 89.60 | 4.00 | 69 | 1.08 | 90.42 | 4.34 | 51 | 1.04 | 90.42 | 4.34 | 51 | 1.04 |
| Births in first 5 years | 1.64 | .11 | 69 | .94 | 1.36 | .13 | 51 | 1.03 | 1.36 | .13 | 51 | 1.03 |
| Births in past 5 years | .92 | .11 | 61 | .92 | .56 | .15 | 46 | 1.05 | .56 | .15 | 46 | 1.05 |
| Currently pregnant | 2.72 | 1.92 | 62 | .92 | 3.68 | 2.47 | 46 | .88 | 3.68 | 2.47 | 46 | .88 |
| Children ever born | 6.42 | .45 | 69 | 1.23 | 6.79 | .49 | 51 | 1.14 | 6.79 | .49 | 51 | 1.14 |
| Living children | 5.48 | .36 | 69 | 1.16 | 5.33 | .36 | 51 | 1.04 | 5.33 | .36 | 51 | 1.04 |
| Months breastfed closed interval | 14.98 | 1.18 | 64 | 1.05 | 14.07 | 1.54 | 47 | 1.11 | 14.07 | 1.54 | 47 | 1.11 |
| Wants no more children | 79.90 | 5.66 | 55 | 1.04 | 93.40 | 4.76 | 35 | 1.12 | 93.40 | 4.76 | 35 | 1.12 |
| Additional number wanted | .60 | .18 | 54 | 1.02 | .02 | .03 | 34 | .94 | .02 | .03 | 34 | .94 |
| Desired family size | 3.95 | .12 | 60 | 1.00 | 3.50 | .18 | 44 | 1.09 | 3.50 | .18 | 44 | 1.09 |
| Knows effective methods | 90.82 | 3.72 | 69 | 1.06 | 91.68 | 3.47 | 51 | .89 | 91.68 | 3.47 | 51 | .89 |
| Ever used contraceptives | 38.18 | 6.68 | 69 | 1.13 | 41.25 | 7.80 | 51 | 1.12 | 41.25 | 7.80 | 51 | 1.12 |
| Ever used effective methods | 35.74 | 6.34 | 69 | 1.09 | 31.27 | 6.88 | 51 | 1.05 | 31.27 | 6.88 | 51 | 1.05 |
| Currently using (exposed) | 35.81 | 6.21 | 53 | .93 | 35.84 | 9.72 | 33 | 1.15 | 35.84 | 9.72 | 33 | 1.15 |
| Using effective (exposed) | 32.63 | 6.22 | 53 | .96 | 23.29 | 8.01 | 33 | 1.07 | 23.29 | 8.01 | 33 | 1.07 |
| Wants no more and using eff.(exp) | 41.17 | 6.96 | 43 | .92 | 25.03 | 8.55 | 31 | 1.08 | 25.03 | 8.55 | 31 | 1.08 |
| Never used contraception | 61.82 | 6.68 | 69 | 1.13 | 58.75 | 7.80 | 51 | 1.12 | 58.75 | 7.80 | 51 | 1.12 |
| Used in past | 10.69 | 3.84 | 69 | 1.03 | 17.50 | 5.02 | 51 | .94 | 17.50 | 5.02 | 51 | .94 |
| Currently using | 27.49 | 5.46 | 69 | 1.01 | 23.75 | 7.23 | 51 | 1.20 | 23.75 | 7.23 | 51 | 1.20 |