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**The Analysis of Repeat
Fertility Surveys:
Examples from
Dominican Republic**

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The World Fertility Survey is an international research programme whose purpose is to assess the current state of human fertility throughout the world. This is being done principally through promoting and supporting nationally representative, internationally comparable, and scientifically designed and conducted sample surveys of fertility behaviour in as many countries as possible.

The WFS is being undertaken, with the collaboration of the United Nations, by the International Statistical Institute in cooperation with the International Union for the Scientific Study of Population. Financial support is provided principally by the United Nations Fund for Population Activities and the United States Agency for International Development.

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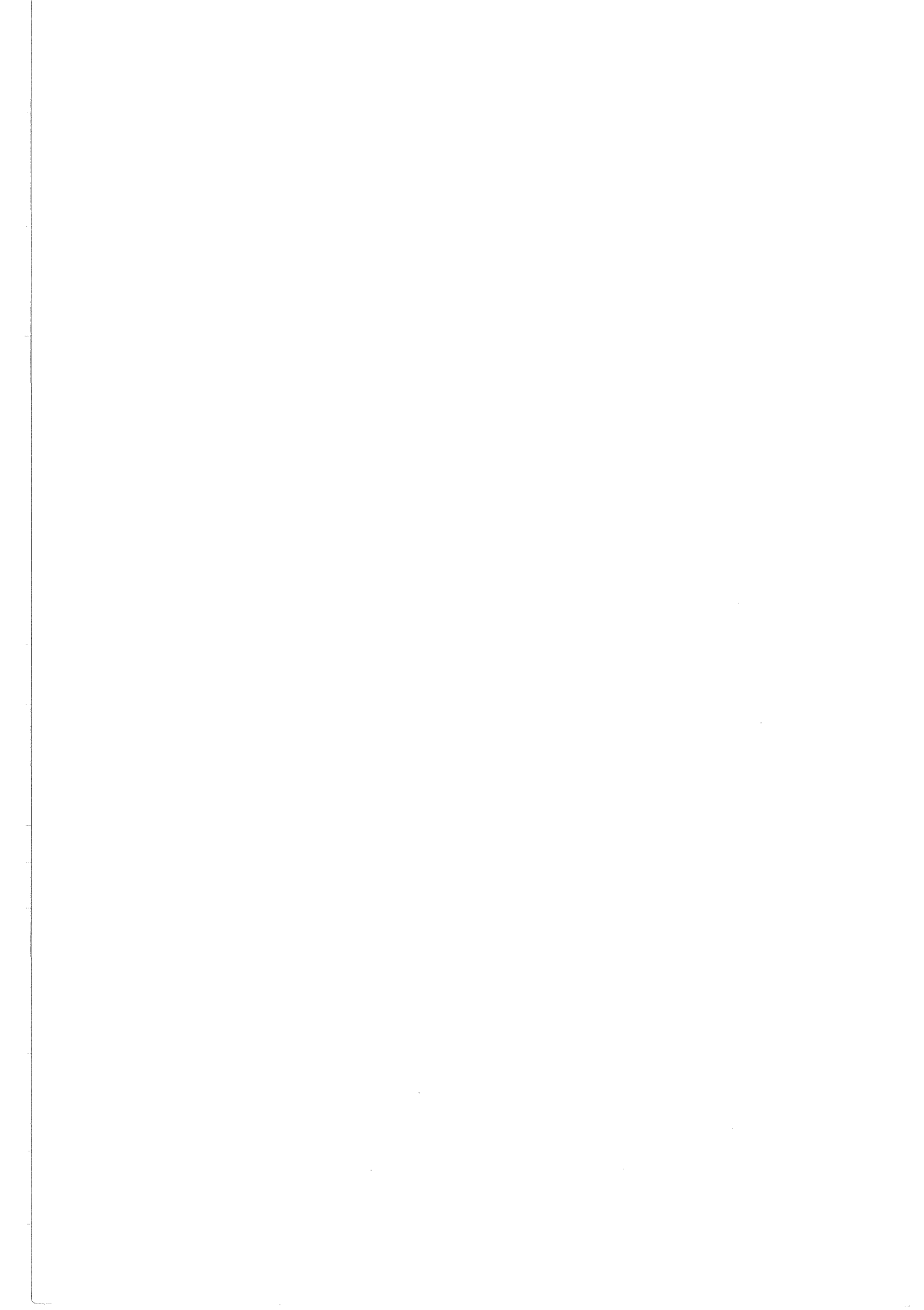
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Preface

In developed countries it has become an established tradition to repeat a fertility survey at regular intervals. The information so obtained has been used extensively to document changes in family planning behaviour, family size preferences, attitudes towards marriage and sexuality and motivation for parenthood. In such countries there has usually been little need to exploit the surveys to measure changes in fertility levels, age at marriage, or infant and child mortality, since information of that kind can usually be obtained quite simply from the existing system of vital registration.

In developing countries the monitoring of changes in levels and trends of fertility and related variables should be one of the main analytic objectives of repeat fertility surveys. Since the experience in this regard has been so limited, it has sometimes been doubted whether it can be done at all and, consequently, whether such surveys are capable of providing policy-makers with the type of data necessary for socio-economic planning and for the development and evaluation of population policies.

In this invaluable report, Hobcraft and Rodríguez show that such doubts need not concern us greatly. They clearly demonstrate that in the hands of skilful analysts repeat surveys form a powerful tool in unravelling the components of fertility change and will thus yield a substantial addition to the factual foundation on which development planning has to be based.

DIRK J. VAN DE KAA
Project Director

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1 Introduction

In 1974 Dominican Republic became the first Latin American country to participate in the World Fertility Survey programme. The survey was conducted by the National Council on Population and Family (hereafter referred to by its Spanish acronym CONAPOFA), a government agency charged with defining a national population policy and co-ordinating a national family planning programme. The main purposes of the survey were to measure fertility levels and trends and to provide baseline data for programming and evaluating family planning activities. Fieldwork took place in 1975 and the results were released in 1976.

One of the most valuable contributions of the survey was to document a substantial decline in period fertility rates for the early 1970s, of the order of 20 per cent in a decade. The precise extent of the decline, however, was obscured by age misreporting and possible displacement of children's dates of birth. The total fertility rate for 1972-4 was estimated at around 5.6. Another valuable contribution of the survey was to uncover extremely high levels of knowledge and use of contraception. Fully 97 per cent of all women in reproductive ages reported knowledge of at least one efficient contraceptive, with female sterilization and the pill being the best known methods. Moreover, 26 per cent of currently married women were using a modern contraceptive at the time of the survey, with 12 per cent being sterilized for contraceptive reasons. These results are remarkable considering that official family planning efforts had been in existence for less than ten years.

The results of the survey had a significant impact on population programmes. In view of the high levels of contraceptive knowledge, CONAPOFA and other agencies shifted the emphasis of their educational programmes from mere diffusion of methods to more detailed information about their characteristics and proper use. The results on sterilization were completely unexpected and led to a revision of attitudes and policies. The government realized that there was a great demand for this form of contraception, and supported full incorporation of sterilization in the official programme. Family planning was pursued with renewed vigour in the following years, with the result that today female sterilization is provided in 30 public health establishments and about 40 private clinics all over the country.

In 1979 CONAPOFA decided to undertake a second national fertility survey to assess changes in the quinquennium and thus evaluate the national family planning programme. The government sought and obtained funding from the United Nations Fund for Population Activities (UNFPA), which, incidentally, had made significant contributions to the family planning programme itself. The survey was to be based largely on their first-round WFS experience; and WFS headquarters was asked for assistance. Following directives of the funding agencies, the WFS agreed to provide some limited technical assistance in the fields of sampling and questionnaire design, data processing and analysis. Fieldwork was undertaken in the first quarter of 1980, and the survey is now at the data processing stage. Dominican Republic thus became the first country to undertake, albeit unofficially, a second-round WFS survey.

These developments took place at a time when the WFS was actively considering the value and possible nature of second-round or repeat fertility surveys for monitoring demographic change. Indeed, the WFS Programme Steering Committee was meeting in February 1981 to discuss these issues. In this context we thought that a preliminary analysis of the second-round data in Dominican Republic would make a useful contribution to the discussion, by providing concrete examples of the insights that can be gained from the analysis of repeat fertility surveys. We were fortunate that CONAPOFA agreed to release to us a copy of the 1980 data as soon as they were keypunched, and authorized the present comparative analysis of the 1975 and 1980 surveys.

The following chapters describe the two surveys and present an analysis of changes in the socio-economic context, fertility, nuptiality, breastfeeding, contraception, and infant and child mortality. It should be noted that the results are provisional and subject to revision after the data have been fully edited and analysed, and therefore the conclusions should be considered tentative even if occasionally they are stated in rather firm terms. The broad picture that emerges regarding the nature and extent of demographic change in Dominican Republic, however, is quite clear, and the analysis contains numerous examples of the tremendous potential of repeat surveys for monitoring such changes.

2 The Two Surveys

The following is a brief description of the Dominican Republic National Fertility Surveys of 1975 and 1980, with emphasis on those aspects where instruments or procedures were modified.

Both surveys used questionnaires based on the WFS core questionnaire, and covered respondent's background, pregnancy history, maternal and child health, knowledge and use of contraception, marriage history, fertility regulation, work history and husband's background. The 1975 survey included a history of sexual life in the past year. The 1980 survey used questions on cost-benefit of children and on the availability of contraceptive methods.

Some areas of difference in questioning include breastfeeding, where the 1980 questionnaire made specific provision for the answers 'still breastfeeding' and 'until child died'; the marriage history, which in 1980 made specific provision for recording age at marriage or duration of union when the dates of beginning or end of a union were not known; sterilization, which was included in the fertility regulation module in 1975 but moved to the earlier section on contraceptive use in 1980; and woman's work, where the 1975 question referred to work for payment in cash or kind, whereas the 1980 question included a reference to unpaid work as well. These improvements in the questionnaire may in some cases seriously affect the comparability of the results, as we shall see in the analysis of the data.

The two surveys used nationally representative, stratified probability samples and relied on the 1970 census to provide a frame. In 1975 a sample of 12 069 households was selected using two area stages in urban areas and three stages in rural areas; the sample for the individual interview was obtained by systematically selecting *one in four* women aged 15-49 who were *de facto* residents in a selected household. In 1980 a sample of 10 558 households was selected using compact clusters and one area stage in all domains

(large city, small city and rural); the sample for the individual interview was obtained by selecting half the households in the sample and interviewing *all* women aged 15-49 who were *de facto* residents.

Though differences in sample design are not substantial, there were some differences in implementation. In particular, in 1975 one of the blocks selected in Santo Domingo turned out to contain 590 dwellings of which 345 were selected, contrasting with average size and take of 44 and 26 dwellings per block respectively, in Santo Domingo. This single block inflated the proportion of women residing in Santo Domingo by about 2½ per cent.

Field procedures were organized along similar lines in both surveys, with teams of supervisors and interviewers visiting the different parts of the country. The 1975 fieldwork was conducted between April and July by six teams with 12 supervisors and 31 interviewers. The 1980 fieldwork took place between February and May and was conducted by eight teams with 16 supervisors and 33 interviewers. The main difference, however, is that in 1975 the household survey had to be completed in each area before the individual sample could be selected by a supervisor, whereas in 1980 the household interview was followed immediately by the individual interviews for the preselected households. Table 1 shows how the response rates varied between the surveys.

Editing and coding followed similar procedures with two main exceptions. In 1975 region of residence was classified into five major regions, whereas in 1980 six regions were defined by subdivision of one region and transference of some provinces among regions. This point is further discussed below. The second difference concerns coding of occupation, which in 1975 was based on ISCO but in 1980 followed COTA, with implications that will become apparent in the analysis.

Data processing and analysis of the 1975 survey followed standard WFS guidelines. The only point

Table 1 Response Rates in 1975 and 1980

	1975			1980		
	Household	Individual	Combined	Household	Individual	Combined
Urban	92	96	89	88	92	81
Rural	89	97	87	83	92	76
Total	91	97	88	85	92	78

worth mentioning is that missing dates were imputed at the midpoint of their logical ranges. Processing of the 1980 survey is proceeding along similar lines, but in keeping with current WFS practice random imputation within logical ranges is being used. The present advance look at the results of the 1980 survey is based on a preliminary processing of the data undertaken in London.

The raw data received from Dominican Republic were subjected to structure and general edits which, after correction of obvious errors, yielded 5057 complete questionnaires. The birth and marriage histories were subjected to manual editing of inconsistencies and

Table 2 Imputation

Type of event	% imputed	
	1975	1980
Birth of respondent	14	8
Birth of child	9	9
First marriage ^a	27	25

^a1975 excludes current marriages for which 13 per cent were imputed.

automatic imputation of missing months. Finally a preliminary standard recode tape was prepared containing most of the variables specified in the WFS guidelines. Table 2 summarizes the extent of imputation, which is similar between 1975 and 1980 except for an improvement in respondent's age.

It may be noted that in editing the 1980 data no attempt was made to check ranges or skip instructions. Instead the variable being constructed was set to 'not stated' whenever an inconsistency was found. It is remarkable that the number of cases with missing values is not substantial: the most serious examples are method used, which is not stated for 58 out of 1169 current users or five per cent, and husband's occupation which is missing for 195 out of 2771 currently married women, or less than eight per cent. Comparison of the preliminary results herein reported with the final results may shed light on the value of extensive editing.

As noted earlier, coding of region varied between the surveys. In 1980 a new region was added by separating the National District and San Cristobal from the rest of region 1 (south central) and the provinces of Azna, La Estrelleta and San Juan were reclassified from regions 4 to 1 (south-west to south central). To make the two surveys comparable we recoded the 1975 survey into the new regions, and later combined regions 1 and 4 (which had a small number of cases) to form a southern region.

3 The Changing Socio-Economic Context

Before undertaking an examination of the demographic components from the 1975 and 1980 fertility surveys in Dominican Republic, it is desirable to examine briefly the wider societal context within which any demographic changes are taking place. The two surveys have made possible a series of comparisons between the socio-economic structures at two points in time. An important aspect of such comparisons involves consideration of the same cohort at two points in time, which can either indicate change or occasionally point to problems of interpretation or changing definition.

Table 3 shows comparisons of the two surveys in terms of geographical distribution of the population. There is some indication of a movement to urban areas among the older cohorts, which is an unusual result, but the trend is not strong. The regional distribution of the samples has also changed in an unusual way. The apparent reduction in the proportion living in Santo Domingo is implausible. There is no reason to suppose substantial migration from Santo Domingo; differentials in natural increase alone cannot cause such a change; and we have been careful to ensure that the regions used here are the same for the two surveys. As mentioned earlier, there were deficiencies in the mapping for the 1975 survey, artificially raising the proportion in Santo Domingo by about two and a half percentage points. The generally improved execution

of the sample design may have had other unquantifiable effects on coverage. Finally, there is little preliminary indication of a lower response rate in Santo Domingo in 1980. As a result of these differences in composition between the two surveys, comparisons at the national level may be slightly distorted where substantial differences exist.

Table 4 shows the distribution for the two surveys on the work status of wives since marriage. More detailed examination (by age) indicates clearly that the apparent changes are spurious. The reduction in family work is brought about by the exclusion of all unpaid work in the definition of work for the 1975 survey, resulting in non-comparability.

Table 5 shows the recorded overall occupational structure for currently married men at the two surveys. For seven per cent of cases in the 1980 survey we were unable to distinguish non-response or coding errors from the no work category, so that these preliminary figures need to be treated with extra caution. A few broad conclusions can be drawn from these results. The proportions in professional, clerical and sales occupations seem to be rising over time. It is clear that the procedures used to classify occupations into the farmers and agricultural categories have changed between the surveys although the proportions engaged in agriculture appear not to have changed (42.4 to 42.9 per cent).

Table 3 Geographical Distribution of the Samples

Percentages in urban areas			Regional composition (per cent distribution)		
Birth cohort	Survey		Region	Survey	
	1975	1980		1975	1980
1925-29	46	-	Santo Domingo	39.4	30.3
1930-34	48	54	North west	21.4	23.3
1935-39	49	52	North central	16.2	18.7
1940-44	57	48	South	14.9	18.3
1945-49	57	54	East	8.1	9.4
1950-54	56	54			
1955-59	55	59			
1960-64	-	53			
All	54	54	Number of Women	3115	5057

Table 4 Wife's Work Status since Marriage

Status	Survey	
	1975	1980
Family work	4	16
Other paid work	36	31
No work	60	53

In view of this change, the two categories will be combined for most analyses, despite this leading to a very large category. There is also some evidence of a reduction in the proportion engaged in service occupations and skilled occupations, although minor changes in the classification of marginal service workers could lead to a redefinition as not working. Slightly more detailed examination of the husband's occupational data by age of wife indicates that the apparent change in the service occupations is probably spurious. Some of the obvious non-comparability between the two surveys probably arises from the fact that the 1975 survey used ISCO, while the 1980 one used COTA as the basis for classifying occupations, although in both instances the same WFS standard occupational groupings should have emerged. The lack of comparability of these results on socio-economic status suggests a need for strong caution in using even superficially similar cross-sectional surveys at two points in time to draw inferences about socio-economic change.

We now turn to changes in educational structure, where the evidence is conclusive. In common with many other developing countries, Dominican Republic is clearly experiencing an educational revolution. Table 6 shows this very clearly. The proportions receiving little or no education have been dramatically reduced and the proportions completing primary and obtaining some secondary education have risen rapidly and consistently over time. This can be seen unequivocally

Table 5 Occupational Structure of Currently Married Husbands (Percentages in each occupational group)

WFS occupational group	1975 Survey	1980 Survey
1 Professional	4.5	6.9
2 Clerical	2.9	3.6
3 Sales	9.7	11.1
4 Farmers	30.2	20.9
5 Agricultural	12.2	22.0
6 Household	0.1	0.0
7 Service	8.4	4.9
8 Skilled	27.9	24.7
9 Unskilled	4.2	5.7
Total	100.0	100.0
Number classified	1800	2576
Not stated or no work	8	195
Total husbands	1808	2771

from either survey, but the results of the 1980 survey suggest a substantial increase in secondary education even since 1975. It is worth noting that the timing and magnitude of changes in education do not differ by sex in Dominican Republic.

It is in this context of well-documented change in educational structure for both men and women that we move to an examination of trends in the demographic variables. Other elements of the social and economic structure and of the culture in Dominican Republic have undoubtedly also changed over the last 20 or 30 years. Educational change may well contribute substantially to fertility change differentials. We shall pay some attention in our subsequent analysis to differentials by broad educational groups (chosen to give a reasonable sample split as 0-2, 3-5 and 6+ years).

Table 6 Educational Structure for All Women (Percentages with various levels of education)

Level of education	Survey	Woman's birth cohort								
		1925-29	1930-34	1935-39	1940-44	1945-49	1950-54	1955-59	1960-64	All
No education	75	34	25	20	12	8	9	6	-	13
	80	-	28	22	18	11	13	9	6	12
Two or less years	75	60	50	44	30	21	25	19	-	30
	80	-	49	41	34	24	23	17	13	23
Complete primary and above (6+ years)	75	15	16	21	26	37	43	44	-	33
	80	-	19	23	25	34	46	60	58	45
Secondary and above (9+ years)	75	8	7	8	10	16	22	16	-	14
	80	-	7	10	11	18	28	39	27	24

4 Fertility Levels and Trends

In the introduction to the chapter of his evaluation report for the 1975 survey concerning recent trends and current levels of fertility, Guzmán says: 'One of the most important findings of the survey is that of a decline in fertility. The total fertility rate seems to have decreased from values as high as 7.5 children in the beginning of the 1960s to levels of 5.6 children for the three-year period 1972-74, that is to say, a decline of approximately 25 per cent.' (Guzmán 1980: 34). The First Country Report suggests that this decline may have had a very close relation 'with the fall of Trujillo (which took place in 1961) and the ensuing greater availability to the population of new sources of information and ideas ... and the diffusion of the knowledge and methods of family planning' (CONAPOFA 1976). Guzmán's conclusion is more tentative: 'There has undoubtedly been a substantial decline (in fertility) during the past decade. Although estimates from the survey are somewhat higher than external estimates, the trend in fertility over the past 15 years is consistent as derived from different sources of data. However, age-misreporting (ie the high parity of women aged 35-39) and displacement of children's dates of birth appear to have exaggerated the decline in fertility. In particular, reporting errors appear to have exaggerated fertility rates in the period 10 to 14 years prior to the survey so that the calculated decline of 23 per cent between the period 0 to 4 and 10 to 14 years prior to the survey may be about five per cent [presumably percentage points?] too high' (Guzmán 1980: 54).

Guzmán's difficulties reflect a general analytic problem when working with maternity histories. In many instances estimates of fertility trends based on reported maternity histories show a peak fertility either 5-10 years or 10-15 years before the survey. It is usually extremely difficult to distinguish whether the apparent rise up to this peak is caused by omissions of earlier births (which may suggest some more recent omissions, leading to underestimation of speed of decline); or by dating errors in the reports (leading to a heaping of events in the peak period, with consequent overestimation of speed of decline); or by a genuine past pattern (this possibility is usually rejected, but could occur through reductions of traditional prolonged lactation practices during an early phase of modernization).

A powerful argument for repeat fertility surveys is that they can be expected to clarify whether trends are genuine or not. The two surveys in Dominican Republic provide a fairly unique opportunity to address these issues as the two surveys used very similar instruments and field procedures. The two surveys are almost exactly five years apart, which permits rather convenient comparison of five-year age group defined

cohorts. To maximize this comparability we have analysed all the history data (fertility, marriage and infant and child mortality) by effectively shifting the dates of interview to 1 January 1975 and 1 January 1980 and calculating all rates and ages as though the surveys had taken place on these dates. Interviewing actually took place from February to May 1975 and from April to July 1980, so that only a small amount of recent experience is lost with this approach. The advantages are obvious: time-periods in calendar years correspond exactly with years before fictitious survey dates; age-cohorts and birth cohorts line up exactly; and cohorts are directly comparable between surveys. Successive surveys at five-year intervals are desirable for analysis.

Table 7 shows five-year period by five-year cohort fertility rates for all periods and cohorts covered by the two surveys. (Note that these are period-cohort rates and *not* period-age rates; nevertheless it is convenient to line up experience at similar stages in the life cycle, arranging the rates for each period by the age of the cohort at the end of the period in question.) Consider first the estimates for the cohort aged 35-39 at the 1975 survey, which are boxed in table 7. The estimates based on the 1975 survey are too high, and clearly out of line with the values for adjacent cohorts, a problem which is probably due to misreporting of age resulting in a downward transfer from the 40-44 group. The estimates based on the 1980 survey, however, are much more reasonable and line up with adjacent cohorts. It is clear that the 1980 survey gave better information in this regard, managing to avoid an excess of more fertile women in either the 35-39 or the 40-44 cohort.

The second area of discrepancy between the two sets of estimates concerns the cohorts aged 45-49 at the 1980 survey. The estimates of fertility for younger ages based on the 1980 survey seem deficient when compared with estimates based on the 1975 survey. This suggests omission of early births by the oldest cohort in the 1980 survey. The possibility also exists that these discrepancies are partly due to misplacement of births, but unambiguous attribution of the error is complicated by the fact that some women from this cohort were transferred into the 35-39 cohort in the 1975 survey.

The final and most significant disagreement occurs in the estimates of fertility for the period 1970-74. The estimates of cumulative period fertility for 1970-74 based on the 1980 survey are consistently higher than the estimates based on the 1975 survey. Estimates for earlier periods are in broad agreement, although the values based on the 1980 survey tend to be slightly lower than those obtained from the 1975 survey, a trend that becomes clearer when the cohort aged 35-39 in the 1975 survey is brought into the cumulation. Several authors have suggested that maternity histories

Table 7 Cohort-Period Fertility Rates and Cumulative Cohort and Period Fertility (for birth cohorts)

Central age	Survey	Period							Age group of cohort at end of each period	
		1940-44	1945-49	1950-54	1955-59	1960-64	1965-69	1970-74		1975-79
A Cohort-period rates (per hundred)										
15	75	.6	10	8	7	7	6	4	-	15-19
	80		6	8	7	7	7	5	4	
20	75		22	25	26	27	26	21	-	20-24
	80			22	25	28	25	23	19	
25	75			29	31	39	34	28	-	25-29
	80				31	34	34	29	25	
30	75				29	29	33	26	-	30-34
	80					33	30	26	20	
35	75					24	24	20	-	35-39
	80						24	22	15	
40	75						14	10	-	40-44
	80							11	9	
45	75							2	-	45-49
	80								2	
B Cumulative cohort fertility										
15	75	.3	.5	.4	.4	.4	.3	.2	-	15-19
	80		.3	.4	.4	.4	.4	.3	.2	
20	75		1.4	1.8	1.7	1.8	1.7	1.3	-	20-24
	80			1.4	1.7	1.8	1.6	1.5	1.2	
25	75			2.9	3.4	3.7	3.5	3.1	-	25-29
	80				3.0	3.4	3.4	3.1	2.8	
30	75				4.3	4.8	5.3	4.8	-	30-34
	80					4.6	4.9	4.8	4.1	
35	75					5.5	6.0	6.4	-	35-39
	80						5.8	6.0	5.5	
40	75						6.2	6.5	-	40-44
	80							6.4	6.5	
45	75							6.4	-	45-49
	80								6.5	
C Cumulative period fertility										
15	75	.3	.5	.4	.4	.4	.3	.2	-	15-19
	80		.4	.4	.4	.4	.4	.3	.2	
20	75		1.6	1.7	1.7	1.7	1.6	1.3	-	20-24
	80			1.6	1.6	1.7	1.6	1.4	1.2	
25	75			3.1	3.3	3.7	3.3	2.7	-	25-29
	80				3.1	3.5	3.3	2.9	2.4	
30	75				4.7	5.1	5.0	4.0	-	30-34
	80					5.1	4.8	4.2	3.4	
35	75					6.4	6.2	5.0	-	35-39
	80						6.0	5.3	4.2	
40	75						6.9	5.5	-	40-44
	80							5.9	4.6	
45	75							5.6	-	45-49
	80								4.9	

distort time patterns of fertility, in particular overstating recent declines by some mechanism leading to a misplacement of events into period 5-9 (or perhaps 10-14) years prior to the survey.

There are at least two plausible explanations of the observed pattern of results with different implications for the assessment of fertility change. The first is that the 1980 survey is essentially correct, but the 1975

survey suffers from backward misplacement of births from the period 0-4 to the period 5-9 years before the survey. If this was the case, the 1975 survey would have overstated the decline, but the 1980 survey would have provided relatively trustworthy estimates. The second explanation is that both surveys provide fairly robust estimates of recent fertility but are both subject to forward displacement of births from the period 10-14 to

Table 8 Cumulative Period Fertility by Education

Education (years)	Survey	Period					Percentage declines	
		1955-59	1960-64	1965-69	1970-74	1975-79	1960-64 to 1970-74	1960-64 to 1975-79
A To age 35-39								
0-2	75		7.2	6.9	6.2		14	
	80			6.8	6.5	5.8	10	19
3-5	75		6.3	6.6	5.6		11	
	80			6.5	6.1	5.0	3	21
6+	75		5.0	4.3	3.1		38	
	80			4.3	3.6	2.8	28	44
All	75		6.4	6.2	5.0		22	
	80			6.0	5.3	4.2	17	34
B To age 30-34								
0-2	75	5.3	5.9	5.5	5.1		14	
	80		5.9	5.4	5.3	4.9	10	17
3-5	75	4.6	5.0	5.5	4.6		8	
	80		5.1	5.4	4.9	4.2	4	18
6+	75	3.6	4.2	3.7	2.6		38	
	80		4.0	3.5	3.0	2.3	25	43
All	75	4.7	5.1	5.0	4.0		22	
	80		5.1	4.8	4.2	3.4	18	33
C To marriage duration 15-19								
0-2	75	6.1	6.7	6.1	5.8		13	
	80		6.6	6.0	5.8	5.3	12	20
3-5	75	5.6	6.0	6.2	5.4		10	
	80		5.9	6.2	5.6	4.7	5	20
6+	75	(6.1)	5.3	4.7	3.6		32	
	80		5.5	4.6	4.2	3.5	24	36
All	75	5.9	6.2	5.9	5.1		18	
	80		6.2	5.9	5.3	4.4	15	29
D To motherhood duration 15-19								
0-2	75	6.6	7.3	6.9	6.4		12	
	80		7.6	7.0	6.5	5.9	14	22
3-5	75	6.6	6.7	6.8	6.0		10	
	80		6.7	7.0	6.2	5.0	7	25
6+	75	5.7	5.4	5.0	4.1		24	
	80		5.9	5.1	4.5	3.8	24	36
All	75	6.5	6.9	6.6	5.7		17	
	80		7.1	6.7	5.9	4.8	17	32

the period 5-9 years before the survey. If this is the case, only a comparison of the two surveys would provide a trustworthy estimate of fertility decline.

In several respects it is clear that the 1980 survey provided better data, especially as it avoided problems of age misreporting around age 40. Yet it is not clear why women should have misplaced events in 1975 and not in 1980. We are therefore inclined to believe the second explanation and will assess changes between 1970-74 and 1975-79 using the two surveys. Note that from comparing the periods 1960-64 or 1965-69 with 1975-79 the estimates from either survey are probably valid.

A further point to note is that both surveys show rising fertility up to the period 1960-64 and a progressively rapid decline since. If this results from omissions of early births, it suggests that the 1980 survey performed better, moving the 'omissions horizon' back a further five years. The possibility exists that women are moving births forward into the period 1960-64 in an attempt to identify births as being post-Trujillo. A further possibility is that fertility did indeed rise a little prior to 1960, perhaps through reduction of traditional prolonged lactation, although there is no information available on past breastfeeding patterns in Dominican Republic.

To assess the decline in fertility further, we turn to an examination of cumulative period fertilities by educational group. Table 8 presents cumulative period fertility to age groups 30-34 and 35-39; and to duration groups 15-19 years since first marriage and since first

birth. The age group figures have to terminate at relatively early ages to enable examination of a reasonably long period. The duration group figures represent a larger portion of final total fertility but the values for earlier periods suffer from an upward bias through only including experience of women who had a first marriage or first birth at a young age for the higher durations.

Interpretation of trends by educational group is made problematic by the differences between results from the two surveys, as discussed earlier. Moreover, the reduction in sample sizes caused by the further subdivision also complicates interpretation. We do not show fully detailed tabulations because of space limitations, but note a few of the more important differences to emerge. Omissions among the oldest cohort in the 1980 survey seem greatest for the least educated women. The problems with the cohort aged 35-39 in the 1975 survey occur for all educational groups and surprisingly seem most severe for the best educated women. Equally the relatively higher period estimates for 1970-74 from the 1980 survey persist across all educational groups, making it more likely that one of the surveys (probably the 1975 one) is the source of most of the discrepancies. Our reasoning for this is simply that we would not expect women with least education to be reporting as well as women with fairly high education. Yet the patterns of discrepancies persist across educational groups, suggesting rather that differences in fieldwork or training procedures caused these differing patterns. Also shown are implied

Table 9 Estimated Probabilities of Having a Further Birth within Five Years of a Previous Birth (Quintums)

Interval	Survey	Period					
		Pre-1955	1955-59	1960-64	1965-69	1970-74	1975-79
First	75	.91	.94	.92	.88	.91	
	80	.84	.89	.89	.92	.91	.90
Second	75	.88	.87	.89	.87	1.00	
	80	.84	.87	.88	.87	.86	.79
Third	75	.86	.92	.90	.87	.77	
	80	.90	.89	.88	.85	.79	.83
Fourth	75	.88	.93	.89	.84	.70	
	80	.89	.92	.85	.85	.75	.67
Fifth	75	(.97)	.91	.89	.81	.79	
	80	(.88)	.90	.90	.82	.76	.74
Sixth	75	(1.00)	.92	.88	.82	.78	
	80	(.86)	.89	.88	.87	.77	.63
Seventh	75	(1.00)	(.93)	.89	.77	.76	
	80	(1.00)	(.89)	.91	.86	.70	.59
Eighth	75	(.67)	(.96)	.86	.89	.86	
	80	(1.00)	(.88)	.92	.81	.76	.60

NOTE: Values are bracketed when calculated on a radix of less than 50 cases.

percentage declines from the period 1960-4 to 1970-4 and to 1975-9. We note from the previous discussion that the estimates for 1970-4 are least secure, suggesting caution. The general conclusion (which is somewhat conservative given the non-inclusion of the highest age groups and durations) is of an 18 per cent decline in the ten years preceding 1970-4 and a 32 per cent decline in the 15 years before 1975-9. These figures suggest a likely increase in the rate of decline over the most recent five year period. The differentials by educational group are also noteworthy. In both surveys the period cumulative rates for the 3-5 years' education group peak in 1965-9, later than the peak for the other educational groups.

Again a fairly consistent picture of trends emerges. The least educated began a modest decline from 1960-4, which seems not to have accelerated and totalled about 19 per cent over the 15 years before 1975-9. The intermediate group started their decline later (from 1965-9), but from a lower initial level. As a result, their declines prior to 1970-4 were modest, but appear to be rapid in the following five years. The completed primary and above group started from the lowest levels, declined rapidly over the ten years prior to 1970-4 and continued at perhaps reduced pace in the following five years, reaching quite low fertility levels by 1975-9.

To conclude our brief analysis of the maternity history data, we turn now to an examination of results from a life-table analysis of birth intervals, which helps clarify the trends by parity. Table 9 presents the estimated probabilities of having a further birth within

five years of a previous birth occurring in the period in question which we also term the quintums of fertility (Rodríguez and Hobcraft 1980). Again, the results from the two surveys are in quite good agreement, although more subject to sampling fluctuations than the fertility rates presented earlier. Two areas are marked off in this table: to the right of and below the dotted line there is probable evidence of change; to the right of and below the solid line there is strong evidence of substantial change. Thus, since 1970, there have been substantial reductions in the propensity to continue childbearing beyond the third child, with the quintums approaching 0.6 (values of 0.5 or just under would be typical of a fairly highly developed country). There is also evidence of reductions above parity two since 1965, and even a possible reduction as early as the transition to the second child for the period since 1975. A brief examination of the shape of the build-up to the quintum (not presented here) suggests a trend towards slightly longer intervals, although the evidence is not conclusive.

The second survey permits a much better evaluation of the quality of the data than one survey alone and tilts the balance of evidence towards credibility of the observed trends. It also documents an increasingly rapid decline in fertility. There is now rather conclusive evidence of fertility decline, even for women with low levels of education. However, it is still possible that both surveys suffer from omission of births before 1960. If this is so the 1980 survey may have pushed back the 'omissions horizon' by five years *vis-à-vis* the 1975 survey, resulting in a consistent timing of peaks.

5 Age at Marriage and Proportions Married

The study of nuptiality acquires a special character in regions like Latin America, where substantial numbers of unions are not legal and are therefore not registered in the vital statistics of the country, and where census-type questions on marital status tend to omit consensual unions (see, for example, Guzmán 1980; Flórez and Goldman 1980). In these circumstances, a WFS-type survey can make important contributions to the study of this component of demographic change.

The 1975 fertility survey in Dominican Republic confirmed the above difficulties and produced new information on nuptiality. A comparison of the 1970 census with a reconstruction of proportions married at the census date based on the 1975 union histories showed that the census largely underestimated the proportion of women ever in union, partly as a result of differences in definition and partly because of omission of consensual unions in the census. The survey data, however, were not free of difficulties. Guzmán (1980) found evidence of heaping on age at marriage and, more importantly, noticed substantial misstatement of age at marriage in the birth cohorts 1925-29 and 1945-49. The cohort 1925-29 overstated age at mar-

riage, an error attributed to possible reporting of second or third unions as the first one, while the cohort 1945-49 understated age at marriage, possibly as a result of age misreporting leading to a transfer to the age group 35-39 of early marrying (uneducated) women from the adjacent cohorts. He concluded that there was no clear trend in age at marriage except possibly for later marriage among the younger cohorts.

Table 10 summarizes results from the 1975 and 1980 surveys in terms of the percentages ever married by selected exact ages for birth cohorts, and reports mean ages at marriage for birth cohorts obtained by fitting Coale's (1971) model nuptiality schedule to complete the truncated experience of the younger cohorts, using the procedures of Rodríguez and Trussell (1980). The results of the second survey considerably clarify the nature of nuptiality levels and trends. Note that the anomalous results for the birth cohort 1945-49 have disappeared in 1980: the extremely high proportions married by exact ages 18, 20 and 22, for example, have been reduced and are now in line with the adjacent cohorts. As a result, the mean age at marriage for this cohort is now estimated as 19.3 rather than 18.3. A

Table 10 Percentage Ever Married at Selected Exact Ages and Mean Age at Marriage by Birth Cohorts (Mean estimated by fitting Coale's model)

Exact age	Survey	Birth cohort							
		1925-29 ^a	1930-34	1935-39	1940-44	1945-49	1950-54	1955-59	1960-64 ^a
15	75	14	19	18	15	18	13	9	—
	80	—	15	20	19	16	17	13	7
18	75	40	51	50	49	52	43	34	—
	80	—	46	47	47	45	43	36	32
20	75	63	69	69	68	71	61	—	—
	80	—	63	66	67	62	60	61	—
22	75	73	79	82	81	82	72	—	—
	80	—	77	79	79	74	74	67	—
25	75	87	92	91	88	89	—	—	—
	80	—	87	91	89	84	85	—	—
30	75	94	97	96	95	—	—	—	—
	80	—	93	96	95	91	—	—	—
Mean age at marriage	75	19.5	18.7	18.5	19.1	18.3	19.5	(21.8)	—
	80	—	19.3	18.9	19.0	19.3	19.9	20.1	20.4

^aSince both surveys interviewed only women aged 15-49 at the time of the survey, the cohort 1925-29 has no data for 1980 (it was 50-54 at the time) and the cohort 1960-64 has no data for 1975 (it was 10-14 at the time).

further notable difference is the cohort 1955-60 (which was only 15-19 in 1975); better reporting and the availability of five more years of nuptiality experience permit a firmer estimate of their mean age at marriage as 20.1 rather than 21.8. The two surveys, however, show the same pattern of error for the cohort aged 45-49 at the time of the survey. In 1975 the cohort 1925-29 appeared out of line with a mean age at marriage of 19.5. In 1980 the cohort 1930-34 also appears out of line with a mean of 19.3, whereas the same cohort five years earlier had reported a more plausible mean of 18.7. This result confirms a pattern of misreporting associated with age and throws doubt on any estimates based on the oldest cohort at the time of the survey. The combination of the results from the two surveys, however, leads to a firm estimate of a smooth trend in age at marriage, which has risen steadily from under 19 for the birth cohort 1930-34 to just over 20 for the birth cohort 1955-59.

This is a clear instance where the results available from a repeat survey have clarified doubtful trends. As to the nature of the discrepancies between the two surveys we have no doubt that they are due to

improved reporting. An experiment backdating the 1980 survey so as to ignore experience in the past five years (not shown) proved that the differences were not due to the fact that in 1980 we had more information, except for the cohort 1955-59 which was only 15-19 in 1975 and underwent the bulk of its nuptiality experience in the last five years. On the other hand, an improvement in reporting was expected following changes made in the questionnaire as a result of WFS experience. In 1975 the questions on the union history insisted on dates of beginning and end of each union and had no provision for recording alternative data such as age at marriage or duration of union where dates were not known. Experience in Dominican Republic and other Latin American countries proved that such information was extremely difficult to obtain. Consequently, in 1980 the WFS advised CONAPOFA to make explicit provision for recording age at marriage when the date was not known. Age was then converted to a year during office editing for the former unions and at the imputation stage for the current union, a procedure which clearly provides better data than forcing the interviewer to record a year in the field.

6 Breastfeeding Practice

In common with most other WFS surveys, the 1975 survey in Dominican Republic provided the first nationally representative information on breastfeeding practice. The 1980 survey probably provides the first opportunity anywhere to examine time trends in such practice for a nationally representative sample. Reported breastfeeding durations suffer from severe heaping on multiples of six months and analysis is complicated by selection problems. We present estimates based on life tables for all experience in open and last closed intervals for the five years preceding the surveys, preferring increased sample size with reporting errors to the option of using current status reports, which reduces heaping at the expense of dramatic reduction in sample size. As a result we show slightly

exaggerated proportions still breastfeeding at durations 6, 12, 18 and 24 months, because of transfer to the preferred values just above these exact durations.

Table 11 presents results by education and for the total samples. Overall there is very little evidence of change in breastfeeding practice between the two surveys. About 80 per cent of all women breastfeed and the average duration of seven months is fairly short, as in most Latin American countries. The analysis by educational group shows that the more educated women consistently breastfeed less and terminate at shorter durations. There is slight evidence that less educated women are breastfeeding less than they used to, whereas the duration of lactation appears to have increased slightly for more educated women.

Table 11 Percentages Still Being Breastfed, Trimeans and Spreads by Educational Level (Based on life tables calculated from experience in open and last closed intervals starting in the five years preceding the surveys)

Educational group	Survey	Duration (exact months)						Trimean ^a (months)	Spread
		0	3	6	12	18	24		
0-2 years	75	85	72	60	38	16	6	8.8	12
	80	82	70	56	33	13	5	7.6	11
3-5 years	75	84	71	56	29	11	3	7.4	10
	80	83	70	54	25	9	3	7.1	10
6+ years	75	63	43	27	12	5	1	3.0	6
	80	71	51	34	14	5	2	3.8	7
All	75	81	66	52	29	12	4	6.9	11
	80	79	65	50	25	10	3	6.4	10

^aThe trimean is a weighted average of the quartiles, with the median getting a double weight. The spread is the interquartile range.

7 Changes in Contraceptive Behaviour

Table 12 presents a comparison of knowledge, ever-use and current use of contraception among all women interviewed in the 1975 and 1980 surveys, irrespective of marital or exposure status. Knowledge of modern contraception was already universal in 1975, with 97 per cent of all women reporting knowledge of at least one efficient method. The best known methods were female sterilization and the pill. As noted earlier, the high levels of knowledge of contraception, particularly female sterilization, led to a change of orientation in the national family planning programme. By 1980 we find an increase in the proportions reporting knowledge of specific methods such as the pill, the IUD, rhythm, male sterilization, injection and particularly 'other female scientific' methods and the condom. The average number of efficient methods known has increased from 4.7 to 5.2, and the change is somewhat more pronounced among older women (not shown).

Ever-use of contraception has increased notably. The proportion who have tried at least one efficient method has increased from 27 to 37 per cent of all women in the

reproductive ages. This change is due primarily to more women trying the pill and to an increase in the proportion of women sterilized for contraceptive reasons, which has reached a remarkable 13 per cent, and only slightly to increments in the numbers who report having tried IUD, 'other female scientific' methods, condom and rhythm. Current use of contraception has also increased, but to a lesser extent. The proportion using an efficient method has gone from 16 to 20 per cent of all women, primarily as a result of the increased use of female sterilization just noted. The fact that ever-use of the pill has increased but current use has remained at the same level suggests the possibility that a number of women have tried and abandoned this method during the last five years.

We now turn to a more detailed examination of current use of contraception among currently married women. The choice of currently married women as the base population leads to simple measures of contraceptive prevalence, although a more refined analysis would be restricted to women exposed to the risk of concep-

Table 12 Knowledge, Ever-Use and Current Use of Contraception (Percentage among all women)

Method	Knowledge		Ever-use		Current use	
	1975	1980	1975	1980	1975	1980 ^a
Pill	89	95	14	23	5	5
IUD	72	77	5	6	2	1
Female scientific	55	66	5	6	1	1
Douche	45	44	2	2	0	0
Condom	67	80	8	9	1	1
Rhythm	42	48	5	6	1	1
Withdrawal	50	47	14	12	2	2
Female sterilization	95	97	8	13	8	13
Male sterilization	30	35	0	0	0	0
Injection	65	71	1	1	0	0
Efficient	97	99	27	37	16	20
Inefficient only	0	0	8	5	3	4
No method	3	1	65	58	81	76
Number of cases	3115	5057	3115	5057	3115	5057

^aMethod currently used is not stated in 58 cases in 1980.

Table 13 Current Use of Contraception by Age and by Number of Living Children (Percentages among currently married women)

Subgroup	Any method		Pill		Sterilization		Other efficient		Inefficient	
	1975	1980	1975	1980	1975	1980	1975	1980	1975	1980
All	32	42	8	9	12	21	6	5	6	6
<i>Age group</i>										
15-19	13	18	5	11	0	1	3	2	5	3
20-24	27	37	13	17	4	8	5	6	5	6
25-29	41	50	12	14	14	21	8	7	6	7
30-34	41	53	7	6	20	33	8	6	6	6
35-39	40	53	5	5	22	36	7	5	6	6
40-44	28	41	2	3	13	26	5	4	7	6
45-49	18	27	3	0	9	19	3	3	3	4
<i>No of living children</i>										
0	10	12	4	5	1	1	2	1	3	2
1	20	29	11	15	1	1	4	5	3	6
2	34	43	14	18	6	7	9	10	5	7
3	42	52	9	8	17	27	8	8	9	7
4	38	51	7	8	18	33	7	3	7	7
5	45	54	8	7	25	39	7	2	5	5
6	39	59	6	7	19	43	6	4	8	4
7	40	51	7	4	21	32	6	5	5	9
8	23	51	2	5	11	32	1	8	7	5
9+	32	39	4	3	14	27	9	4	5	5
No of cases	1808	2771								

NOTE: Method currently used is not stated for 58 cases in 1980.

tion by excluding the pregnant and the not fecund. We have considered only four categories of method used, namely pill, sterilization, other efficient and inefficient. Table 13 shows the percentage currently using each of these methods, as well as the total percentage using any method, among currently married women. Use of contraception increased from 32 to 42 per cent, almost entirely as a result of a rise in the prevalence of contraceptive sterilization, which has been adopted by a remarkable 21 per cent of currently married women.

Further insight into the nature of the changes in contraceptive behaviour is obtained from a comparison of levels of use by age based on the two surveys. A large component of the change is the increase in the proportion sterilized among married women aged 25 or more, and particularly among married women in their thirties, where one-third have been sterilized for contraceptive reasons. The cohort aged 25-29 in 1975 more than doubled its proportion sterilized (from 14 to 33 per cent) in only five years. A smaller, but none the less significant, component of the change is an increase in the proportion using the pill among married women aged under 25. As a result, overall levels of use have increased about ten percentage points in all age groups except the youngest one. An analysis by number of living children reveals a similar pattern: there is

practically no change among nulliparous women, but use has increased by about ten percentage points in all other parities. The change among married women with one or two living children is due to increased use of the pill, whereas the change among married women with three or more children is due to the high prevalence of sterilization. Note that the proportion sterilized is a quarter of married women with three children, a third of those with four, and even higher at family sizes five or six. The data suggest that the programme has been highly successful in providing the option of sterilization to women with three or more children.

Table 14 provides a comparison of levels of contraceptive use in 1975 and 1980 within categories of six background variables, namely region and type of place of residence, wife's education and work status, and husband's education and occupation. The National District, which in 1975 was the region with the highest level of contraceptive use, shows an increase in proportions sterilized, but this appears to have been achieved partly at the expense of use of other efficient methods, so that the overall level of use increased only slightly. The north shows a substantial increase in the use of sterilization without appreciable reductions in the use of other methods; on the contrary, use of the pill (as well as inefficient methods) appears to have

Table 14 Current Use of Contraception^a by Background Characteristics (Percentages among currently married women)

Subgroup	Any method		Pill		Sterilization		Other efficient		Inefficient	
	1975	1980	1975	1980	1975	1980	1975	1980	1975	1980
<i>Region</i>										
National District	39	43	8	9	17	22	9	6	6	5
North west	34	48	11	10	10	25	7	6	6	5
North central	25	46	5	8	9	23	6	5	6	9
South	23	35	5	9	10	17	4	3	4	5
East	22	32	9	9	8	13	3	5	1	4
<i>Residence</i>										
Urban	41	47	11	11	16	23	8	7	6	6
Rural	23	38	6	8	8	20	4	4	5	6
<i>Wife's education</i>										
0-2 years	22	33	4	5	11	18	4	3	4	5
3-5 years	33	43	9	8	12	25	7	5	5	5
6+ years	46	50	13	14	15	20	9	7	9	7
<i>Wife's work status^b</i>										
No work	29	42	7	9	12	21	5	5	5	5
Family work	19	43	5	8	4	25	6	4	4	6
Other work	37	42	10	10	13	19	8	6	7	6
<i>Husband's education^c</i>										
0-2 years	20	35	3	6	8	19	5	3	4	5
3-5 years	34	45	8	8	15	24	5	5	6	6
6+ years	43	47	12	13	14	21	10	7	7	6
<i>Husband's occupation^d</i>										
Prof. and clerical	47	51	11	11	15	23	14	9	7	8
Sales and service	45	43	11	11	18	21	8	6	9	6
Farmers and agriculture	20	38	5	7	8	21	4	3	4	6
Manual workers	36	43	10	10	14	22	7	5	5	5

^aMethod currently used is missing for 58 cases in 1980.

^bWife's work status is missing for 24 cases in 1980.

^cHusband's education is missing for 92 cases in 1975, 110 in 1980.

^dHusband's occupation is missing for 195 cases in 1980.

increased in the North Central region, which shows a remarkable increase of 20 percentage points in overall levels of use. As a result of these changes, levels of use in the north are now on par with, if not higher than, those in the National District. The East and the South continue to be the regions with the lowest levels of use, but both experienced increases in the use of sterilization as well as other methods, so that the gap with respect to the National District has been halved. Clearly the sterilization programme had a nationwide effect with particular success in the north.

A crucial question in the evaluation of a family planning programme concerns its ability to reach rural areas. The comparison of the 1975 and 1980 surveys reveals that the programme in Dominican Republic has done remarkably well in this regard. Levels of contraceptive use have risen much more rapidly in rural than in urban areas, as a result of an increase in

proportions sterilized without loss of users of other methods (if anything, pill use has increased in rural areas). The urban-rural gap in use has been halved, and there is only a narrow differential in the prevalence of sterilization.

Similar patterns emerge in the analysis by characteristics of the woman. Overall levels of use have risen faster among women with up to five years of education than among those with six or more, and educational differentials have consequently narrowed. The prevalence of sterilization has increased more notably among women with three to five years of education, but some of these women have transferred from use of other methods. Levels of use have risen faster among women who have not worked since marriage or who have done only family work, compared with those who have worked in the modern sector of the economy. Differentials by work status have disappeared altogether. This

change can be attributed almost entirely to the increased prevalence of sterilization.

An analysis by characteristics of the husband confirms the above pattern of results. In 1975 contraceptive use had a strong direct association with husband's education. Over the last five years, however, the prevalence of sterilization and the overall level of use has risen most among the least educated couples and least among the best educated. There is now no difference in use between husbands with three to five and six or more years of education; but the group with zero to two years still lags ten percentage points behind the others. The results by occupation of husband shed further light on the nature of changes observed. The professional and clerical stratum shows a modest increase in overall use, coupled with a likely transfer of users from other efficient methods to sterilization. The sales and service group shows practically no change, although it is possible that changes of methods have taken place. The agricultural stratum shows a remarkable increase in the prevalence of sterilization with no loss of other users. Manual workers show a similar pattern, but the increase is more modest. A further

breakdown of this category into skilled and unskilled workers (not shown), indicates that the increase in use has been more noticeable among unskilled workers.

To sum up, we find a remarkable increase in overall levels of contraceptive use which is almost entirely due to a rise in the prevalence of sterilization without loss of users of other methods. The changes are more notable among women in their thirties, with three or more children, in the north of the country, in rural areas, among the less educated, among women who have not worked in the modern sector of the economy, and in families where the husband is an agricultural or manual worker. In short, in the lower socio-economic strata. The implications of these results for population policy are multifold. Clearly the sterilization programme has been an unqualified success, and its continuation in the south and east, in rural areas and among the least educated would further narrow differentials in levels of use. On the other hand, the programme has obviously relied on a single method, and consideration could be given to a shift of emphasis towards the pill and IUD to attract spacers.

8 The Components of Fertility Change

In the preceding chapters we have looked separately at changes in fertility and three of its most important proximate determinants, namely nuptiality, breastfeeding and contraception. In this chapter we integrate these results applying Bongaarts's (1978, 1980) framework to account for the changes observed in fertility between 1975 and 1980 in terms of changes in the intermediate variables. Briefly, Bongaarts expresses the observed total fertility rate (TFR) as the product of five indices: the total fecundity rate (TF), which is usually taken as 15.3; an index of proportions currently married (C_m); an index of post-partum infecundability (C_i), which is usually estimated from data on the duration of breastfeeding; an index of contraceptive use (C_c), which in turn depends on the average proportion of currently married women using contraception (u) and the average efficiency of the methods used (e), and finally an index of induced abortion (C_a). Thus

$$TFR = C_m \cdot C_i \cdot C_c \cdot C_a \cdot TF$$

In our application of the method we present percentage reductions in fertility (ie the complements of the values Bongaarts presents). Since we lack data on abortion we have not estimated C_a ; therefore our residual term C_r confounds a possible effect of abortion with lack of fit of the model. We present the factors in a slightly different order from Bongaarts, introducing exposure factors before contraception: of course, since

the model is multiplicative the order is immaterial. To be consistent, in graphical presentation of the results we use a logarithmic scale to represent the fertility rate expected after accounting for the fertility inhibiting effect of each factor, so that the order of the factors will not affect the apparent magnitude of the effects.

Table 15 and figure 1 show the results of applying the method to the 1975 and 1980 surveys within broad educational groups. Looking first at the overall sample we note that fertility declined from 5.6 to 4.7. The fertility inhibiting effect of marriage increased slightly from 31 to 35 per cent, the effect of post-partum infecundability remained stable around 15 per cent, but the effect of contraception increased from 30 to 42 per cent. The increased impact of contraception is almost entirely due to the rise in use rates, with only a slight gain in the efficiency of the methods used. In both surveys, we are left with a residual effect after accounting for the above factors, representing induced abortion as well as lack of fit of the model.

The model also summarizes the changing nature of differentials by education. Among women with less than three years of education, a slight increase in age at marriage is compensated by reduced breastfeeding, the increase in contraceptive use accounting for all of the decline in fertility. Among women with 3-5 years of education, there are no changes in marriage or breastfeeding, but large increases in contraceptive prevalence which account for all of the observed decline in fertility.

Table 15 The Components of Fertility Change by Education (Estimates of the fertility inhibiting impact of each component based on Bongaarts's model).

Proximate determinants	Index × 100	0-2		3-5		6+		All	
		1975	1980	1975	1980	1975	1980	1975	1980
Marriage	1- C_m	19	22	24	24	48	50	31	35
Breastfeeding	1- C_i	20	18	17	17	8	10	16	15
Contraception use	1- C_c	20	32	31	42	46	49	30	42
	u	20	31	30	41	46	48	30	40
efficiency	e	93	94	93	95	92	93	92	95
Abortion and residual	1- C_r	11	2	7	0	18	14	10	3
Total fertility rate ^a		7.1	6.5	6.2	5.6	3.2	3.0	5.6	4.7

^aBased on cohort-period rates for 1970-4 and 1975-9.

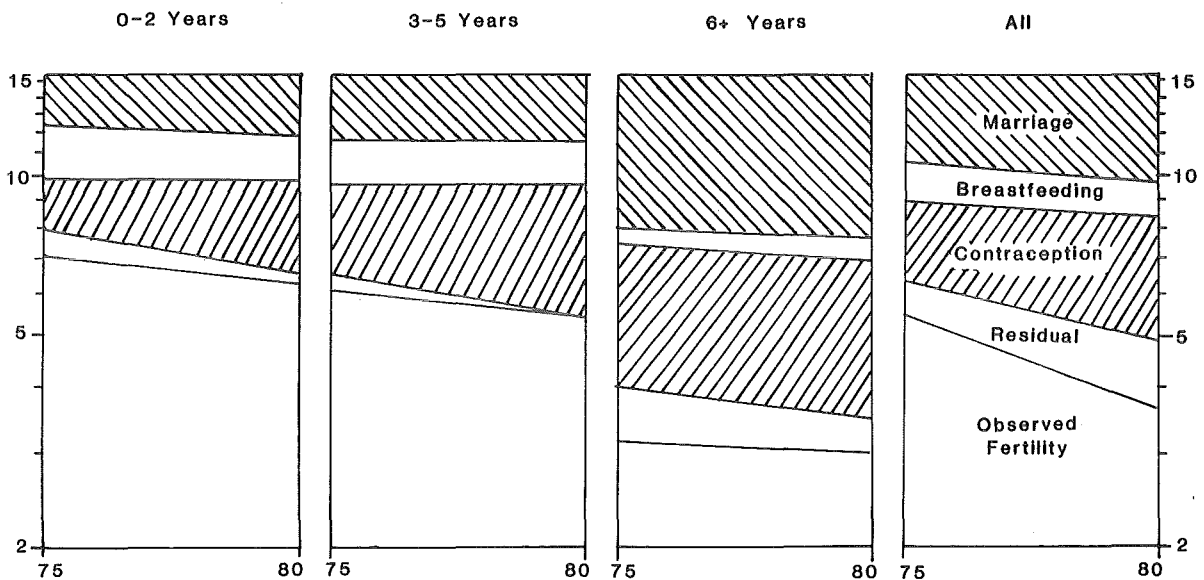


Figure 1 Components of Fertility Change by Education (Estimates based on Bongaarts's model)

NOTE: The ordinate represents total fertility after accounting for the fertility inhibiting effect of each factor, plotted on a logarithmic scale.

Among women with six or more years of education, the more modest fertility declines can be accounted for by small effects of later marriage and increased breastfeeding as well as a small increase in contraceptive prevalence. The pattern of residuals suggests that, if the model is correct, the incidence of induced abortion increases sharply with education. Among women with six or more years of education, observed fertility is about 16 per cent less than would be expected from a

total fecundity of 15.3 and the observed patterns of marriage, breastfeeding and contraceptive use. No doubt this question deserves further detailed analysis. We note that these residual effects are generally smaller for 1980 than for 1975, perhaps suggesting greater self-consistency. (By using fertility rates based on the last five years rather than the past twelve months, as Bongaarts recommends, we have, if anything, understated the magnitude of residual effect.)

9 Infant and Child Mortality

The 1975 survey gave the first information on time trends in infant and child mortality for Dominican Republic, although Guzmán (1980) concluded that reported levels and trends more than 15 years before the survey were too low, probably as a result of omissions of distant infant deaths. Once again, the 1980 survey not only provides estimates for the more recent

past, but also permits comparisons of estimates for the same periods from the two surveys. In order to simplify comparisons over time, all estimates presented here are for mortality of children whose mothers were under 35 years of age at the time of birth, which removes most of the possibility that apparent time trends are due to changing sample representation. (It is worth noting that

Table 16 Infant and Child Mortality (Restricted to children whose mothers were under 35 at birth) (rates per thousand)

Educational level	Survey	Period of birth					
		1950-54	1955-59	1960-64	1965-69	1970-74	1975-78
A Infant mortality (${}_1q_0$)							
0-2 years	75	94	97	94	114	71	
	80		88	119	89	88	76
3-5 years	75	46	70	108	92	83	
	80		98	104	95	84	72
6+ years	75	77	62	93	67	59	
	80		71	77	53	65	46
All	75	78	84	99	96	74	
	80		89	106	84	81	65
B Child mortality (${}_4q_1$)							
0-2 years	75	84	69	75	62	—	
	80		66	62	63	58	—
3-5 years	75	20	59	47	27	—	
	80		52	36	46	29	—
6+ years	75	0	7	24	16	—	
	80		18	14	25	8	—
All	75	55	57	57	38	—	
	80		54	44	48	34	—
C All children under five (${}_5q_0$)							
0-2 years	75	169	159	162	169	—	
	80		148	174	146	141	—
3-5 years	75	65	124	150	117	—	
	80		144	136	136	111	—
6+ years	75	77	68	114	82	—	
	80		88	90	76	72	
All	75	129	136	150	130	—	
	80		138	145	128	112	—

NOTE: For the first period shown for each survey all mothers were under 30 at the birth of their children. For the 1975 survey the most recent period is taken as 1970-3 for infant mortality.

this restriction to experience of women under age 35 at birth makes very little difference to overall estimates.)

Table 16 presents results from the two surveys for infant, child and under-five mortality for five-year time periods and also for broad educational groups. This table clearly shows the effects of omissions (and dating errors) for the earlier periods. In general the 1980 survey seems to have suffered less from these omissions. Except for the period 1950-4, estimates of child mortality seem relatively unaffected by early omissions. As a result of these omissions it seems reasonable to consider only trends since 1960. There exists a possibility that some of the missing infant (and child) deaths from before 1960 have been misdated into the period 1960-4, which would exaggerate apparent trends since 1960; however, such differential misdating of births of children who subsequently died into the period 1960-4 would be hard to explain.

Turning to trends since 1960 for all educational groups combined, infant mortality was almost certainly about 90 per thousand and probably about 100 per thousand in the early 1960s, falling to about 70 per thousand in the mid-1970s. We note that both surveys suggest a fairly substantial fall between the period approximately 5-9 years before the survey and that approximately 1-4 years before the survey, but not for immediately preceding periods. This may reflect some under-reporting of recent infant deaths in both surveys (or else selective transfer to earlier periods for the birth dates of infants who died). Further evidence that reporting errors exaggerate recent declines in both surveys (and more so for the 1975 survey) can be obtained by an examination of educational differentials in infant mortality. The exaggerated recent decline

occurs almost entirely among the least educated women (note that the most educated women – who have completed primary or higher grades – are especially subject to sampling fluctuations). Somewhat curiously, the women with intermediate education show a similar phenomenon of an exaggerated recent decline in childhood mortality in both surveys. It is important to note that the recurrence of the same distinct pattern in relation to time before survey (rather than calendar period) at two successive surveys permits an almost unambiguous attribution of the phenomenon of apparent rapid decline to erroneous reporting. With a single survey, we could not have made such a clear attribution, but the results presented here suggest that great caution is needed in interpreting data on trends in infant and child mortality from a single survey, especially when abrupt changes seem to have occurred rather close to the survey.

In view of the above considerations, a conservative view of declines in infant mortality for Dominican Republic might suggest a decline from about 90 per thousand in the early 1960s to 75 per thousand in the mid-1970s, whereas an interpretation taking the data at face value would suggest a decline from 100 per thousand to 70 per thousand in the same period. The probable decline over this 15-year period is 20 points, rather than either of the aforementioned extremes of 15 or 30 points. The policy interpretation of the two extremes would be radically different. We are able to reject fairly safely the upper extreme, mainly through having the second survey to compare with the first, although the results of the 1975 survey were sufficiently curious to suggest a need for caution in their interpretation.

10 Discussion

The preliminary analysis of the 1980 fertility survey has provided a number of insights of both a substantive and a methodological nature. On the substantive side, we have obtained firmer estimates of a declining trend in fertility amounting to a reduction of 32 per cent between 1960-4 and 1975-9; we have documented a smoothly rising trend in age at marriage of one year over the cohorts 1945-9 to 1955-9; we have shown that breastfeeding practices have not changed recently; we have documented a substantial increase in the prevalence of contraceptive sterilization, which rose from 12 to 21 per cent of currently married women; we have accounted for the fertility decline in terms of its proximate determinants; and we have obtained clear indications of a decline in infant mortality of the order of 20 per cent in the period from early 1960s to the mid-1970s.

On the methodological side, we have illustrated the value of a second round or repeat survey for clarifying

doubtful trends in fertility, nuptiality and mortality. A second survey not only provides an additional time period, but allows checks on retrospective data for earlier periods, thus permitting separation of real trends from omission or displacement errors, two facts which are confounded in a single survey. It is only possible to hope to disentangle reporting errors from real trends when continuity and comparability of the survey instruments and field procedures are maintained. This seems to have happened for most of the 1980 survey in Dominican Republic, although the problems with the socio-economic comparisons over time illustrate the difficulties that can arise from fairly minor, seemingly innocuous, changes in procedures. In particular we are concerned about unexplained apparent changes in regional composition, although the consistency of the results obtained suggests that the demographic analyses are little affected by any such differences.

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