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Evaluation of the Venezuela Fertility Survey 1977

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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.
This publication is part of the WFS Publications Programme which includes the WFS Basic Documentation, Occasional Papers and auxiliary publications. For further information on the WFS, write to the Information Office, International Statistical Institute, 428 Prinses Beatrixlaan, Voorburg, The Hague, Netherlands.

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Evaluation of the Venezuela Fertility Survey 1977

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Preface

One of the major objectives of the World Fertility Survey programme is to assist the participating countries in obtaining high quality data through national fertility surveys. The high standards set by the WFS are expected to yield better quality data than typically obtained in the past, but this expectation in no way obviates the need for a detailed assessment of the quality of the data. It is recognized that such an evaluation will not only alert the analysts by identifying defects, if any, in the data, but also may throw light on the shortcomings of the WFS approach, which can be taken into account in the design of future fertility surveys.

It is in this context that, as part of its analysis policy, the WFS has initiated a systematic programme for a scientific assessment of the quality of the data from each survey. A series of data evaluation workshops is being organized at the WFS London headquarters with the dual objective of expediting this part of the work and of providing training in techniques of analysis to researchers from the participating countries. Working in close collaboration with WFS staff and consultants, participants from four or five countries evaluate the data from their respective surveys after receiving formal training in the relevant demographic and data processing techniques.

The first such workshop, involving researchers from four Latin American countries – the Dominican Republic, Mexico, Peru and Venezuela – was held between July and October in 1979. The present document, which is a translation from the original Spanish, reports on the results of the evaluation of the data of the National Fertility Survey of Venezuela of 1977 and was prepared by Gilberto Vielma, the participant from Venezuela. Yolanda Céspedes, José Miguel Guzmán, and Manuel Ordorica, the other participants, contributed to the present evaluation through their ideas and discussions.

Dr Shea Oscar Rutstein, as the co-ordinator of the workshop, assumed a major responsibility in the successful completion of the work, while many other staff members also made significant contributions to it. Drs Noreen Goldman and Joseph Potter provided valuable assistance as consultants.

HALVOR GILLE
Project Director

1 Introduction

1.1 THE WORLD FERTILITY SURVEY

The International Statistical Institute, with the participation of national organizations, has promoted a programme of fertility surveys denominated the World Fertility Survey (WFS). The main objectives of the programme may be summarized as follows:

1 To provide information that will allow the description and interpretation of the fertility of the population of the participating countries.
2 To increase the countries' capability to study their fertility and to carry out other demographic studies. This aim applies particularly to developing countries.
3 To carry out comparative analyses of fertility and the factors that affect it at an international level.

In order to fulfil these objectives WFS promotes the use of scientifically designed sample surveys. In general, the methodology consists of the selection of a sample of households from which information is then collected regarding the general characteristics of the population, and in some instances of the dwelling itself, through the use of a household questionnaire. A subsample of women of childbearing age is then obtained and they are interviewed with an individual questionnaire. The questionnaires applied are kept as standard as possible in order to enable international comparisons and the development of a uniform tabulation program.

WFS surveys provide a measure of the levels and trends of fertility, infant and child mortality, and nuptiality. Evidently, the reliability of these measures will depend on the quality of the data collected and in spite of carefully formulated questions and strict quality control during the collection of the data, various situations still produce errors which affect the estimates. Therefore, it is essential to be absolutely certain about the quality of the data collected, especially in the developing countries. The possible biases must be considered, as well as their magnitude and the effect they may have in the estimation of the parameters.

1.2 THE VENEZUELA FERTILITY SURVEY

The First Country Report of the National Fertility Survey of Venezuela, which will be referred to in this report as the Venezuela Fertility Survey (VFS) had not been published when the present study was being written; therefore, the information about the survey included here was taken from the Interviewer's Manual (1977) and from a draft of the First Country Report.

Objectives of the Survey

The specific objectives of the Venezuela Fertility Survey were framed within the World Fertility Survey objectives, and were as follows:

1 To obtain information that would allow an in-depth analysis of the trends and patterns of fertility at a national and international level.
2 To obtain information on knowledge, attitude and use of contraceptive methods among the women interviewed.
3 To provide the basic data needed for the planning and later evaluation of family planning activities.
4 To increase the scientific study of one of the most important components of demography, that is to say fertility, with particular emphasis on its explanatory aspects.
5 To assist the government by providing information needed to formulate population policies in the specific area of fertility.
6 To obtain a solid foundation on which to base the programmes for the evaluation of the policies adopted with respect to fertility.

Organizations Participating in the Direction, Promotion and Funding of the Study

The Dirección General de Estadística y Censos Nacionales (Directorate-General of Statistics and Census), through its Dirección de Población (Population Office) was the national organization responsible for the carrying out of all the activities connected with the planning, implementation, development, analysis and publication of the results of the survey. In January 1978 the Dirección General (Directorate-General) became the Oficina Central de Estadistica e Informatica (Central Statistical and Data Processing Office), attached to the Presidency of the Republic.

WFS staff participated and assisted in every stage of the survey. During the initial stages, an expert of the Population Council assisted the Venezuelan experts with the original sample design.

The Latin American Demographic Centre contributed the valuable co-operation of their experts in data processing during the cleaning of the data as well as allowing the use of their computers for developing the tabulations.

Funding of the survey activities, apart from the technical assistance offered by other organizations, was undertaken by the Directorate-General of Statistics and the International Statistical Institute.

1.3 METHODOLOGICAL ASPECTS

The Sample

The sample used by the VFS was part of that selected for the sample household survey, which is continuously carried

out by the Directorate-General of Statistics and Census (now Central Statistical and Data Processing Office). This organization maintains an updated national sample available as a frame for any study related to households, dwellings, individuals or similar study units.

The sample for the VFS was selected in three stages:

1 Selection of primary units or segments: these were a subsample of the enumeration units used in the population census.
2 Selection of clusters: the same clusters that had been used for an employment survey were taken from the selected primary units.
3 Selection of households: those already selected for the household surveys were used and a sample was taken from a listing of women in them for interview with the individual questionnaire.

All women between 15 and 44 years of age were considered eligible to be interviewed with the individual questionnaire, regardless of marital status and whether or not they were permanent members of the household. From this set of eligible women, one out of every two listed in the household questionnaire was selected for interview.

The Questionnaires

The two questionnaires used – household schedule and individual questionnaire – were based on the standard questionnaires developed by WFS and adapted to the national characteristics and requirements.

The household schedule was designed with three main objectives in mind:

1 To obtain a list of the household members that would allow the identification of eligible respondents for the individual questionnaire.
2 To obtain data about the age, sex and marital status of the population.
3 To obtain useful data on factors related to fertility such as monthly income and number of children ever born to women aged 15 and over.

The objectives of the individual questionnaire are stated in the headings of the sections into which it was subdivided, and comply with the main objectives of the programme as a whole.

1 Background characteristics of the respondent
2 Pregnancy history
3 Knowledge and use of contraceptives
4 Sexual history for the last 12 months
5 Marriage history
6 Fertility regulation
7 Respondent's work history
8 Background characteristics of the current (or last) husband.

The questionnaire followed the WFS core questionnaire very closely, the main modification consisting of the inclusion of section 4 of the above list.

It is worth mentioning that the household schedule data became available only a short time before this report was finalized. Due to this fact, only a brief cleaning of the data was possible, and therefore we were unable to do some tabulations that would have been very useful. We were also hampered by the fact that the First Country Report had not been published.

2 Errors and Biases which May Affect the Information in Fertility Surveys

2.1 SELECTION PROCEDURES

The definition of women eligible for being selected for individual interview and the procedures for selection in the World Fertility Survey vary according to country. In some cases all women of childbearing age registered in the household schedule were included as eligible, irrespective of their marital status. In others, only the women who were ever in a legal or consensual union[1] were eligible to be selected for the individual interview. Where the first procedure was used, as in the case of Venezuela, and a subsample of women was selected, one can compare characteristics of selected women with those of women not selected in order to detect biases in the selection of the women.

2.2 ERRORS IN THE REPORTING OF AGE

The incorrect reporting of the women's ages results from a preference for certain digits and a transference of age. In general, greater concentrations of persons are observed in the ages ending in 0, 5, 8 and 2 at the expense of the adjacent digits. If age is obtained through reference to date of birth, preference may be given to the other digits, depending on the date of interview.

The shifting (transference) of age to declare a higher or lower age than true age is a systematic tendency among the respondents. One example of this type of error is that of women over 40 declaring themselves to be younger. This type of error has very important impacts on the estimation of measures in which the age of the women is involved.

The lack of reporting of age may also distort the age structure. The survey, therefore, tried always to obtain an estimate of the woman's age during the interview. However, this estimation may also be an additional source of error, especially when the interviewer (or supervisor) derives her estimate by using data on characteristics such as parity or marital status.

Age transference can have important effects on estimated fertility rates. The biases that occur depend not only on the direction of transference (ie to older or younger ages than the real age), but also on the real age of the woman and whether or not transference is selective with respect to fertility. As an example, let us take the case of women whose real ages were 45–49 at the time of the interview, but who reported ages 40–44. If these women were not different in their fertility from women of the same age reporting correctly, this transference would upwardly bias the estimate of children ever born to women 40–44 because older women in general have higher parity. This result holds true for all age groups. With respect to current fertility rates however, a downward bias will occur for the age group 40–44 because women 45–49 have lower rates. The effect on fertility rates holds for women whose real ages are 30 and above; the opposite is true for women really 20–24 reporting ages 15–19; and the situation is indeterminate for women really 25–29.

Now let us see the effect on the estimation of fertility rates for earlier periods for the cohort of women reporting age 40–44. If the women who transferred to this group from 45–49 report the dates of their childbearing accurately, the reported ages at which they gave birth would be too low, inflating the rates for those ages less than 20 and deflating for ages 30 or greater: in other words the entire cohort fertility curve would appear to be shifted to younger ages.

If the transferred women correctly report their ages at giving birth, then the age specific rates for that cohort would be correctly reported but births would be transferred to later periods. Of course, if women report older ages, the errors introduced would be in the opposite sense from those indicated above.

2.3 ERRORS IN THE RETROSPECTIVE INFORMATION

The accuracy of fertility estimates will depend on the quality of the data involved in both the numerator and the denominator of the rates. We have already described age reporting errors which may affect the denominator of the rates. Now we shall examine the factors which could affect the numerator, that is to say the live births.

The basic source of information on births is the maternity history of the respondent, in which all pregnancies are listed in chronological order, as well as the outcome of these pregnancies and the dates of their occurrence. In addition, the survival status of all children at the time of the interview and their ages at death (if applicable) are also registered.

It must be pointed out that the women interviewed in each age group are the survivors of their respective cohorts, and therefore one must assume in using the maternity history for analysis that the fertility of the survivors does not differ from that of the women who have died. The bias from the non-fulfilment of this assumption will be greater for periods more distant from the time of the interview and will also be related to the level of adult mortality. If female mortality is high and differs according to the number of children, the level of past fertility will probably have been underestimated.

The data contained in the maternity history are obtained retrospectively so that their quality depends on the res-

[1] For brevity, we will refer in this report to women in either a legal or a consensual union as 'in union', unless a distinction is necessary.

pondent's capacity for remembering each event and the exact date at which each occurred, in addition to her willingness to report all events.

Omissions

A frequent error in the maternity histories is the omission of births. Generally, omission occurs more often among older women and for births that occurred long before the time of the survey. However, more recent births may also be omitted, mostly those that occurred in unstable unions. In addition children are more frequently omitted if they had died during their first years of life or were living outside the home at the time of the interview. It has also been observed in countries with son preferences that more female births are omitted than are male births.

When omission affects periods distant from the time of the survey, it leads to underestimates of fertility in these periods, with the possible result of showing a false increase in fertility with time. The level of total fertility for the older women would thus be underestimated, and therefore the mean parity by age would show a decline in the older ages. On the other hand, when children of very young age at interview are omitted, the level of fertility in the most recent period is underestimated, which could give the impression of a recent decrease of fertility.

Goldman *et al* (1979) have found a high correlation between poor reporting of age and omission of births in a study on the quality of the data obtained in the Nepal Fertility Survey.

Misdating of Births

Incorrect reporting of children's dates of birth can be another important source of distortion of the maternity history. The failure of some women to remember the dates at which their children were born may be important if there is a systematic tendency on the part of the respondents to transfer the birth date of their children nearer to or further from the time of the survey.

Analysing the data of surveys carried out in West New Guinea around 1962, Brass (1974) found some evidence for a shift in fertility to periods further removed from the time of survey, caused by a presumed tendency on the part of the interviewers to assume that the women had begun childbearing at a very young age. The effect of this distortion was to overestimate the fertility in the earlier periods and to show a false decline in the fertility in the younger ages for the later periods.

In an analysis of the data obtained in the Bangladesh Fertility Survey of 1976, Brass (1978) found evidence of other types of displacement. Specifically, it seemed that births which occurred during the last five years had been transferred to the previous period (5–10 years prior to the survey), and that births which had taken place in periods further in time were brought forward, many to this same period. This error, which mainly affects the older cohorts, creates a distortion in the trend of fertility, shown as an exaggerated decline of fertility in recent periods for the older ages.

Potter (1977a), starting from certain assumptions on the manner in which displacement of births in time are produced, developed a simulation model to find out to what extent the fertility levels and trends obtained from the data contained in a maternity history could be distorted. In his model, the following assumptions are made: the more distant the births are from the time of the survey, the less exactly the interviewed women remember the date at which the births occurred; and if the maternity history is obtained through questions about births in the order in which they occurred, that is to say, starting with the first born child, then the data a woman gives for any other birth is influenced by the information she has given about her previous births. In effect, the model assumes that the respondents report their births – at least those furthest removed from the time of the survey in terms of birth intervals, and that dates of birth are brought forward in time because of the reporting of a later date for the first birth or the exaggeration of the interval between successive births. Comparing the results of his model with the information obtained in surveys carried out in Bangladesh and El Salvador, Potter found that the distortions affecting the data of these surveys were of the type specified by his model (Potter 1977b).

3 Age Reporting

In chapter 2 it was noted that incorrect reporting of women's ages distorts the analysis of fertility levels and trends. In this chapter we will examine age reporting in both the household and individual surveys. In general, we shall focus on the preference for certain terminal digits and the extent to which misreporting has a serious effect on the five-year age groups used in the estimation of fertility rates. We shall also endeavour to discover which women are more prone to age misreporting. As part of this investigation, we shall carry out comparisons with the population census (1971).

In the VFS information about age was initially obtained from the respondent to the household schedule by asking specifically for the age of each household member. Even if age was not known, the interviewer was instructed to get an estimate for all members. In addition for women interviewed with the individual questionnaire, data on age was obtained by asking the respondent's age in completed years and then by asking for the month and year of the respondent's birth. The interviewer was instructed to probe and correct any inconsistency between the two.

3.1 AGE IN THE HOUSEHOLD SURVEY

Table 1 compares the distribution of the population in the household survey and in the 1971 population census, by five-year age groups. The survey shows an age structure which is older than the population census, with a difference of around 3 per cent for the percentage of the population under 15 years of age. This difference, which may be due to changes in fertility, could also be due to omission of young children in the survey. Such omission may not be present in the individual survey, however, for which detailed information regarding live births is provided only by the respondent herself (ie the mother), whereas for the household schedule the information could have been provided by any member of the household over 18 years of age. In the chapter evalu-

Table 1 Age distribution of the population by sex, according to the household survey and the 1971 census (percentages)

Age groups	Household survey			Census		
	Both sexes	Males	Females	Both sexes	Males	Females
0–4	13.8	14.4	13.2	16.2	16.4	16.0
5–9	14.4	14.8	14.1	15.2	15.4	15.1
10–14	13.9	13.7	14.2	13.6	13.7	13.4
15–19	12.4	12.2	12.6	11.4	11.2	11.5
20–24	9.4	9.2	9.6	9.0	8.8	9.2
25–29	7.1	7.0	7.1	6.5	6.3	6.7
30–34	5.3	5.5	5.2	5.5	5.5	5.5
35–39	4.8	4.6	5.1	5.0	5.0	5.0
40–44	4.1	4.2	4.0	4.4	4.5	4.2
45–49	4.0	4.0	4.0	3.5	3.6	3.4
50–54	3.0	3.0	3.0	2.8	2.9	2.8
55–59	2.2	2.3	2.1	2.2	2.2	2.2
60–64	2.1	2.0	2.1	1.8	1.8	1.8
65–69	1.3	1.1	1.4	1.1	1.1	1.2
70–74	0.9	0.9	0.9	0.8	0.8	0.9
75–79	0.6	0.5	0.7	0.4	0.4	0.4
80–84	0.3	0.3	0.3	0.3	0.2	0.4
85+	0.4	0.3	0.4	0.3	0.2	0.3
Broad groupings						
Less than 15	42.1	42.9	41.5	45.0	45.5	44.5
15–64	54.4	54.0	54.8	52.1	51.8	52.3
65+	3.5	3.1	3.7	2.9	2.7	3.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
No of cases	39 909	19 408	20 501	10 721 522	5 349 711	5 371 811

Table 2 Sex ratios by age in the household survey, the 1971 census, and in a stable population (males per 100 females)

Age	Source		
	Household survey	Census	Stable population[a]
0–4	103.1	102.6	102.9
5–9	99.7	102.1	102.8
10–14	91.8	101.7	102.8
15–19	91.7	97.3	102.8
20–24	90.1	94.7	102.7
25–29	92.8	94.4	102.4
30–34	99.8	99.1	102.3
35–39	85.4	99.9	101.5
40–44	97.7	106.5	100.3
45–49	95.9	106.4	98.2
50–54	92.6	103.8	96.0
55–59	107.1	98.8	93.0
60–64	89.7	96.1	88.8
65–69	79.3	91.3	82.9
70–74	91.6	85.2	78.8
75–79	69.6	76.7	68.3
Total	94.7	99.6	–

[a]Model West, level 15 r = 2.5 per cent, from Coale and Demeny (1966).

ating fertility we shall have an opportunity to study the possibility of these omissions in more detail.

It is important to note that the age distribution of the household survey shows irregular declines in the percentages of the females in neighbouring age groups. This is especially evident for the groups 30–34 *vs* 35–39, 40–44 *vs* 45–49 and 55–59 *vs* 60–64, where the percentages of women are either the same or almost the same. These possible errors also may be related to proxy reporting.

Table 2 and figure 1 show sex ratios by five-year age groups for the household survey and the 1971 population census together with those of a stable population from Coale-Demeny (1966) tables. Sex ratios at young ages are usually over 100, as shown by the stable population, but in the household survey it was only true for the 0–4 age group, suggesting a greater omission of males than of females. Furthermore, the very low ratios found at ages 15 and over point to a relative deficit of adult men, which is possibly due to the immigration of young women, and to the fact that non-response was higher for all-male households owing to the greater difficulty of finding someone at home. The erratic nature of the sex ratio reveals that age transference also took place in the household survey. In particular, ages 35–39 have too many women at the expense of ages 30–34 and 40–44.

Figure 2 shows the age distribution of females by single years of age, both in the household survey and in the 1971 population census. In general, we note better reporting of age in the census, as reflected in a Myers' index which is 5.3 for the census compared to 9.4 for the household survey (on scales of 0–180). The distributions are quite similar, with heaping in the survey being mainly on digits 0 and 5 and to a lesser extent on 2, 6 and 8. The age distributions for males both in the survey and in the census have characteristics very similar to those described for females.

3.2 AGE IN THE INDIVIDUAL SURVEY

Figure 3 presents a percentage distribution of women aged 15–44, by five-year age groups, from three data sources: the individual and the household surveys and the 1971 population census. The age distribution in the individual survey is younger than in the other two sources. As can be seen from table 1, there are no important differences in the 20–

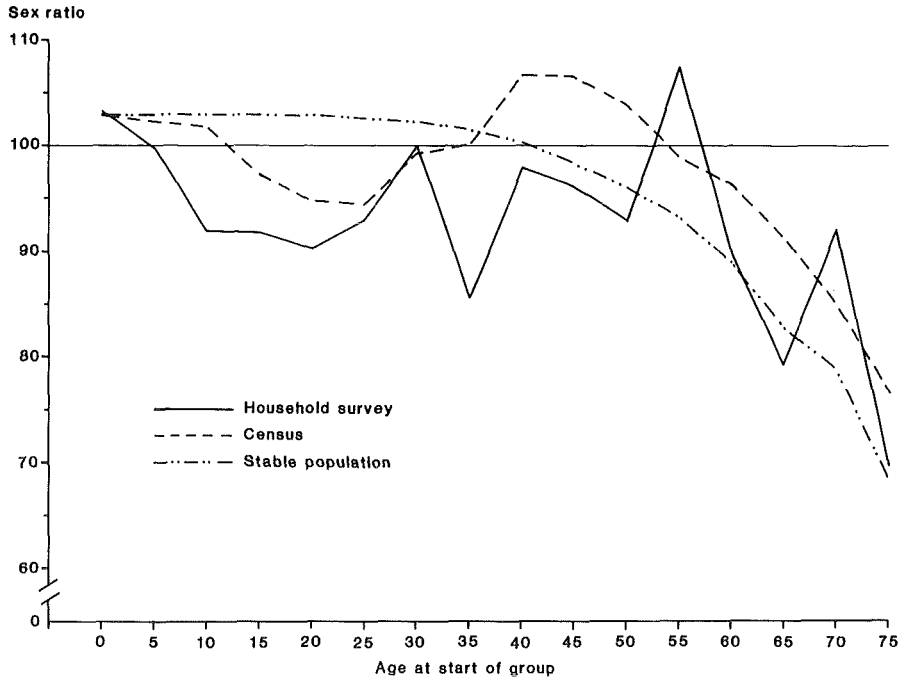


Figure 1 Sex ratio in the household survey, the 1971 census and a stable population

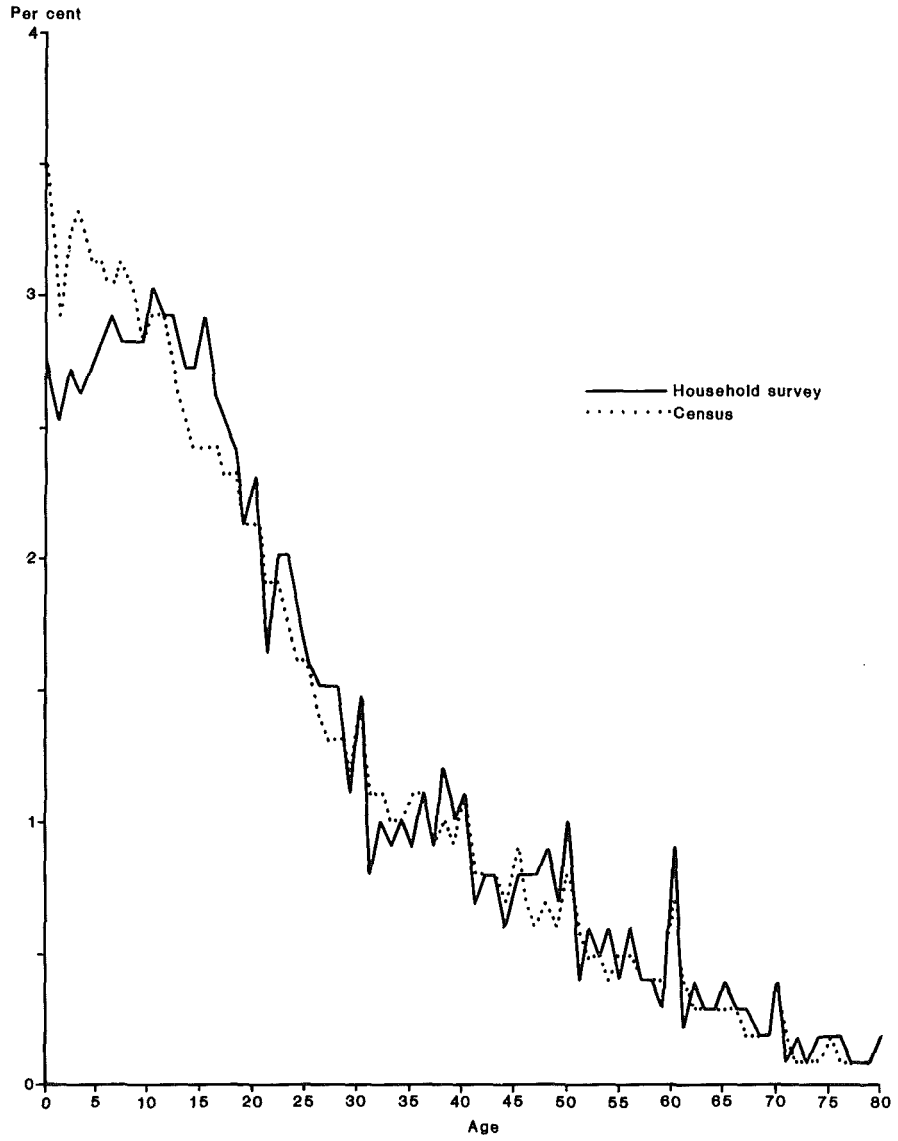


Figure 2 Single-year age distribution of the female population in the household survey and the 1971 census

44 age range between the census and the household survey, which suggest either the possibility that the same error in the age structure occurred in the census as well as in the household survey, which is unlikely, or there was a bias in the individual survey towards younger women. The changes in the demographic variables that have occurred in Venezuela could not have affected the population structure in the way that is apparent from the data in only six years.

It was not possible to carry out direct comparisons between reports of age in the household survey and the individual survey because of difficulties in matching records of the respondents from both surveys. However, figure 3 also shows that the age distribution from the individual survey is much closer to what is expected, especially when compared to that observed from the household survey.

As noted earlier, the household survey distribution shows neighbouring age groups with very little differences in percentage, an anomaly that is not evident in the individual survey where we see a more normal behaviour of the age structure, probably because there are fewer instances in which age had to be estimated. However, we can still note the presence of a bump in the age distribution for the age group 35–39.

Figure 4 presents the percentage distribution of women by single years of age for both the individual survey and the household survey. The distributions are quite similar although there seems to be less heaping in the former survey. Preference and rejection of different digits is also evident. Better age reporting in the individual survey is due to the fact that the information was provided by the respondent herself. It was also possible to verify her answer, since the birth date was also asked. It would have been interesting to compare the age distribution of women who provided their birth date against those who did not, but the instructions to the interviewer specified that if no birth date was available, it should be estimated from the age reported by the women, and therefore such comparison is not possible. There is still some evidence of heaping, which could be due to the fact that it was not possible to carry out verification when the respondent did not know her birth date.

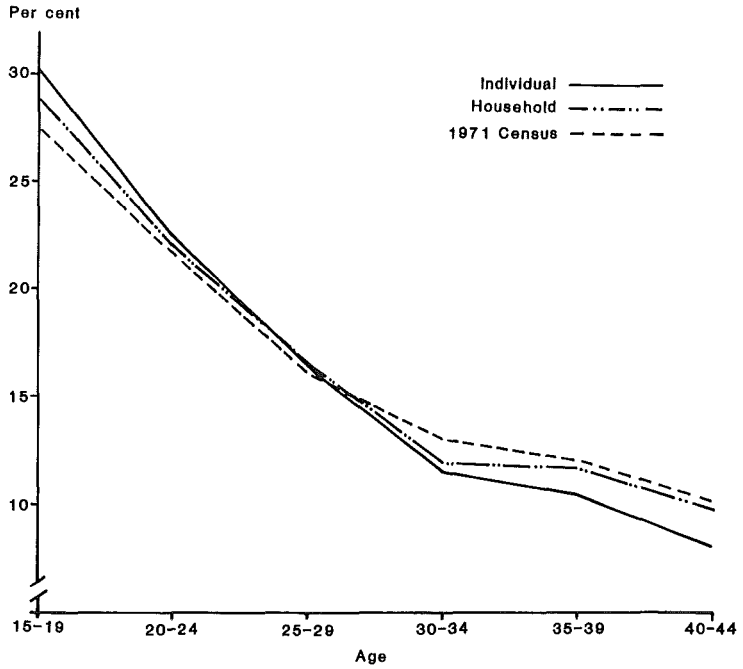


Figure 3 Five-year age distribution of females aged 15–44 according to the individual and household surveys and in the 1971 census

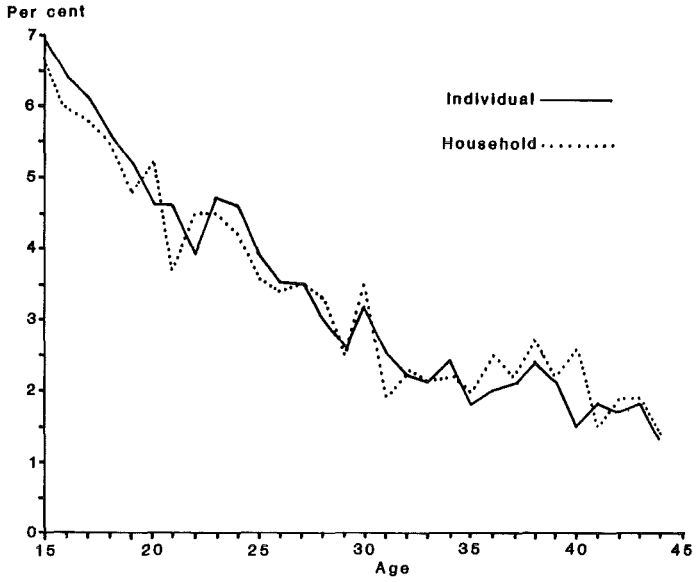


Figure 4 Single-year age distribution of females aged 15–44 in the individual and household surveys

Table 3 includes an index of digit preference computed on the basis of the respondent's birth date as reported in the individual survey. According to the index there is heaping on digits 0, 1, 8 and 9. Since the fieldwork was done in 1977, women reporting a birth date ending in 0 would have had ages 16–17, 26–27 and 36–37 at the time of the survey. As can be seen from figure 4, there is little or no preference for ages 16, 17, 26 and 27, but heaping does exist for ages 36 and 37. We also see that the 35–39 age group ascends instead of descending as expected. Women who reported ages of 36–39 would have been born in years ending in 1, 8, 9 and 0. Thus the heaping indicated by the index when applied to year of birth comes from this age group and in particular from ages 36–39. Also apparent from the figure is that the normally preferred ages of 35 and 40 have been rejected. It therefore seems that the excessive number of women of ages 36–39 do come from other five-year age groups.

3.3 DIFFERENTIALS IN AGE REPORTING

In order to investigate which kind of respondent is more likely to report her age correctly, the interviewed women

Table 3 Distribution of digit preference and Myers' index for age in the 1971 census and household survey by sex, and for year of birth in the individual survey

Terminal digit	Census		Household survey		Individual survey by year of birth
	Males	Females	Males	Females	
0	2.0	1.9	2.8	2.8	3.5
1	–0.2	–0.1	–2.4	–2.8	3.4
2	–0.2	–0.4	0.8	–0.3	–2.3
3	–0.5	–0.6	–1.2	–0.4	–2.5
4	–0.6	–0.6	–0.4	–0.2	–2.1
5	0.5	0.6	0.8	0.3	–2.0
6	–0.2	–0.1	0.3	0.6	–0.7
7	–0.5	–0.5	0	0.2	–0.4
8	0.3	–0.2	0.5	0.8	1.7
9	–0.6	–0.4	–1.2	–1.0	1.4
Myers' index	5.6	5.3	10.5	9.4	20.0[a]

[a]Not from a blended population.

were classified by single years age and by various characteristics. The results are presented in figure 5. The graph in the upper left-hand corner shows the distribution of the respondents according to urban or rural residence at the time of the survey. Age reporting is notably better in the urban areas as would be expected. The rural areas present a very irregular distribution with heaping on terminal digits 0 and 5, and additionally on some even numbers. There is some heaping in the urban areas as well, but it is much less pronounced than in the rural areas.

The comparison of respondents by area of current residence is limited by the small number of women in the rural areas (15 per cent of all women). We have therefore classified women according to the social and economic development of their region of residence. Three regions were classified as more developed (Caracas, Central and Zuliana), and five regions were classified as less developed (Occidental, Andina, Sur, Nor-Oriental and Guayana). The age distribution by this new classification is shown in the upper right-hand graph in figure 5. We can see that age reporting is quite similar in both regions, although a certain amount of heaping and a rejection of some ages is more apparent in the less developed regions.

A study of age reporting by literacy, as shown in the graph in the lower left-hand corner, is also hindered by the small number of illiterate women in the sample (only 10 per cent of women stated they could not read and write). The women are better represented if we group them by educational level. We will use two categories: women with primary education or less and women with an educational level higher than primary. As expected, the more educated women report their age more accurately than the less educated. The latter category may have been substantially influenced by the illiterate women.

The remaining graph of figure 5 (overleaf) shows the age distribution by current marital status for single, legally married and consensually married women. The age distribution of the single women is quite even, and possible errors appear only after the age 30, which may also be due to the very few

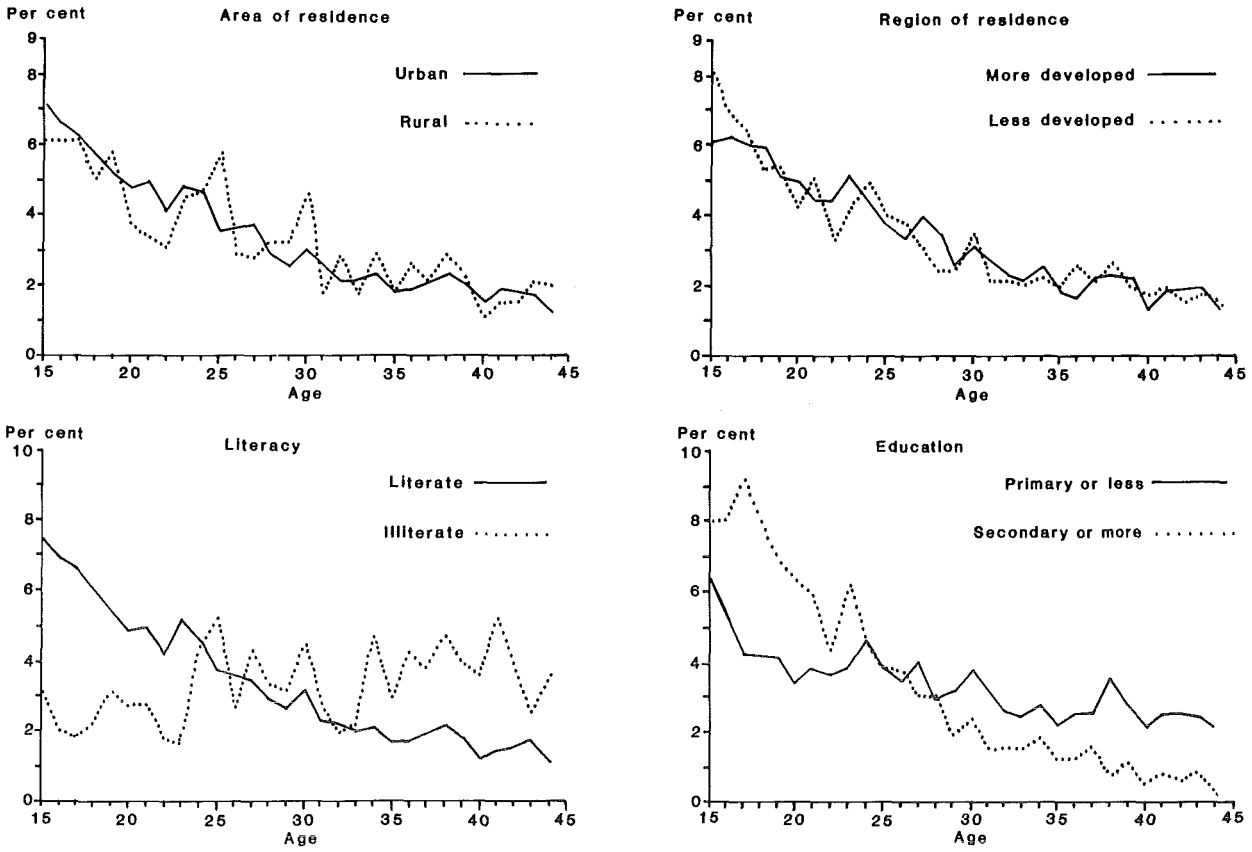


Figure 5 Single-year age distribution in the individual survey by selected characteristics

[*Figure 5 continues*]

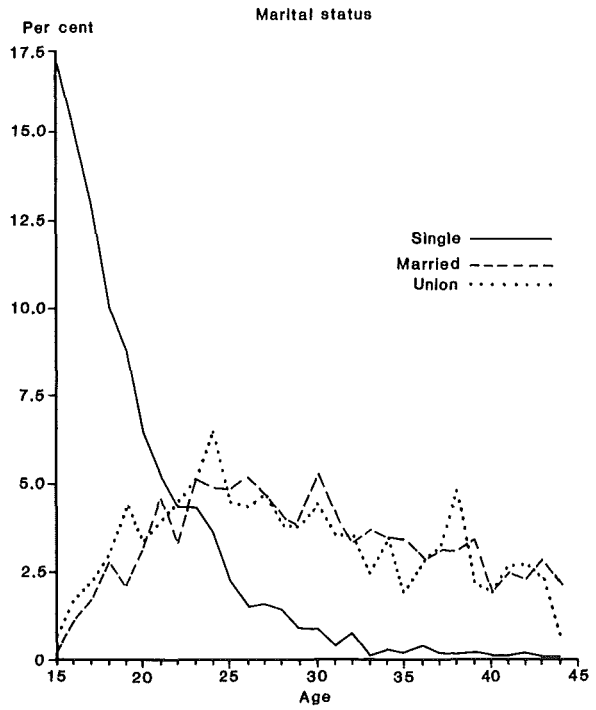


Figure 5 (*cont*)

women who have remained single. In comparison, age reporting by legally and consensually married women shows contrasting irregularities, existing preferences by one group for digits that are rejected by the other. For example, legally married women show a strong rejection for age 19 and an attraction for ages 26 and 33. The consensually married women show attraction and rejection, respectively, for these ages. This somewhat inverse pattern may be the result of linked age and marital status misreporting.

Summing up, the comparison of the age structure between the census and the survey shows the effects of changes in fertility, although there is also some evidence of omission, which seems to have particularly affected male children 5–14 years old. There is also omission of adult males, although some of the effects on the sex ratio may have been due to large international immigration of women and age transference. The individual survey shows a slight bias towards the selection of younger women. In general, the observed preference for certain digits does not seem to significantly influence the age distribution by five-year age groups. Concerning age reporting by certain characteristics, the results obtained were as expected, ie better age reporting in urban areas, in the more developed regions, by better educated women, and by ever-married women. We still note, however, the presence of too many women at ages 36–39 in the individual survey due to age transference from neighbouring age groups.

4 Nuptiality

The evaluation of the data on nuptiality in the Venezuela Fertility Survey is important not only because of the value of the nuptiality data themselves, but also because of their relation to fertility. Errors in reporting nuptiality may indicate errors in the fertility data because of the high correlation between the two. If the nuptiality data are incorrect, it is very likely that the data on fertility are also incorrect, even though the survey had different sections for each topic.

Both the household survey and the individual survey obtained information on the marital status of eligible women, although the data obtained from the latter are more detailed because the individual questionnaire included check questions as well as a marriage history with questions about each union: type of union, date of entry and date and form of dissolution (if relevant). Since, in the individual survey, each respondent provided information about her own marital history, it can be assumed that the data are more reliable than that provided by a different person, as may have been the case in the household schedule and which frequently occurs in the census.

The purpose of this chapter is to investigate the quality of marital status reporting. We will focus our attention mainly on marital status at the time of the survey and on information regarding the first union, due to the high proportion of women (84 per cent of all ever-married women) who declared having been in only one union.

4.1 THE PROPORTION OF EVER-MARRIED WOMEN

The proportions of ever-married women by current age group according to the household schedule and the individual questionnaire are presented in table 4. From this table we see that the values obtained from the individual questionnaire are consistently greater than those obtained from the household schedule. The most noticeable difference is that for the 40–44 age group, where there is a difference of 2½ per cent between the individual survey and the household survey. These results show us that some women who are reported as single in the household schedule were later found to have been in a previous marriage or a consensual union. Some of these women, especially the older ones, were either separated, divorced or widowed at the time of the survey, although they had declared themselves as having never been married in the household schedule. However, the differences in the proportion married between the two surveys may also have been due to the fact that more single women were included in the household schedule than were interviewed with the individual survey, due to differing response rates. At the present time we are unable to tabulate the reponse rate by marital status.

A check on the quality of data in the marital history of the individual survey may be made through a comparison with the population census of 1971. However, for this comparison it is necessary to 'reconstruct' the marital status at the time of the census from the marital history. Table 5 shows this reconstruction of marital status by age group. For every age group we see a higher proportion of ever-married women according to the data from the survey, even though single women were grouped together with separated women, since the census does not distinguish between women who were separated from marriage (although not legally) or from consensual unions and were therefore included as single.

Table 4 Percentage ever married by age, household and individual surveys

Age group	Survey	
	Household	Individual
15–19	19.4	20.2
20–24	58.2	59.7
25–29	80.7	82.4
30–34	91.6	92.5
35–39	95.4	95.8
40–44	95.3	97.8

Table 5 shows important differences between the census and the marital history of the Venezuela Fertility Survey. For example, there is a higher proportion of women in a consensual union according to the survey, which leads us to the conclusion that many women who had been recorded as single in the census were in fact in a consensual union. The data from the survey also show higher proportions of legally-married women at all ages, although the differences between the two sources are more pronounced above age 20.

One wonders why the survey would find a higher proportion of legally married women than the census. The explanation depends on two elements. First, the questionnaire from the individual interview determined marital status of the woman at the time of the interview by asking whether she was single, legally married, consensually married, widowed, divorced or separated. It then asked whether the woman had had more than one union. Women who had started their married life as consensually married but then legalized that union may have replied that only one union occurred since they had had only one partner. Thus their first union would have been recorded in the survey as being a legal marriage rather than as a consensual union with a second union as a legal marriage. Thus, legalization would reduce the proportion in the survey who would report being consensually married at the time of the census. Secondly, since the survey was more able than the census to determine women who were consensually married at all times, some women who had declared themselves single for

Table 5 Marital status distribution for November 1971, as reconstructed from the VFS and as reported in the 1971 census

Age	Venezuela Fertility Survey				Census			
	Single and separated	Married	In a consensual union	Widowed and divorced	Single	Married	In a consensual union	Widowed and divorced
15–19	78.1	10.7	11.1	0.1	83.9	9.7	6.2	0.2
20–24	38.7	37.0	23.2	1.1	50.7	31.9	16.5	0.9
25–29	16.2	54.7	27.0	2.1	28.0	47.4	22.7	1.9
30–34	13.9	53.9	31.3	0.9	19.7	51.7	25.5	3.1
35–39	10.7	52.3	33.6	3.4	17.7	52.0	26.0	4.3

the census but who were really in a consensual union, in the survey had declared their true marital status at the time of the census.

Thus, both these elements together would lead to the differences in proportions that we observe.

4.2 AGE AT FIRST UNION

Information on age at first union is very useful because changes in age at first union may explain a large part of the changes that have occurred in fertility. Table 6 presents the percentage of women who had ever been in a union by given ages according to their five-year age group at the time of the survey. The patterns in age at first union are shown graphically in figure 6. We note that the percentage of women ever married by a given age decreases as we move from the older to the younger cohorts, implying an increase in the mean age at first union.

Table 6 Percentage ever married or ever in a union by specified ages, by cohort. Individual survey

Specified age	Cohort				
	20–24	25–29	30–34	35–39	40–44
13	0.9	1.4	1.9	2.0	2.3
14	2.4	4.0	7.5	6.4	5.7
15	7.4	10.2	14.2	12.0	9.9
16	12.7	15.6	21.8	20.8	18.9
17	19.7	23.0	31.2	30.1	28.5
18	28.0	30.8	37.5	41.2	39.6
19	35.9	41.3	46.3	50.4	51.1
20	44.9	51.3	53.4	58.0	59.6
21		59.0	59.5	64.2	66.1
22		64.0	65.7	72.8	71.8
23		68.5	74.3	77.0	76.3
24		74.1	78.2	80.1	79.4
25		76.7	81.3	82.7	82.5
26			84.1	86.7	84.5
27			85.3	88.9	86.7
28			87.3	89.6	88.7
29			89.4	90.5	89.8
30			90.7	92.5	91.8
31				93.4	92.7
32				93.4	94.3
33				93.5	95.2
34				94.9	95.5
35				95.6	95.8
36					96.6
37					96.6
38					96.9
39					97.2
40					97.2

There is some evidence of irregularity in the data provided by the older cohorts. The percentages of women ever in a union by age 17 for the cohorts 35–39 and 40–44 is less than the percentage by that age for the 30–34 cohort; however, the percentages ever in a union by age 19 for the older two cohorts is higher than that for the 30–34 cohort (see figure 6). It is possible that the preceding results may be true, but most probably they are due to the fact that some women have displaced their date of first union towards the survey or have omitted a first union which took place when they were very young. However the differences in the percentages as shown in table 6 are not very large.

One way of evaluating changes in age at first union is by applying Coale's nuptiality model to the observed data (Coale 1971). Three parameters are used in this model: the age at which women begin marrying (a_0), the rhythm of marrying in relation to that of a standard curve (k), and the proportion of women who ever marry by age 50 (C). The model allows, with the information available, prediction of the future behaviour of the younger cohorts, as well as smoothing the data provided by the older cohorts.

The mean ages at first union and their standard errors from the application of the model to different five-year age cohorts are shown in table 7. The values obtained for the different cohorts are quite acceptable if we consider the standard error of the means. The results indicate that there is a difference of almost one year between the mean age at first union of the youngest cohort shown, 20–24, and the older cohorts, a result which confirms the changes in nuptiality patterns mentioned above. It should be noted, however, that the cohort 35–39 has an exceptionally low mean age at first union.

Errors in the reporting of age at first union may be seen easily from figure 7, where observed age at first union and the values obtained from the fitted model are shown for each cohort. In the younger cohorts there is more heaping on even numbers, with almost no heaping on numbers ending in 0 or 5, as expected; in the older cohorts, nevertheless, there is a certain preference for the digit 5 and for numbers ending in 1 and 9, similar to the heaping observed for age reporting. The differential heaping suggests that the

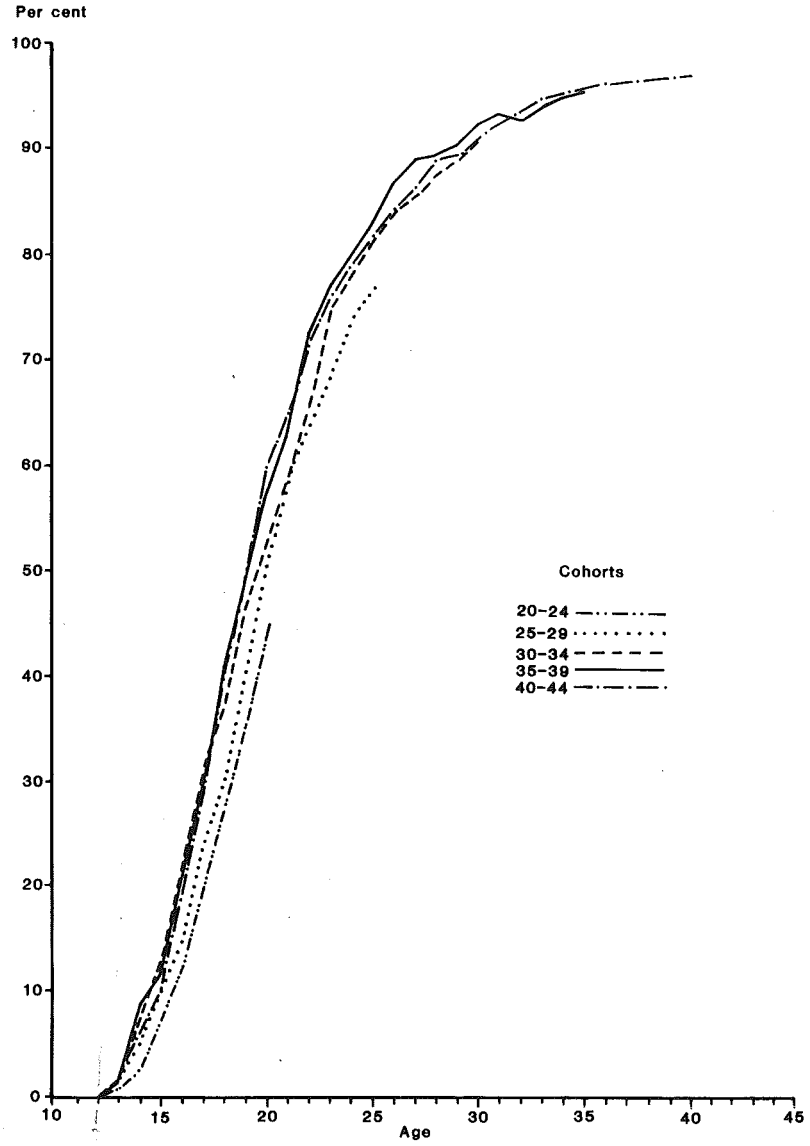


Figure 6 Percentage ever in a marital union at single years of age for five-year cohorts

Table 7 Estimates of the parameters of Coale's model nuptiality schedule as fitted to five-year cohorts in the individual survey

Cohort	Initial age of the schedule (a_0)	Mean age at first union	Standard error of the mean
20–24	11.7	21.0	0.45
25–29	11.4	20.6	0.32
30–34	10.8	20.2	0.29
35–39	11.2	19.8	0.25
40–44	11.3	20.1	0.27

younger women probably provided the date of their first union, while older women provided age at first union.

4.3 NUPTIALITY DIFFERENTIALS

Table 8 shows the application of the Coale nuptiality model to women grouped by certain characteristics. For the most part we see results that we would have expected, indicating that the data are of good quality. In this sense, we see that for every cohort urban women have a higher mean age at first union than rural women, literate women higher than illiterate, women with more than primary education having a much higher mean age at first union than lower educated women and that women who are currently legally married have a higher mean age at first union than women in a consensual union. However, we also see that for most groups the cohort 40–44 has a higher mean age at marriage than the cohort 35–39, indicating a misreporting or an omission of the date of first union, but which does not occur for women with more than primary education. The unexpected result for rural women, where we see that the oldest cohorts also have the highest mean ages at first union, is probably due to the small numbers of observations that we have for these cohorts.

The differentials indicated above are shown in a different way by figure 8, in which respondents have been distributed according to their age at first union by the selected characteristics. In general, we see the curves are quite smooth except in the portions above age 25, which may be due to the fact that very few women marry after that age.

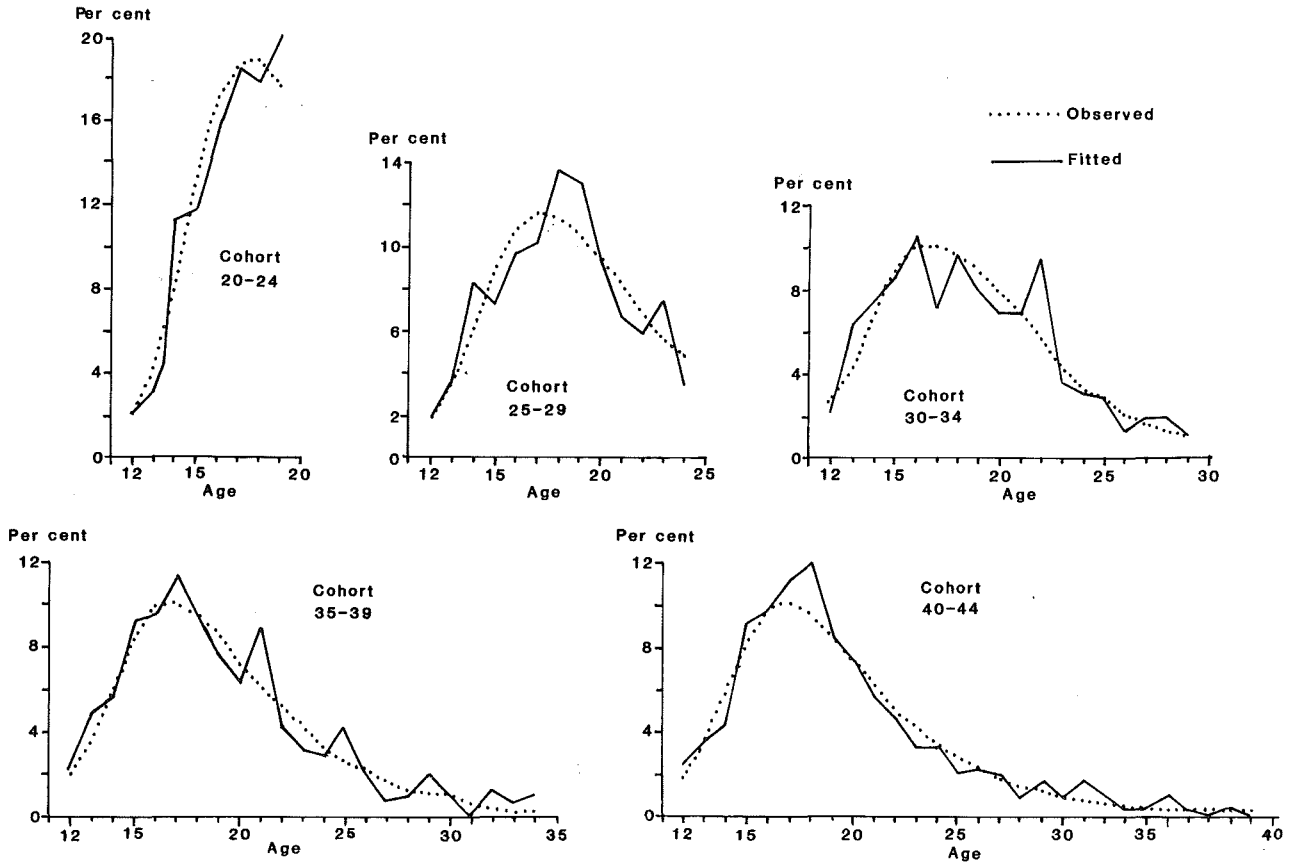


Figure 7 Observed and fitted distributions of age at marriage among ever-married women by cohort. Individual survey

Table 8 Mean age at first union obtained by fitting Coale's model, by cohort and selected characteristics

Cohort	Area of residence		Literacy		Education		Type of union	
	Urban	Rural	Yes	No	Primary or less	Secondary or more	Married	Consensual
20–24	21.8	18.3	20.9	20.3	19.3	24.5	22.2	19.7
25–29	21.0	18.9	21.0	18.1	19.3	23.4	21.3	18.9
30–34	20.7	18.1	20.8	17.0	19.0	23.9	20.8	17.9
35–39	20.0	19.0	20.4	17.5	19.3	22.5	20.7	18.5
40–44	20.2	19.5	20.6	18.6	19.8	21.8	21.0	19.2

4.4 DIGIT PREFERENCE IN REPORTING DATE OF FIRST UNION

In reporting the dates of unions, the respondents could have given the date in month and year or, if they did not remember, could have calculated the date by estimating how long ago the marriage had occurred. In both cases there is a tendency to prefer certain digits. However, since the interviewing took place for the most part in 1977, different digits should be preferred by those who remembered the calendar date of the union rather than calculating it through reference to how long ago that union occurred. In order to study this differential digit preference, we have calculated for each woman the number of years ago that her first union occurred. The single-year distribution is shown in figure 9. Noticeable heaping only occurs for 4, 7, 18 and 24 years since the first union. The heaping for 7 years corresponds to marriages which occurred in 1970. However, the peaks at 4, 18 and 24 are not what we would expect for reporting of calendar year nor for calculation of years since first union.

Figure 10 shows the distribution of the respondents by the number of years since their first union according to selected characteristics. The distributions are as expected: better reporting of the date of first union in the urban area, in the 'more developed regions', by women who can read and write, and by those with a higher educational level. The similarity of digit preference for years since first union to that found for age at first union suggests that the previously shown heaping on 4, 18 and 24 could be due to reporting time since first union. It is not possible to investigate this matter further because reclassifying implies reduc-

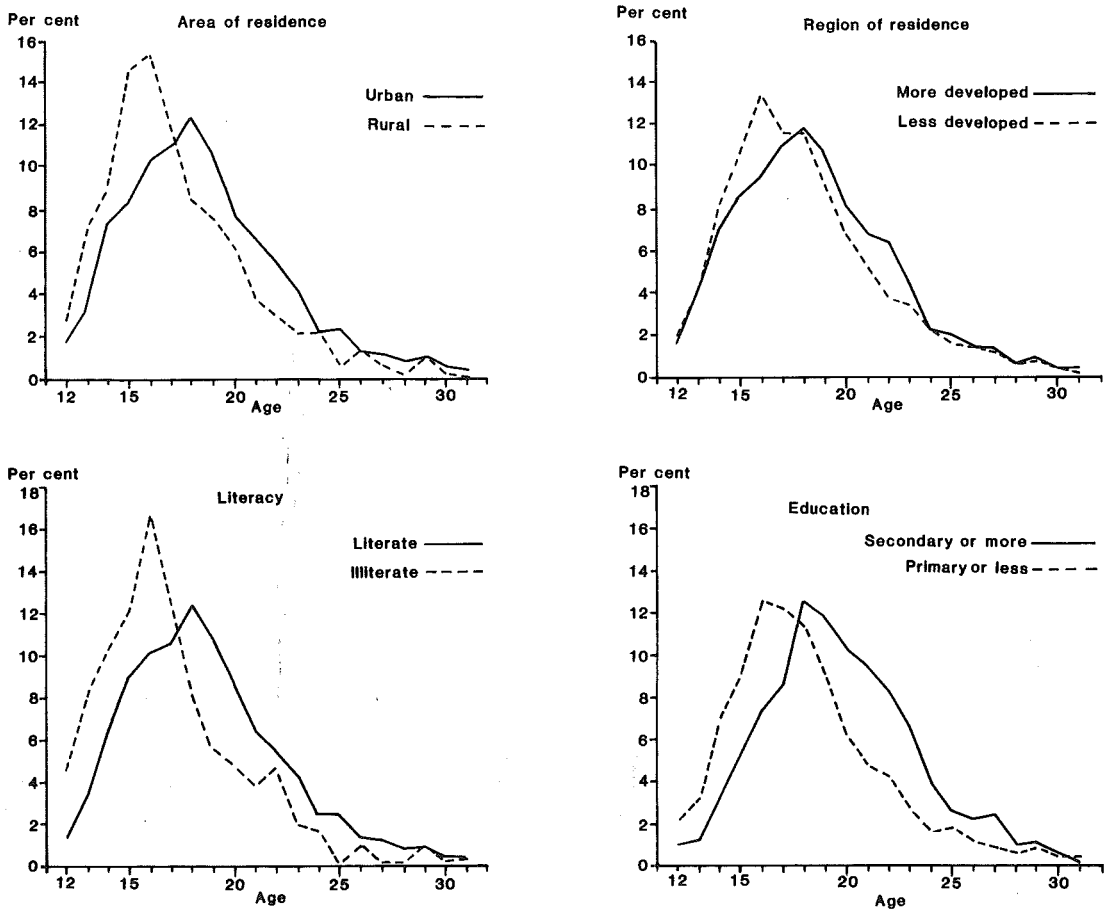


Figure 8 Single-year distribution of age at marriage among ever-married women by selected characteristics. Individual survey

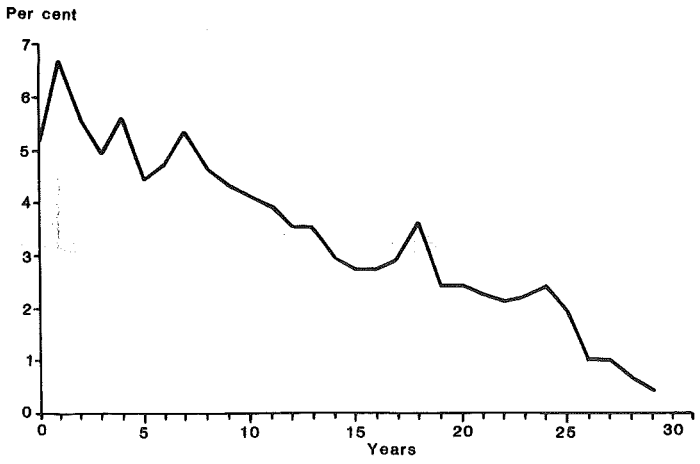


Figure 9 Single-year distribution of years since first union for women ever in union. Individual survey

ing the number of women in each category, and in view of the small sample sizes which would result, the comparisons would be too affected by randomness.

The foregoing analyses were done only for the first union since the number of women who had more than one nion is particularly small.

4.5 NUPTIALITY AND FERTILITY

At the beginning of this chapter we indicated the importance of the relationship between nuptiality and fertility. As will be seen in chapter 5, the changes in fertility follow almost the same pattern as the changes in nuptiality which

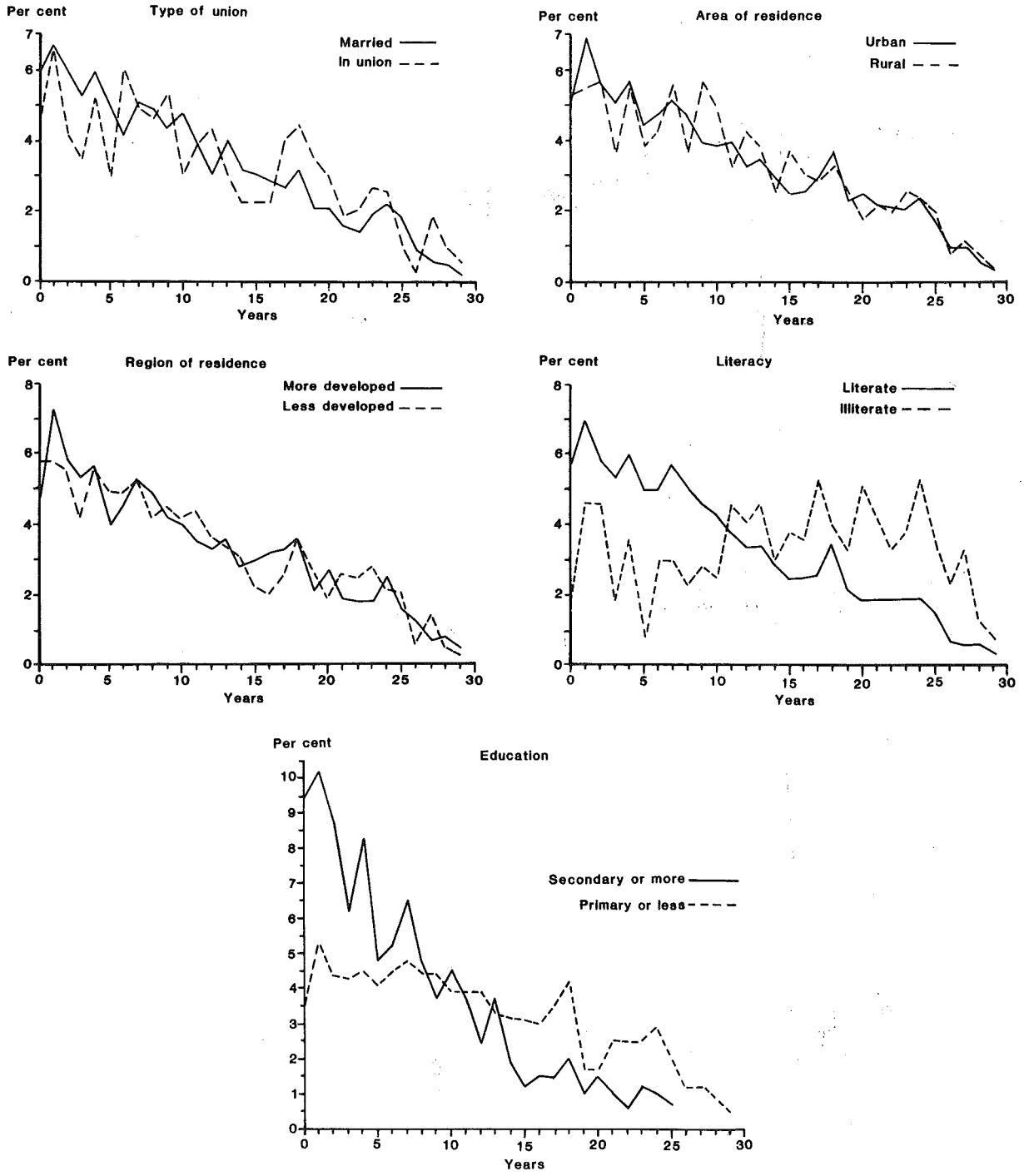


Figure 10 Single-year distribution of time since first union by selected characteristics

we report in this chapter. In general, however, higher order births are more affected by changes in fertility. Thus we would expect that the fertility of the five years immediately following entry into a first union would be the same for all cohorts if the date of the first union and the dates of birth were accurately reported. An omission of a first union or a substantial transference of the date of first union towards the date of the survey should result in a higher number of children born during the first five years of union for that cohort than for other cohorts. Similarly, a transference of the date of first union away from the survey would reduce the number of children ever born.

Table 9 represents the mean number of children ever born in the first five years of union, for women who have been in union for at least five years, according to cohort and age at first union. From this table we see no substantial changes between the cohorts at a given age at first union or within the cohorts over the different ages at first union. Women who had their first union at less than 15 years of age, however, have slightly less children during the first five years, a possible indication of adolescent subfecundity. The only other noticeable differences that we find occur to women who were first married at 20–24 years of age for the cohort 25–29 and for women of the cohort 30–3

Table 9 Mean number of children born in the five years following first union, by cohort and age at first union. Individual survey

Cohort	Age at first union			
	Less than 15	15–19	20–24	25–29
20–24	1.9	2.2	–	–
25–29	2.0	2.2	1.7	–
30–34	1.8	2.2	2.0	1.8
34–39	1.9	2.3	2.2	2.1
40–44	2.0	2.2	2.2	2.0

who married at 25–29 years of age. Since these values are about 3/10ths of a child lower than the neighbouring values, we might conclude that these women have transferred the date of their first union farther into the past. However, we should note that these are women who were recently married, and the reduction in fertility may be real. In general, however, the means do not differ substantially from two children confirming that the changes which have occurred in fertility have mainly affected higher order births, which occur at higher durations of marriage.

Conclusions

Summarizing, the data on nuptiality are quite acceptable. The observed trend in nuptiality appears real, and already suggests to us the likelihood of changes in fertility. However, there is evidence of some errors in the reporting of age at first union, especially by the older cohorts. Although these errors are not particularly serious in terms of biasing results from the data, they could be due to some omission of first unions or a misreporting of the age at first union.

When the data on nuptiality are classified by certain characteristics of the women, we find the relationships expected in terms of higher ages at first union for urban women, for the more educated, and for women who are currently legally married. However, for all groups except higher educated women, the oldest cohort has an anomalously higher mean age at marriage than next oldest cohort.

The reconstruction of marital status to the time of the 1971 census from marital history of the survey shows that marital status as recorded by the census is probably affected by several errors, especially for women in a consensual union or women separated from either a consensual or a legal union who declare themselves as having ever been married. Additionally, some women separated from a legal marriage were declared as being legally married. However, there is a problem in the individual questionnaire: women whose current union is their only union (ie only one partner) were only asked for their current marital status, ignoring changes in legal status. Women who began married life in a consensual union and afterwards legalized that union, have been classified as having always been legally married.

5 Fertility

The measurement of the current level and the recent trend of fertility is the principal objective of the World Fertility Survey programme. In many countries, the fertility survey is a main, if not the only, source of information towards reaching these objectives. Nevertheless, as has already been pointed out, the data collected may not always have the reliability necessary for obtaining accurate measures. The basic information used in the analyses of fertility levels and trends comes from the data obtained in the maternity history section of the individual questionnaire. For each woman interviewed, all pregnancies were to be recorded in chronological order (integrated history): the date of the termination and the type of outcome (live birth, still birth or abortion), as well as other related information, such as the child's current survival status and age at death if not alive.

As indicated in chapter 2, the information thus obtained may have been affected by several types of error, which have differing effects on fertility estimates. These errors can stem from incorrect reporting of the age of the mother, omission of children or misstatement of the date of the child's birth. Also, the non-fulfilment of the implicit assumption that mortality has not affected women according to their parity may have the effect of depressing fertility in the more distant period, if mortality is higher among women with a greater number of children.

5.1 GENERAL CHARACTERISTICS OF THE INFORMATION ON FERTILITY

The first information obtained about a woman's fertility comes from the informant for the household schedule, where the number of children to whom she has ever given birth was asked. Subsequently during the individual interview, as part of the maternity history, the responding women themselves were asked whether or not they had ever given birth. Following this they were asked about the number of children who were living with them, the number living away, and the number of children who had died, according to their sex. These figures were then summed, and the respondents were asked to confirm this total number of children ever born to them. Starting with the first born, the respondents were then asked detailed information about each child: its sex, whether it lived with her, its current age (for living children) or its age at death (for children who had died) and its month and year of birth.

5.2 MEAN PARITY BY AGE

In order to study the possibility that omission of children could have occurred in the survey, we will classify women by their age at interview and calculate their mean number of children ever born (mean parity). First we look at the figures for all women in the survey, and then we shall look at the figures for women classified by various characteristics. Table 10 shows the mean number of live births per woman according to age in single years at the time of the survey, both for the household schedule and for the individual questionnaire. The means are graphed in figure 11. The differences between the two sources are insignificant before age 30 and really only become important after age 40. Although the data from the individual questionnaire is more affected by fluctuations than that from the household schedule, in general we see a higher number of children ever born reported with the individual survey than with the household schedule. The probable explanation of the greater fluctuation of the individual questionnaire is the smaller numbers of cases in each single year of age. Overall, neither source reveals substantial omission of children ever born.

Table 10 Mean number of children ever born by single years of age at time of survey. Household schedule and individual questionnaire

Age	Household schedule	Individual questionnaire
15	0.03	0.03
16	0.08	0.08
17	0.14	0.14
18	0.32	0.34
19	0.39	0.42
20	0.62	0.59
21	0.81	0.92
22	1.10	1.09
23	1.26	1.28
24	1.65	1.79
25	2.04	2.04
26	2.09	2.38
27	2.44	2.42
28	2.86	2.71
29	2.87	2.90
30	3.34	3.41
31	3.56	3.78
32	3.82	3.94
33	4.09	4.29
34	4.44	4.34
35	4.53	4.25
36	4.86	4.91
37	4.95	4.68
38	5.50	5.63
39	5.53	5.55
40	5.53	5.94
41	6.11	6.58
42	5.73	6.13
43	5.96	5.65
44	5.91	6.31

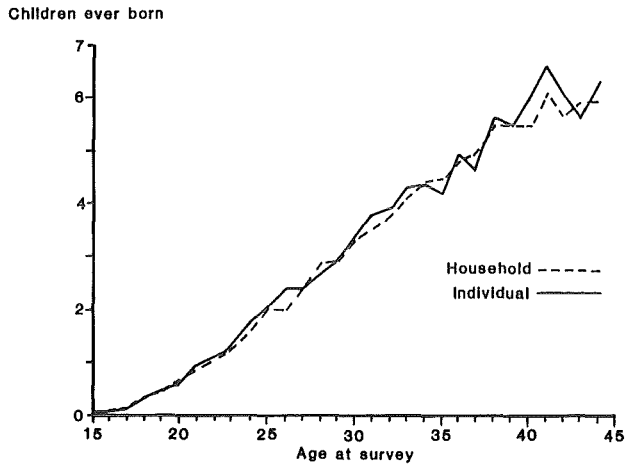


Figure 11 Mean number of children ever born by single years of age of mother. Household and individual survey

We would have liked to have compared directly the data of each woman from the individual survey with her data from the household survey; however, for reasons previously mentioned this was not possible. We would have also liked to have compared the data from the survey with similar data from the census, but the census did not include questions on fertility.

In the analysis of age reporting by women in the individual questionnaire, it was observed that the age group 35–39 contained too many women, although age 35 did not show the typical pattern for heaping on digit five. It is possible that fluctuation in mean number of children ever born is due to some age transference into this age group. Ages 35 and 37 are especially suspect since the individual questionnaire data show declines at these ages, rather than the monotonic increase expected.

When we calculate the mean number of children ever born for five-year age groups (table 11), the data do not seem to be greatly affected by possible transferences from one age group to another. However, age groups 25–29, 30–34 and 40–44 show a greater mean parity reported from the individual survey, but 35–39 shows a smaller reported parity, again leading us to suspect differential age misreporting. The difference of 0.3 of a child at ages 40–44 indicates some omission.

5.3 DIFFERENTIAL MEAN PARITY

The mean number of live births by age according to some of the women's characteristics is shown in figure 12. As expected from studying the age and nuptiality data, rural areas show important fluctuations. However, the fall in the number of children reported by women aged 35 and 37, as noted in figure 11, does not occur for rural women, indicating that such errors have occurred only among the urban women.

In spite of the fluctuations due to small numbers of cases, figure 12 also shows that rural fertility is consistently higher than urban fertility, as expected. The difference between the areas is around two children above age 30, as also shown by the mean number of live births for five-year age groups in table 12. This table reveals that grouping the individual ages into five-year groups produces a very acceptable pattern of mean number of children ever born, indicating that the fluctuations by single years of age are principally due to randomness because of the small number of cases involved. However, even when we group women according to the level of development of the area of their residence, we still observe fluctuations in the data by single years of age. Most noticeable are the declines at ages 35 and 37, which we noted for all women.

Studying the data by literacy, we see the same tendencies that have already been observed for the rural and urban areas. We also see that a better classification of the respondents is obtained by using whether or not they had gone beyond primary school. Both types of classification, however, show that more educated women have a lower fertility at every age, as we would expect. Table 12 shows that when we use age groups instead of single years of age, the information is very acceptable.

Classifying the women by type of union, we see that the errors in the information on children ever born correspond principally to women in consensual unions. From the figure, however, we also see that at certain ages there are deviations in opposite directions, indicating possibly linked misstatement of age, marital status, and fertility.

Table 11 Mean number of children ever born by five-year age groups of mother. Household schedule and individual questionnaire

Age group	Household schedule	Individual questionnaire
15–19	0.2	0.2
20–24	1.1	1.1
25–29	2.4	2.5
30–34	3.8	3.9
35–39	5.1	5.0
40–44	5.8	6.1

5.4 AGE-SPECIFIC FERTILITY RATES

The only available external source with which to compare the fertility rates of the survey are the statistics from vital registration. Table 13 shows the age-specific rates from each source. With very few exceptions, the rates obtained from the vital registration are higher than those recorded in the survey, although the differences are not great. However, in these comparisons we must take into account that births in the vital statistics were classified by date of registration rather than date of occurrence, and a great proportion of the births that enter into these rates have come from previous periods. For example, of the total number of births registered in 1974, 32 per cent were births that had taken place in previous years. This factor becomes more important if fertility is changing, as the rates from both sources show. In this case the fertility rates from the vital statistics would tend to be overestimates.

If we take the differences between the rates from the fertility survey and those from vital statistics, we see that for all periods the survey gives higher estimates at ages 15–19 than do the vital statistics, especially for the years 1955–61 where the differences are very pronounced. At ages above 20 the vital statistics show rates higher than the survey, although, except for the period 1962–6, the differences for 20–24 year old women are not very large. In fact

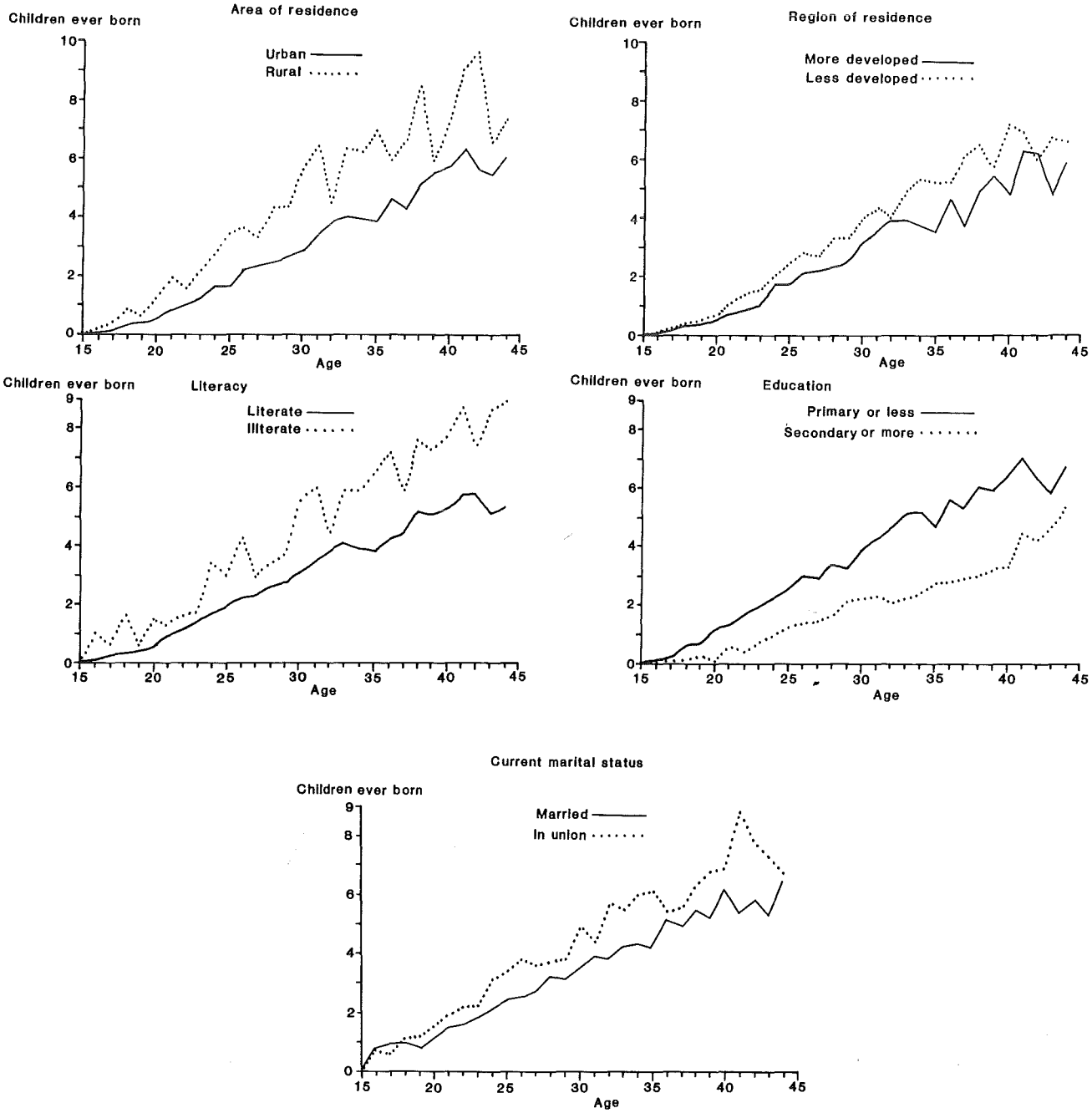


Figure 12 Mean number of children ever born by single years of age of mother, by selected characteristics. Individual survey

Table 12 Mean number of children ever born by age of mother and selected characteristics. Individual survey

Age group	Area of residence		Region of residence		Literacy		Education		Current marital status	
	Urban	Rural	More developed	Less developed	Literate	Illiterate	Primary or less	Secondary +	Married	Consensual
15–19	0.15	0.41	0.10	0.10	0.17	0.71	0.30	0.08	0.80	1.01
20–24	1.02	1.94	0.48	0.74	1.07	2.16	1.70	0.52	1.68	2.32
25–29	2.20	3.73	1.02	1.47	2.32	3.39	2.99	1.51	2.76	3.66
30–34	3.53	5.73	1.80	2.15	3.61	5.68	4.54	2.23	3.92	5.28
35–39	4.70	6.74	2.27	2.75	4.58	6.94	5.56	3.14	4.99	6.24
40–44	5.82	7.82	2.86	3.39	5.46	8.29	6.46	4.08	5.80	7.78

Table 13 Age-specific fertility rates by calendar period. Individual survey and vital statistics

Age	Individual survey						Vital statistics				
	1955–6	1957–61	1962–6	1967–71	1972–5	1976	1955–6	1957–61	1962–6	1967–71	1972–5
15–19	167	155	133	123	97	97	121	129	125	118	105
20–24		307	285	276	241	217	290	315	309	283	246
25–29			307	265	219	209	310	315	313	279	238
30–34				223	179	174	219	230	235	221	195
35–39					129	100	165	177	180	166	142
40–44						47	67	61	64	63	58
45–49							29	14	16	14	12

Source: Statistical Yearbook of Venezuela (Anuario Estadístico de Venezuela), 1955–75

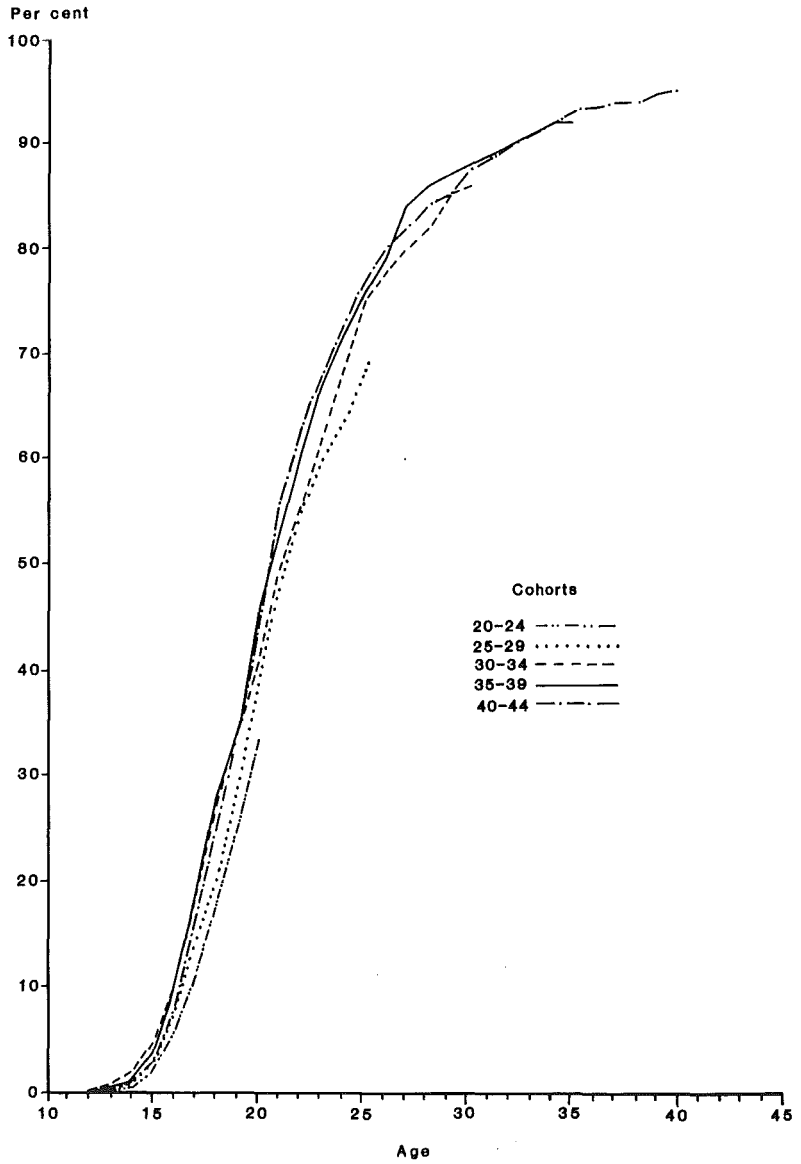


Figure 13 Percentage of women who had become a mother by single years of age for five-year cohorts. Individual survey

the largest differences occur for ages above 25 for the latest period, that is 1972–5, which is precisely what we would expect with a large fertility decline, as has happened in Venezuela, if there were no omission in either source but if there were a delayed registration of births.

5.5 AGE AT BIRTH OF FIRST CHILD

When we examined the data on first marriage, we observed a rise in age at first marriage over time, which suggests that mean age at first birth could have also risen. If we compare figure 13 with figure 6 we can clearly see that both sets of information are compatible. There has indeed been a rise in both age at first marriage and age at first birth. Furthermore there is evidence that the same kind of displacement that was observed in the reported age at first marriage is also present in the information provided about the birth of the first child. It may be that the dates of first marriage and first birth were jointly determined by the respondent at the time of the survey.

Table 14 presents the cumulative proportions of mothers as of a given age according to cohort. We see that the oldest cohort has smaller percentages having had a first birth than the cohort 35–39, up to the 20 years of age, after which the oldest cohort has slightly higher percentages having had a birth. However, the differences between the cohorts are not large and are of the order of one to three per cent.

Table 14 Percentage of women who had become mothers by specified single years of age, by cohort. Individual survey

Specified age	Cohort				
	20–24	25–29	30–34	35–39	40–44
13	0.2	0.6	0.9	0.9	0.3
14	0.5	1.4	2.2	1.6	0.9
15	2.2	3.5	5.2	4.4	3.1
16	5.8	7.4	10.8	10.8	8.8
17	11.1	14.2	18.8	18.1	17.0
18	18.0	20.5	27.6	29.0	25.4
19	26.2	29.9	34.5	35.8	35.0
20	33.5	39.1	41.8	46.2	45.8
21		48.5	49.8	54.0	56.8
22		55.1	56.7	61.1	63.8
23		60.4	62.5	67.5	68.9
24		64.9	69.0	72.8	73.7
25		69.9	75.4	76.1	77.7
26			78.7	79.9	80.5
27			80.8	84.7	82.8
28			82.8	86.7	84.5
29			85.4	87.4	85.9
30			86.9	88.5	88.1
31				89.8	89.6
32				90.7	90.1
33				91.4	91.0
34				92.5	92.4
35				92.7	93.5
36					93.5
37					94.1
38					94.4
39					94.9
40					95.2

Table 15 Mean age at first birth obtained by fitting Coale's model, by cohort. Individual survey

Cohort	Mean age	Standard error
20–24	23.4	1.1
25–29	22.6	0.2
30–34	21.7	0.1
35–39	21.3	0.1
40–44	21.4	0.3

These figures imply a higher mean age at first birth for the cohort 40–44 than for the cohort 35–39, a finding which we would not have expected since there is a general trend towards lower proportions at any given age as we move towards the younger cohort. The anomalous data for the oldest cohort may be the result of any of three factors: (1) a displacement of the first birth towards the date of the survey (ie to older ages), (2) the omission of some early first births with the consequent result that second births have been called first, and (3) selective age misreporting in which women who have had birth at young ages have been misreported in the household schedule as being older than 44 years and therefore were not eligible for interview. Thus, the patterns that we observe from table 14 are very similar to those we have already noted for nuptiality.

Coale's nuptiality model may also be applied to the first birth data. The result of this exercise confirms that changes in the mean age at birth of first child have occurred between the older and the younger cohorts. However, it should be noted that in view of the results, as shown in table 15, the model does not apply very well to the 20–24 cohort, as can be seen from the high standard error. As we saw with the nuptiality data, the difference in the means between the older and the younger cohorts is of the order of one year. Comparing the mean age at first marriage with the mean age at first birth for each cohort we see a clear trend towards an increasing difference as we move from the older to the younger cohorts. For example the mean interval between first birth and first marriage for the oldest cohorts is approximately 1.3 years, while this interval is about 2.4 years for the cohort 20–24.

5.6 COHORT-PERIOD FERTILITY RATES

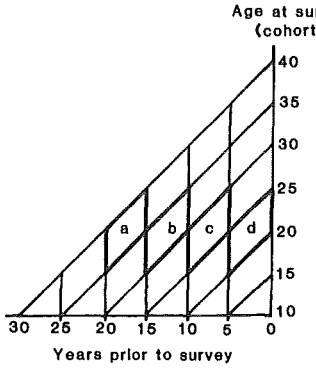
Due to the nature of the birth histories obtained through retrospective fertility surveys and to the types of error that are likely to occur, it is worth while to describe fertility using rates that are specific to birth cohorts and to period of observation. We will call these rates cohort-period specific fertility rates (CPFR).

Before beginning to examine fertility by cohorts, we shall explain the method of analysis and the terminology employed. In the present study we define each cohort as the five-year age group to which the women belonged at the time of the interview. By time period we mean intervals of five years with respect to the date of the interview: 0–4, 5–9, 10–14, etc years prior to the interview.

Thus, the numerator of the CPFR is the number of births during the period Z to Z + 5 years (exactly) before interview to women age X to X + 5 years (exactly) at interview. The denominator is five times the number of women

in the cohort X to X + 5 since this number is equal to the number of person-years lived during that period.

The rates can be graphically represented as follows:



A rate is represented by the area of the parallelogram comprised by the vertical lines which represent Z and Z + 5 years before the interview (period), and the diagonals, which represent the boundaries of the cohort, X and X + 5 years of age at the time of interview. An example would be the area marked as 'a' in the figure. If we travel diagonally upward from left to right we can visualize the fertility history of a cohort. If we sum these rates and multiply them by five, we obtain the fertility achieved by each cohort at 25, 20, . . . , 5 years before the interview and at the time of the interview (P_i). If we sum the rates vertically, that is to say the rates for the same period but of different cohorts, we obtain the cumulative fertility of the 'synthetic' cohort (F_i).

We can compare the fertility between the cohorts by comparing the rate at the same horizontal level, that is to say when the cohorts were at same age, for example, area 'a' compared to areas 'b', 'c', and 'd'. To simply reference to rates compared in this way, we use the central age of the rate to indicate it. For example, we refer to the rates represented by areas 'a', 'b', 'c', and 'd' as the rates at central age 20 of the cohorts 35–39, 30–34, 25–29 and 20–24, respectively.

5.7 FERTILITY TRENDS FROM COHORT-PERIOD RATES

Table 16 and figure 14 show the cohort-period fertility rates calculated from the survey as indicated above. In the

Table 16 Cohort-period fertility rates, cumulative rates for real (P) and synthetic (F) cohorts and P/F ratios

Age at survey	Number of women	Years prior to survey						
		0–4	5–9	10–14	15–19	20–24	25–29	30–34
A Birth-cohort fertility rates								
15–19	1312	.036	.000					
20–24	979	.174	.050	.002				
25–29	724	.232	.205	.050	.001			
30–34	536	.201	.282	.228	.065	.004		
35–39	452	.141	.231	.293	.262	.079	.004	
40–44	358	.093	.205	.293	.308	.261	.058	.001
B Cumulative fertility of real cohorts (P)								
15–19		.182	.002					
20–24		1.132	.260	.009				
25–29		2.439	1.280	.256	.006			
30–34		3.897	2.890	1.481	.341	.019		
35–39		5.040	4.336	3.184	1.719	.412	.018	
40–44		6.095	5.631	4.606	3.140	1.601	.293	.006
C Cumulative fertility of synthetic cohorts (F)								
15–19		.182	.002					
20–24		1.053	.254	.009				
25–29		2.212	1.278	.259	.006			
30–34		3.220	2.687	1.399	.328	.019		
35–39		3.923	3.840	2.864	1.636	.412	.018	
40–44		4.387	4.865	4.330	3.175	1.720	.305	.006
D P/F ratios								
15–19		1.000	1.000					
20–24		1.074	1.027	1.000				
25–29		1.103	1.002	.986	1.000			
30–34		1.210	1.076	1.059	1.040	1.000		
35–39		1.285	1.129	1.112	1.051	.998	1.000	
40–44		1.389	1.158	1.064	.989	.931	.960	1.000

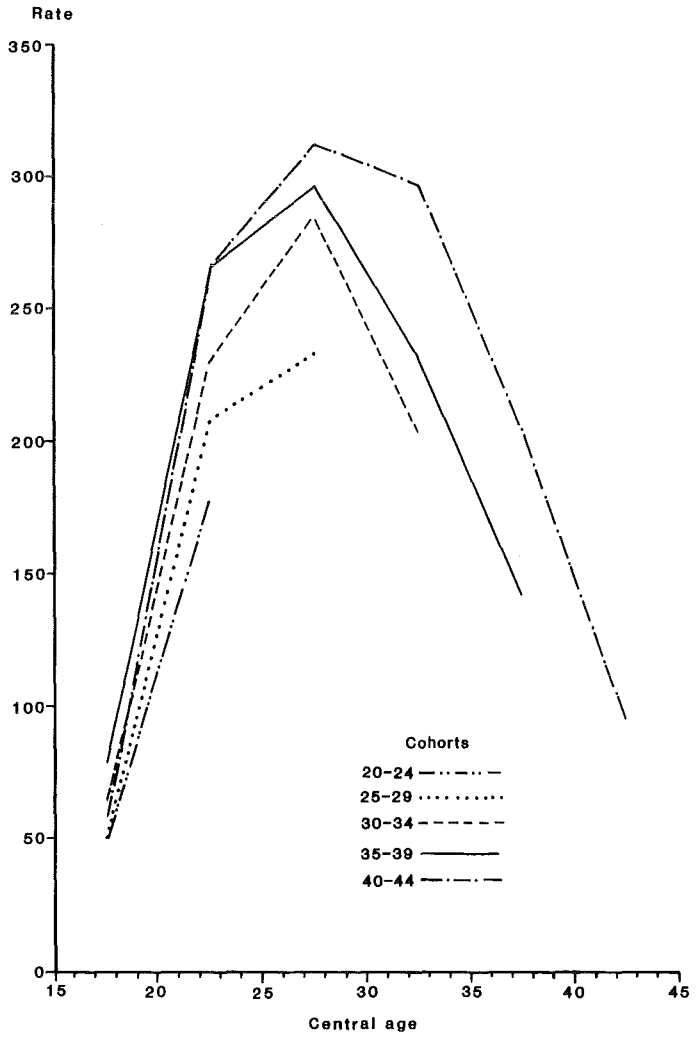


Figure 14 Cohort-period fertility rates by cohort and central age

figure we have aligned the rates according to central age so that they may be more easily compared. Here we can see evidence of the important changes in fertility and also evidence of errors in the rates for the older women during the periods furthest away from the time of the survey. Note how the rate for the 40–44 cohort, for central age 15, is lower than that for cohorts 30–34 and 35–39, at the same central age. This behaviour is not normal if fertility is decreasing. Evidence points to two possible types of error: displacement of births to periods nearer to the survey in time, the type of error that had been suggested by Potter, or a small amount of omission. Possibly both types of error affect the information.

5.8 P/F RATIOS

The importance of the subject of fertility trends leads us to put the information of the fertility history to several additional tests which may confirm or cause us to reject the amount of the decline in fertility that we observed in figure 14. For the first such test, we shall use the method of the P/F ratio formulated by Brass (1978). In this method, P represents the cumulative mean parity of the real cohort and F the cumulative current fertility in the same way as the total fertility rate is computed (synthetic cohort). The method is based on the assumption that if fertility remains constant the P/F ratio must equal one, and if there is a decrease, the current cumulative fertility will be less than the cohort cumulative parity, and therefore the ratio will be greater than one.

The last panel of table 16 shows the P/F ratio applied to fertility of the years prior to the survey. For the most recent periods the ratios are greater than one and increase with cohort, as expected when there is a decline in fertility. The large size of the ratio, especially at ages 30 and above indicates that a very large decline in fertility has occurred. However, the behaviour of the ratio for the oldest cohort appears to indicate errors in the data, due to misreporting of birth dates rather than omission of children.

5.9 P/F RATIOS BY BIRTH ORDER

If a fertility decline occurs, it is probable that this decline affects higher order births in greater measure than lower order ones, because the proportion of women who eventually become mothers will not change much over time. We

Table 17 P/F ratios by cohort and periods prior to the survey for first births and births of order four and higher

Cohort	Years prior to survey					
	0–4	5–9	10–14	15–19	20–24	25–29
A First births						
20–24	1.050	1.028				
25–29	1.079	1.030	0.992			
30–34	1.126	1.067	1.094	1.068		
35–39	1.136	1.081	1.169	1.084	0.983	
40–44	1.150	1.075	1.149	1.063	0.891	0.949
B Births of order four and higher						
20–24	1.090	1.016				
25–29	1.116	0.983	0.976			
30–34	1.237	1.074	1.037	1.018		
35–39	1.320	1.139	1.091	1.033	1.000	
40–44	1.451	1.180	1.050	1.970	0.962	0.982

therefore expect that the P/F ratio for first-order births should be about one and that the decline in evidence for higher order births should indicate P/F ratios of much greater than one. The P/F ratios for first births and births of orders four or higher are shown in table 17.

As expected the ratios show higher values for birth orders four and above; the fact that the values for first births are slightly greater than one is due to the changes in age of first union that were discussed in the chapter on nuptiality. However, there is also evidence of some omission, especially in the periods furthest from the date of the survey. In addition, the decline in fertility appears to have accelerated in the most recent period considered.

5.10 P/F RATIOS BY EDUCATION AND CURRENT RESIDENCE

We shall apply the P/F ratio method one last time by now taking into consideration the education of the respondent and her area of current residence. In general we expect a greater decline in fertility for those women with education higher than primary school than for women who are less educated. The results are shown in table 18. Indeed, we see a greater decline in the fertility of the more educated women, and the decline seems to have been steady over the past 20 years. For the lesser educated women the decline in fertility has come about only during recent years. When women are classified according to the level of development of the region of current residence, the P/F ratios also indicate a consistent and expected pattern: the fertility declines are more constant for women residing in the more developed regions than for the other women.

5.11 DETAILED ANALYSIS OF THE COHORT-PERIOD RATES

In the evaluations carried out in the previous sections of this chapter, we have demonstrated that there is a decline in fertility and also that there is evidence of possible errors in the data. We now intend to look at the cohort-period rates in detail and, as far as possible, identify the omission and displacement that may be present. Table 16 includes

Table 18 P/F ratios by cohort and period, by education and by region of residence

Cohort	Years prior to survey					
	0–4	5–9	10–14	15–19	20–24	25–29
A Secondary education or more						
20–24	0.985	1.000				
25–29	1.069	0.996	1.007			
30–34	1.052	1.012	1.004	0.993		
35–39	1.268	1.163	1.125	1.136	1.006	
40–44	1.531	1.288	1.223	1.122	0.983	0.994
B Primary education or less						
20–24	1.086	1.026				
25–29	1.040	0.977	0.970			
30–34	1.134	1.020	1.039	1.045		
35–39	1.157	1.041	1.066	1.027	0.988	
40–44	1.218	1.053	1.000	0.948	0.916	0.961
C More developed regions						
20–24	1.039	1.009				
25–29	1.110	1.023	1.008			
30–34	1.269	1.107	1.080	1.048		
35–39	1.326	1.128	1.095	1.001	0.946	
40–44	1.520	1.217	1.104	1.024	0.948	1.004
D Less developed regions						
20–24	1.106	1.037				
25–29	1.095	0.978	0.960			
30–34	1.147	1.031	1.030	1.031		
35–39	1.224	1.114	1.120	1.108	1.043	
40–44	1.272	1.102	1.030	0.962	0.917	0.924

the cohort and period fertility rates as well as cumulative cohort fertility up to given ages. Examination of the individual rates shows that omission and displacement have had very little effect on the information. The only evidence for either displacement or omission comes from the oldest cohort at central age 15 (in the period 25–29 years prior to the survey) which is lower than the corresponding rates for the cohorts 30–34 and 35–39. The small effect of the slightly low rate at central age 15 for the 40–44 cohort indicates that there has been either an omission or a displacement of births of approximately 0.1 children on average. This number is quite small and affects the cumulative rates up to age 25 for the cohort 40–44, as can be seen in the second panel of the table. Until the age of 30 the error that has affected the information may have been displacement. Note though that the rate may also be low due to sampling randomness, since the difference between the rates at central age 15 for the oldest two cohorts is not statistically significant.

5.12 FERTILITY RATES BY SEX

As a test for omission we can calculate the sex ratio at birth. Note that this test only indicates whether one sex has been omitted more than the other. In general, the survey gave a sex ratio at birth of 100, indicating a relative omission of male children. In comparison, the Statistical Yearbook of 1974 for Venezuela shows a sex ratio at birth of 103.5.

The mean number of live births by sex, as well as the sex ratio, obtained from the individual questionnaire are

Table 19 Mean number of children ever born by sex and sex ratios, by age group of mother. Individual survey

Age group of mother	Children ever born		Sex ratio[a]
	Males	Females	
15–19	0.10	0.09	120
20–24	0.59	0.55	108
25–29	1.21	1.24	97
30–34	1.95	1.96	100
35–39	2.49	2.56	97
40–44	3.09	3.03	102

[a]Calculated from absolute numbers.

Table 20 Percentage surviving of children ever born by sex and by age group of mother. Individual survey

Age group of mother[a]	Both sexes	Sex	
		Males	Females
20–24	95	95	95
25–29	94	94	95
30–34	94	93	94
35–39	93	92	94
40–44	92	91	94

[a]Age 15–19 is excluded because there are too few births.

shown in table 19. We can see from this table that women age 25–39 reported a smaller number of boys than girls, indicating that omission is present in the survey in these age groups. The omission seems to affect mainly older women with regard to sons and younger women with regard to daughters.

Confirmation is provided by table 20, which indicates the proportion of children surviving by sex according to current age of the respondents. We normally expect that mortality differentials by sex would indicate a higher survival of girls, but we find the opposite occurs for survival reported by the younger respondents. This evidence is consistent with a possible omission of very young girls as we have seen in the chapter on age, and with the information on sex ratio in table 19.

Table 21 presents cohort-period fertility rates and cumulative rates for cohorts according to sex of child. This table indicates that the discrepant rates for the cohort 40–44 at central age 15 is basically due to too low numbers of female births indicating some omission. However, the rates calculated by sex and especially sex ratios are subject to large sampling errors. The number of births upon which these rates are based are shown in table A1, indicating the quite small sizes of some cells.

5.13 FIRST BIRTH RATES

We shall briefly examine the cohort-period rates for first births in order to see if the omissions indicated above correspond to the first child born to a woman. As we have said previously, we expect that first children are more likely to be omitted than those of other orders. These rates are shown in table 22. The second panel of this table shows the proportion of women who have become mothers by the indicated age. For age 15–19 we see a strong downward trend in the proportion of mothers as we move from older to younger cohorts, with the outstanding exception of the 40–44 cohort. The proportion of mothers by age 20–24, however, does not show any discrepant values although the decline is still quite large. We can therefore conclude that the fertility at central age 15 for the cohort 40–44 is discrepant due mainly to an omission of first births and thus a naming of second births as first.

5.14 SUMMARY

The analyses of mean parity and differential mean parity point to linked age, nuptiality and fertility misreporting,

Table 21 Cohort-period rates and cumulative cohort-rates by period by sex of child. Individual survey

Cohort	Males						Females					
	0–4	5–9	10–14	15–19	20–24	25–29	0–4	5–9	10–14	15–19	20–24	25–29
A Cohort-period fertility rates												
15–19	19.8	0.3					16.5	0.3				
20–24	92.7	23.9	1.4				82.9	26.3	0.4			
25–29	114.4	102.1	24.8	0.3			117.4	105.2	25.4	0.8		
30–34	97.0	148.9	112.3	29.1	2.2		104.9	133.6	116.0	35.1	1.5	
35–39	73.9	104.4	152.7	128.8	35.4	1.8	66.8	125.7	141.2	132.7	43.4	1.8
40–44	46.9	114.1	136.7	154.8	134.5	29.9	44.6	91.0	157.6	155.4	129.4	28.2
B Cumulative rates for real cohorts												
15–19	0.10						0.08					
20–24	0.59	0.13					0.55	0.13				
25–29	1.21	0.64	0.13				1.24	0.66	0.13			
30–34	1.95	1.46	0.72	0.16			1.96	1.43	0.76	0.18		
35–39	2.49	2.12	1.59	0.83	0.19		2.56	2.22	1.60	0.88	0.23	
40–44	3.09	2.86	2.29	1.60	0.83	0.16	3.03	2.81	2.35	1.57	0.79	0.14

Table 22 Cohort-period fertility rates for first-order births and cumulative rates for real cohorts

Cohort	Years prior to survey					
	0–4	5–9	10–14	15–19	20–24	25–29
A First birth rates (per 1000)						
15–19	2.7	0.1				
20–24	7.2	3.1	0.1			
25–29	4.5	7.6	3.4	0.1		
30–34	1.5	4.7	7.3	4.1	0.4	
35–39	0.5	1.4	3.6	8.0	5.0	0.3
40–44	0.1	0.8	1.5	3.5	9.6	3.6
B Cumulative rates (per cent ever a mother)						
15–19	14.0					
20–24	52.0	16.0				
25–29	78.0	55.5	17.5			
30–34	90.0	82.5	59.0	22.5		
35–39	94.0	91.5	84.5	66.5	26.5	
40–44	96.0	94.5	91.5	84.0	66.5	18.5

but of a small magnitude and not related to a specific class of women. The household schedule in general reports a lower number of births than the individual questionnaire, particularly for women 40–44.

Comparisons with vital statistics point to deficiencies in rates from vital statistics: under-registration of births to women 15–19 and underestimation of the real fertility decline due to delayed birth registration. Analyses of the age at the birth of the first child shows about a one year rise in mean age, but a small error in the data for the oldest cohort. Examination of the cohort-period fertility rates and P/F ratios confirm that the oldest cohort (40–44) has a problematic rate at central age 15. Rates and ratios by birth order and sex indicate that the error is due to omission of first female births to the oldest cohort, resulting in a low estimate of fertility of about one-tenth of a child for the distant part. However, discrepant sex ratios may indicate an overall 3 per cent under-reporting of male births and a small omission of some recent female births, but the sex ratios are subject to large sampling errors.

In general, the errors noted above occur to the oldest cohort in the far past and do not obscure the fact that a large fertility decline has occurred in Venezuela, starting in the early 1960s and accentuating in the early 1970s. The decline is due both to a rising age at first birth and a fall in higher order births.

6 Infant and Child Mortality

The present chapter is concerned with the evaluation of the data pertaining to infant and child mortality and in particular to see whether children who died had been omitted by the respondents. As indicated in the previous chapter, information on mortality was gathered in three sections of the questionnaires. Both the household schedule and the individual questionnaires obtained for each woman the number of children ever born who were currently surviving and who had died. Using indirect estimation procedures involving assumptions on constancy of both fertility and mortality levels, their survival information can be turned into probabilities of dying before certain (exact) ages for the recent past. We would expect the estimates obtained from the individual data to be more correct than those of the household schedule, for the reasons noted before for other measures.

Direct estimates of current and past levels of mortality can be made using the information about date of birth and age at death contained in the birth history section of the individual questionnaire. However, for the more distant past the utility of this information is limited by several factors:

1 The age limits of eligibility for interview mean that only births occurring to successively younger mothers have been recorded as the period examination moves further into the past. For Venezuela, with an upper limit of 44 years as age of respondent at interview, only births up to age 24 are recorded for 20 years prior to interview.

Table 23 Survivors per 100 births, both sexes and by sex, according to mother's cohort and five-year period prior to survey

Cohort of mother	Total	Years prior to survey					
		0–4	5–9	10–14	15–19	20–24	25–29
15–19							
Both sexes	95	95					
Males	96	96					
Females	93	93					
20–24							
Both sexes	95	95	94				
Males	95	95	94				
Females	95	96	93				
25–29							
Both sexes	94	96	93	91			
Males	94	95	92	92			
Females	95	96	94	90			
30–34							
Both sexes	94	96	94	93	90		
Males	93	95	93	93	90		
Females	94	96	94	92	90		
35–39							
Both sexes	93	91	94	94	94	90	
Males	92	90	93	92	93	89	
Females	94	93	95	95	94	91	
40–44							
Both sexes	92	95	94	93	94	87	87
Males	91	94	93	92	93	87	83
Females	94	95	94	94	94	90	92
Total							
Both sexes	93	95	94	93	94	87	87
Males	93	94	93	92	93	87	83
Females	94	95	94	94	94	90	92

2 Children whose mothers did not survive until the date of interview are not recorded.
3 The age structure of the sample plus the eligibility criteria mean that mortality estimates are based on successively fewer births the farther in the past is the period of examination.

Errors in the data compound the foregoing limitations, and we must realize the above limitations when testing for errors. The kinds of error relevant to mortality are omission of children ever born, misreporting of date of birth and misreporting of age at death. Contrary to standard WFS practice, information on age at death in the VFS was gathered only in completed years, rather than months and years. As such, neo-natal mortality rates cannot be calculated, and infant mortality rates may be distorted.

Table 23 shows the proportion of children surviving at the time of the survey by current age of women and by five-year periods of birth, for both sexes and by sex of child. In the column corresponding to all periods we see that the two youngest cohorts report either more or an equal number of boys surviving as girls, suggesting that some girls who died had been omitted. Looking at the information by period, we see the four youngest cohorts unexpectedly have higher male survival rates for their oldest children, which may indicate a relative omission of a small number of first-born females who no longer survive. However, we would not expect these younger cohorts to badly misreport their fertility, so that the results from this table are somewhat surprising.

Figure 15 shows the time trends in the probabilities of dying before ages one ($_1q_0$) and five ($_5q_0$). We have also included in this graph the probability of dying between age one and age five ($_4q_1$). The plots indicate a very steep decline from the past to the period 15–19 years ago and very little change thereafter. However, we must keep in mind two factors which limit the utility of figure 15. The first is the size of the sample. In table A1, the number of births by sex for cohorts of women and for periods prior to the survey show that earlier than 20 years before the survey the number of births are really too small to provide confidence in estimates of infant and child mortality. We should therefore ignore the rates for periods earlier than 15–19 years prior to the survey.

The second factor to be considered is the fact that information on survival is only obtained for children born to women who were less than 45 years of age at the time of the interview as mentioned above. For example, for children born 20 years prior to the survey the maximum age of their mother at the birth would have been 24 years. Since it is well known that there is a U-shaped relationship between infant and child mortality and age of the mother at birth, mortality rates measured from the survey for very early periods would be upwardly biased while the rates for periods moderately distant from the date of the survey would be downwardly biased. This second factor, combined with no real change in infant mortality may have produced the small increase that we notice for the most recent period.

Tables 24 and 25 show the probabilities of dying before (exact) ages one and five, respectively, for total and each sex, by period of birth prior to survey and by age of mother at birth. From table 24 we see that the recent rise in infant mortality is not due to the changing proportion of births by

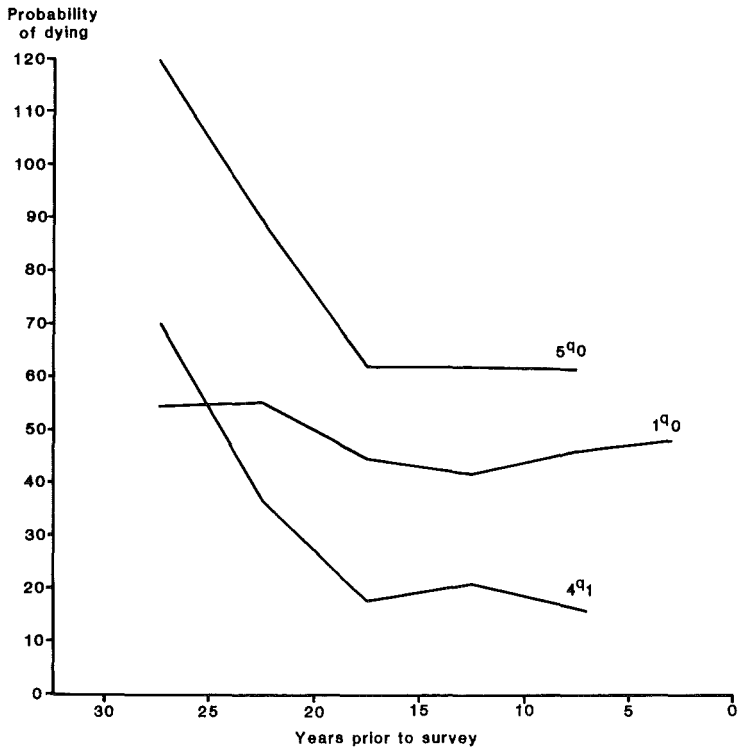


Figure 15 Probability of dying before ages one ($_1q_0$) and five ($_5q_0$) and between one and five ($_4q_1$), by period of birth prior to survey

Table 24 Infant mortality rates ($_1q_0$ – expressed per 1000) by sex, according to age of mother at birth, for periods prior to the survey

Age at birth	Sex	Years prior to survey				
		1–4	5–9	10–14	15–19	20–24
15–19	Both	62	54	44	55	63
	Males	65	78	44	(50)	(91)
	Females	58	32	(46)	(60)	(34)
20–24	Both	36	47	47	47	42
	Males	34	49	58	67	(54)
	Females	37	45	34	29	(30)
25–29	Both	42	39	38	26	
	Males	53	39	47	(36)	
	Females	33	38	30	(15)	
30–34	Both	60	39	40		
	Males	57	39	(73)		
	Females	64	39	(9)		
35–39	Both	63	(56)			
	Males	95	(73)			
	Females	36	(33)			
All ages	Both	48	46	42	44	55
	Males	53	51	52	54	73
	Females	43	40	32	34	37

NOTE: Parentheses indicate less than 200 children born.

Table 25 Probability of dying before age five ($_5q_0$ – expressed per 1000) by sex, according to age of mother at birth, for periods prior to the survey

Age at birth	Sex	Years prior to survey			
		5–9	10–14	15–19	20–24
15–19	Both	60	69	66	86
	Males	81	63	(61)	(114)
	Females	39	(76)	(70)	(57)
20–24	Both	71	64	68	95
	Males	77	73	86	(93)
	Females	64	56	52	(97)
25–29	Both	51	52	37	
	Males	52	57	(43)	
	Females	51	47	(30)	
30–34	Both	56	66		
	Males	65	(110)		
	Females	48	(25)		
35–39	Both	(63)			
	Males	(85)			
	Females	(33)			
All ages	Both	61	62	61	89
	Males	70	69	70	101
	Females	53	55	53	78

NOTE: Parentheses indicate less than 200 children born.

Table 26 Probability of dying before selected ages for periods prior to the survey, according to development of region of current residence and education of mother

Years prior to survey	Region of residence		Education	
	More developed	Less developed	Primary or less	More than primary
A Probability of dying before one year of age ($_1q_0$)				
2–5	48.5	51.6	56.2	28.5
5–10	35.6	55.0	48.5	28.2
10–15	37.5	49.6	42.7	47.6
15–20	41.7	43.3	45.0	21.3
20–25	36.0	81.4	58.6	33.9
B Probability of dying before two years of age ($_2q_0$)				
2–5	52.0	52.7	57.6	31.3
5–10	43.7	63.9	58.0	30.6
10–15	45.2	59.1	52.4	47.6
15–20	47.4	56.2	55.2	21.3
20–25	52.6	108.5	82.1	33.9
C Probability of dying before five years of age ($_5q_0$)				
5–10	49.7	71.7	65.7	32.9
10–15	52.9	72.8	64.6	47.6
15–20	54.6	64.2	63.7	21.3
20–25	63.7	125.4	95.5	50.8

age of mother at birth, but that it occurs within four out of five age groups for total, and in three out of five groups for each sex. Female infant mortality rates are more suspect since in the totals for each period we note a rise in female rates in contrast to falling male rates (other than the most recent), resulting in much too large differentials between the sexes for ten and more years before.

The totals in table 25, however, do not show untoward results for mortality before five years of age, and indicate that most of the deficit of female infant mortality is due to misreporting age at death. The fact that ${}_4q_1$ is higher for females than males born 15–19 and 10–14 years before the survey but lower for those born 5–9 years before the survey may indicate some additional misclassification of age at death. The Venezuela Fertility Survey may be especially prone to this kind of error due to the fact that age at death was only requested in terms of completed years rather than years and months, as in other WFS surveys. It would therefore be easier for a woman to declare a child who had died at let us say 10 or 11 months of age as having died at 1 year instead of saying, correctly, that he died at 0 years of age.

Table 26 shows differentials in infant and child mortality according to the level of development of the region of residence and according to level of education of the mother. Although these rates are more affected by sampling errors than those in figure 15, we nevertheless observe the expected differentials: higher mortality in the less developed areas and for children of less educated women.

Finally, from the information on children ever born and children who have died recorded in the individual questionnaire before entering into the maternity history, we have computed the probability of death by the indirect methods of Brass (1968) and Sullivan (1972). The estimates obtained are shown in table 27 and seem to be quite similar to those obtained for the latest periods directly from the data. The exception is the rate for ${}_5q_0$ for females where both Brass and Sullivan estimate a rate of about 60 per 1000 and our direct calculation for the period 5–9 is 53 per 1000. This discrepancy may be indicative of some relative omission of female children.

Table 27 Probability of dying before selected ages, by sex, from survival at time of survey according to methodology of Brass and Sullivan (West model)

Sex	Rate (per 1000)	Brass meth.	Sullivan meth.
Both sexes	${}_2q_0$	53	54
	${}_3q_0$	60	59
	${}_5q_0$	64	62
Males	${}_2q_0$	53	54
	${}_3q_0$	65	63
	${}_5q_0$	67	64
Females	${}_2q_0$	52	53
	${}_3q_0$	55	55
	${}_5q_0$	61	59

7 Conclusions

One of the purposes of this evaluation study has been to highlight the biases and limitations of the Venezuelan Fertility Survey and thus contribute to future research using the data. A summary of the more relevant aspects of this study follows.

The comparison of the data from the household schedule with the population census data, as well as the internal consistency of the data from the schedule show evidence of omission of male children age five to nine. We arrive at this conclusion after studying the sex ratios for the youngest ages and after noting the great change in the age structure that has occurred even though there are only six years in time between the dates of the 1971 census and the household survey. We also found evidence pointing to an omission of adult males, but since the survey was carried out only in households, we cannot be conclusive.

The age structure of the individual survey is younger than that of the household schedule which is younger than the 1971 census. A plausible explanation for this result is the combination of a slight bias towards younger women in the individual survey and female international immigration.

Age reporting in the individual survey is affected by heaping on certain terminal digits, but this does not seem to have seriously affected the age structure by five-year age groups. We also saw that there is less heaping among the more educated women, those who live in urban areas and those who are married.

Although less than in the household schedule data, there is still an excessive number of women in the age group 35–39 at the expense of the age groups 30–34 and 40–44. This pattern also occurred in the census.

In the chapter on nuptiality (chapter 4) we saw that heaping is also present in the data regarding age at first marriage as well as in the date of first marriage. The individual survey detected some ever-married women who had been reported as single in the household schedule, an error that also seems to have affected the population census. An important finding was the change in the age at first marriage, which was confirmed by applying the Coale nuptiality model. However, there is also some evidence of transference in the age at first marriage – in the sense that an older age was reported or that a very early marriage was omitted, or a combination of both – for the older cohorts.

The mean parity of the women by single years of age showed the effects of digit preference and rejection that had been observed in the reported age and also suggests the possibility of omission by the older women. The error in the mean number of live births is lessened when the women are distributed by five-year age groups.

The increase in the mean age at first marriage affected the reported age at birth of the first child by increasing it as well, as we confirmed by the use of Coale's model. The data regarding age at birth of first child shows evidence of being affected by the same errors as the nuptiality data. This suggested the idea that an error in the reported age at first marriage affects the reported date of birth of the first child.

We compared the fertility rates by age at the time of birth with the ones from the vital statistics registration, and found that the survey rates were lower. However, the vital statistics registration data for any given year contain a high proportion of births that occurred in previous years, which affects the comparison especially if fertility is declining, and is also evidence of the quality of the Venezuelan birth registration system.

Evaluating the maternity history by use of fertility rates specific for cohorts and time periods and by comparison of real and synthetic cumulative rates (P/F ratios) confirmed a large decline of fertility which began in the 1960s and accentuated in the 1970s. The decline was due both to a rising age at first birth (related to higher ages at first union) and declining fertility at higher parities, the second factor being more important. Also noted was a small (0.1 child) discrepancy in the early fertility of the oldest cohort, which further tests pointed to being caused by omission of first births by some of the women now 40–44 when they were around 15 years old (ie 25–29 years ago).

Sex ratios and cohort-period fertility rates by sex both appear to indicate a general omission of male children except for children born in the last five years, consistent with the omission of young boys and men noted from the household survey. Assuming a true sex ratio at birth of 105 males to 100 females, the underestimates of fertility due to omission of male births are approximately 2 per cent, 3 per cent, 6 per cent and 6 per cent for the periods 5–9, 10–14, 15–19 and 20–24 years prior to the survey, respectively. Thus the decline in fertility has been somewhat understated.

Analysis of infant and child mortality showed that there has been little or no improvement for the last 15–19 years, in contrast to a steep decline in earlier years. Misreporting of age at death, due in part to the type of question, has somewhat affected the infant mortality rates, especially of females.

Overall, the survey provides much useful and reliable information confirming a rapid decline in fertility of about 25–30 per cent in the last ten years prior to the survey. Relatively small amounts of omission and age misreporting errors require that further analyses should proceed with due caution.

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Appendix A Numbers of Births

Table A1 Numbers of births[a] to cohorts in five-year periods prior to survey, total and by sex

Cohort	Total	Years prior to survey						
		0–4	5–9	10–14	15–19	20–24	25–29	30–34
15–19								
Both sexes	244	240	4					
Males	133	131	2					
Females	111	109	2					
20–24								
Both sexes	1115	860	246	9				
Males	578	454	117	7				
Females	537	406	129	2				
25–29								
Both sexes	1758	831	743	180	4			
Males	866	410	366	89	1			
Females	892	421	377	91	3			
30–34								
Both sexes	2092	541	757	612	172	10		
Males	1044	260	399	301	78	6		
Females	1048	281	358	311	94	4		
35–39								
Both sexes	2279	318	520	664	591	178	8	
Males	1123	167	236	345	291	80	4	
Females	1156	151	284	319	300	98	4	
40–44								
Both sexes	2167	162	363	521	549	467	103	2
Males	1094	83	202	242	274	238	53	2
Females	1073	79	161	279	275	229	50	0
Total	9655	2952	2633	1986	1316	655	111	2
Males	4838	1505	1322	984	644	324	57	2
Females	4817	1447	1311	1002	672	331	54	0

[a]A few inconsistent births have been eliminated.