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Evaluation of the Mexican Fertility Survey 1976–77

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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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L'Institut International de Statistique avec l'appui des Nations Unies, a été chargé de la réalisation de ce projet en collaboration avec l'Union Internationale pour l'Etude Scientifique de la Population. Le financement est principalement assuré par le Fonds des Nations Unies pour les Activités en matière de Population et l'Agence pour le Développement International des Etats-Unis.
Cette publication fait partie du programme de publications de l'EMF, qui comprend la Documentation de base, les Documents Non-Périodiques et des publications auxiliaires. Pour tout renseignement complémentaire, s'adresser au Bureau d'Information, Institut International de Statistique, 428 Prinses Beatrixlaan, Voorburg, La Haye, Pays-Bas.

La Encuesta Mundial de Fecundidad (EMF) es un programa internacional de investigación cuyo propósito es determinar el estado actual de la fecundidad humana en el mundo. Para lograr este objetivo, se están promoviendo y financiando encuestas de fecundidad por muestreo en el mayor número posible de países. Estas encuestas son diseñadas y realizadas científicamente, nacionalmente representativas y comparables a nivel internacional.
El proyecto está a cargo del Instituto Internacional de Estadística en cooperación con la Unión Internacional para el Estudio Científico de la Población y con la colaboración de las Naciones Unidas. Es financiado principalmente por el Fondo de las Naciones Unidas para Actividades de Población y por la Agencia para el Desarrollo Internacional de los Estados Unidos.
Esta publicación ha sido editada por el Programa de Publicaciones de la EMF, el que incluye Documentación Básica, Publicaciones Ocasionales y publicaciones auxiliares. Puede obtenerse mayor información sobre la EMF escribiendo a la Oficina de Información, Instituto Internacional de Estadística, 428 Prinses Beatrixlaan, Voorburg-La Haya, Países Bajos.

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MANUEL ORDORICA

Consejo Nacional de Población

JOSEPH E. POTTER

El Colegio de México
and The Population Council

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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 the 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, 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 – Dominican Republic, Mexico, Peru and Venezuela – was held between July and October in 1979. The present document reports on the results of the evaluation of the data of the Mexican Fertility Survey 1976–77 and was prepared by Manuel Ordorica, the participant from Mexico, and Joseph Potter, consultant. Yolanda Cespedes, José Miguel Guzmán, and Gilberto Vielma, 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 large responsibility in the successful completion of the work, while many other staff members also made significant contributions to it. Dr Noreen Goldman provided valuable assistance as a consultant.

DIRK J. VAN DE KAA
Project Director

1 Introduction

The Mexican Fertility Survey (EMF) was conducted between July 1976 and March 1977 by the Statistics Bureau of the Coordinated National Information System, in co-operation with the World Fertility Survey and with assistance from different national institutions such as the National Population Council, the Institute of Social Research of the National Autonomous University of Mexico and the Colegio de México.

The Mexican Fertility Survey is the first demographic survey of its kind to be undertaken at the national level. The two fertility surveys that could be considered forerunners of this effort were the 1964 Survey of Fertility in Mexico City, and the 1969 Mexican Survey of Rural Fertility that was implemented with a sample representative of the population residing in places with fewer than 20 000 inhabitants.

The Mexican Fertility Survey (hereafter referred to by its Spanish acronym, EMF) consisted of both a household survey and a detailed individual survey. The sample was drawn from the self-weighting National Sample of Households maintained by the Bureau of Statistics. The number of households selected for the household survey was 13 739 and 13 080 interviews were actually completed. Women enumerated in the household survey were defined as eligible for the individual survey if they were between the ages of 20 and 49 or, if between 15 and 19 years of age, they had had at least one live birth or had married or lived in a consensual union. A total of 7672 women were selected for the detailed interview, about one out of every 1.7 eligible women enumerated in the household survey. Of these, a complete questionnaire was obtained from 7310 respondents.

The purpose of this report is to evaluate the accuracy of the demographic information collected in both the household and the individual surveys. Given the greater richness and abundance of information collected in the latter, it has naturally received a greater share of our attention. The report is divided into chapters on age reporting, nuptiality, fertility and mortality. Conclusions are presented at the end of the report. In the analysis, we examine the internal consistency of the data collected in the EMF and compare the results of this survey with such independent sources of information on the demography of Mexico as are available.

2 Age Reporting

Inaccurate reports of age for females can do much to limit the value of the variety of demographic analyses that can be performed with the data collected in a survey such as the EMF. Generally speaking, the quality of age reporting is a function of the cultural importance of this variable in a society and the overall level of educational attainment, as well as of the questions used in the survey and the care with which they are asked. Most WFS-type surveys that include a question on age, but not on date of birth, as for example the household survey, have produced age distributions that exhibit patterns of age misreporting similar to those found in the censuses of the same population, but the degree of misreporting is slightly less. Mexico provides no exception to this rule, as can be seen in figure 1 showing the single-year

Table 1 Distribution of Respondents According to Age in the Household and Individual Surveys

Age reported in household survey	Age in individual survey less age in household survey								
	−4 or more	−3	−2	−1	0	+1	+2	+3	+4 or more
15	0	0	0	0	27	2	0	0	0
16	0	0	0	7	49	4	0	0	0
17	0	0	1	12	71	10	1	0	1
18	0	1	0	13	99	12	2	0	2
19	0	1	3	11	130	15	3	1	1
20	0	1	3	22	327	49	8	4	1
21	0	0	0	27	248	30	4	2	0
22	1	1	9	40	280	37	10	2	5
23	0	0	7	42	234	42	10	3	4
24	1	1	8	25	205	43	12	1	4
25	5	5	2	29	218	52	16	6	4
26	0	1	1	25	241	47	12	6	3
27	1	1	1	15	155	47	4	2	6
28	1	2	3	23	198	33	6	7	6
29	0	4	2	22	160	36	5	3	5
30	0	1	6	19	196	46	16	5	25
31	0	2	3	21	102	25	6	1	1
32	2	1	4	30	152	34	9	3	5
33	2	0	3	27	144	32	5	3	2
34	2	0	5	26	120	19	5	3	2
35	3	4	2	22	161	24	10	5	14
36	4	1	8	35	150	23	12	6	6
37	3	1	1	18	109	17	15	1	3
38	6	2	6	30	146	22	9	5	12
39	2	0	5	23	118	22	4	1	8
40	1	0	3	21	145	22	11	3	21
41	0	0	0	9	73	16	4	1	0
42	2	2	10	23	102	28	8	4	9
43	2	0	3	20	90	21	6	2	4
44	1	1	5	15	84	4	2	5	0
45	12	2	5	22	121	19	8	9	1
46	3	1	2	9	96	14	7	3	0
47	2	0	2	16	75	13	8	0	0
48	6	1	5	25	99	16	0	0	0
49	2	0	2	7	62	0	0	0	0

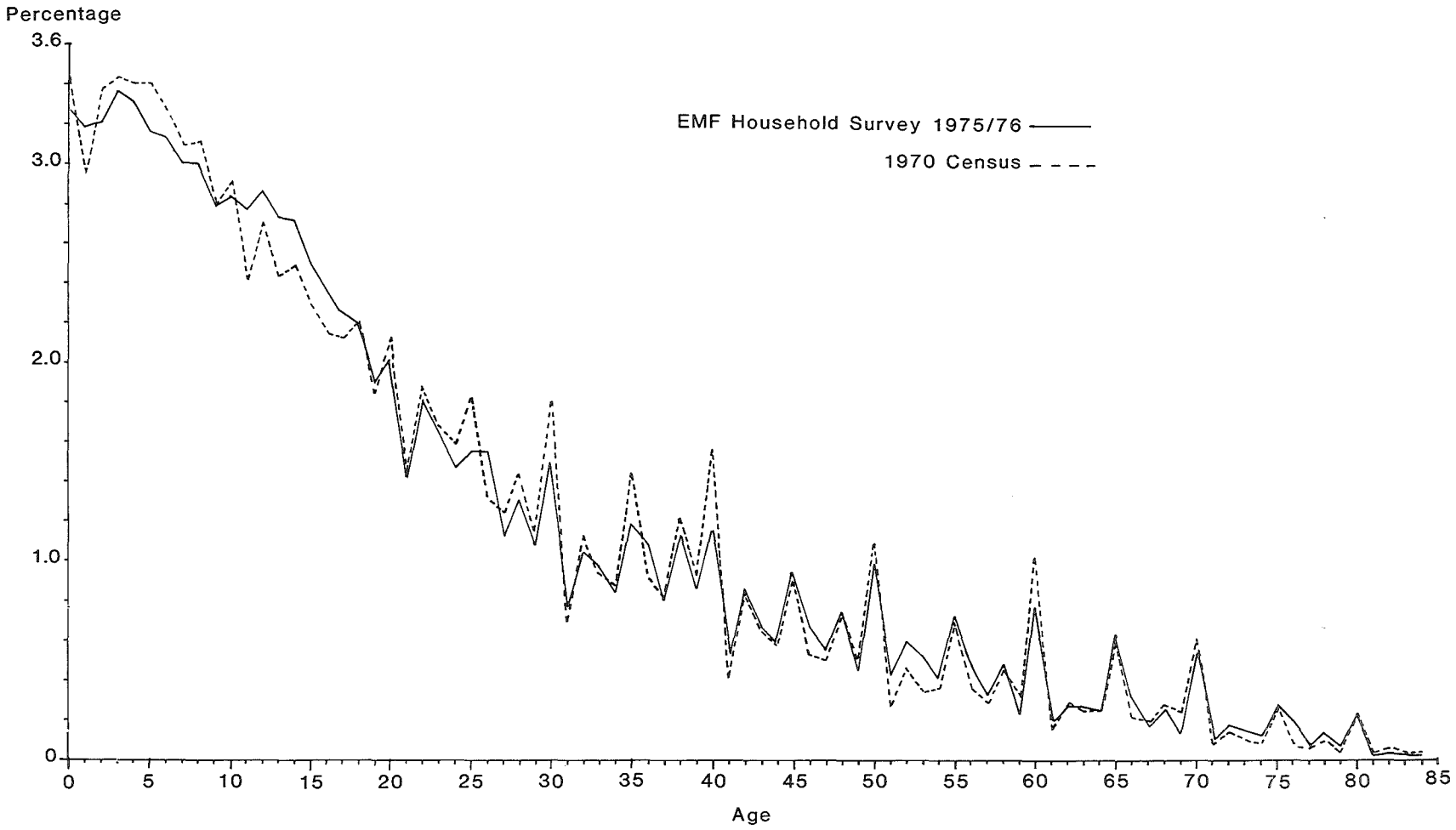

Figure 1 Single-Year Female Age Distributions According to the EMF Household Survey and 1970 Census

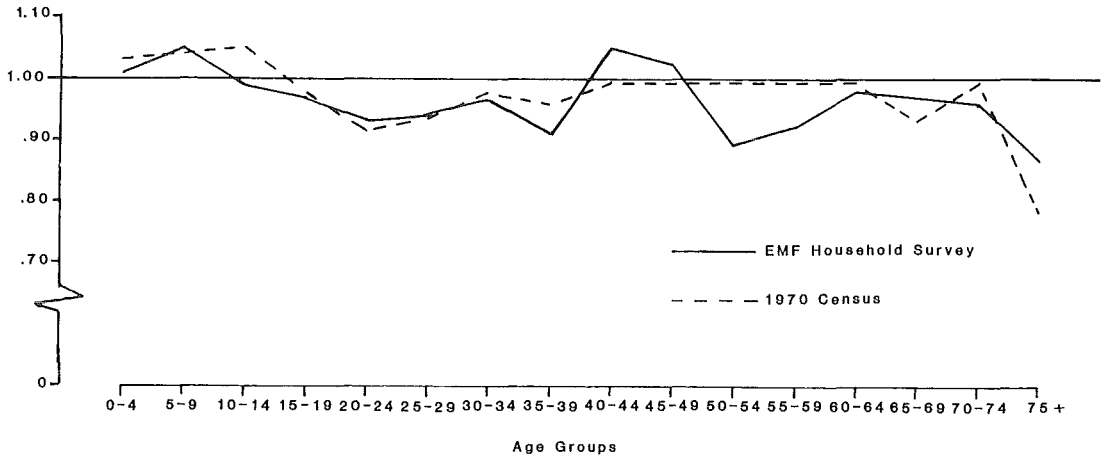

Figure 2 Sex Ratios According to the EMF Household Survey and 1970 Census

age distribution for females from both the EMF household survey and the 1970 census. The Myers' Index for the survey distribution is only about three-quarters as large as that for the census, but both distributions exhibit similar patterns of heaping of reported ages at preferred numbers, notably those ending in zero and five.

While figure 1 gives a good picture of the amount of age heaping, problems of age misreporting and selective underenumeration in certain age groups are perhaps more clearly revealed by the fluctuations in the sex ratios shown in figure 2 for both the EMF household survey and the 1970 census. Taking sampling variation into account, the pattern is nearly the same for both, with a noticeable deficit of males in the age range 15–40.

The EMF individual survey, which included a question on date of birth as well as age at last birthday, should have produced better reports of age than the household survey. The single-year age distributions of women aged 15–49 from both surveys, shown in figure 3, indicate that this indeed seems to be the case. At least the degree of heaping is substantially reduced in the individual survey.

For the purpose of examining the consistency of the information in the household survey and that obtained from the individual survey, a file containing matched interviews was created for all respondents in the individual survey. Results of matching age reports from household and individual surveys are shown in table 1. We note that inconsistencies are much more frequent for women who were enumerated at a preferred age such as 35 or 40 in the household survey than for women enumerated at other ages. This result lends support to the conclusion that age is relatively well reported in the individual survey.

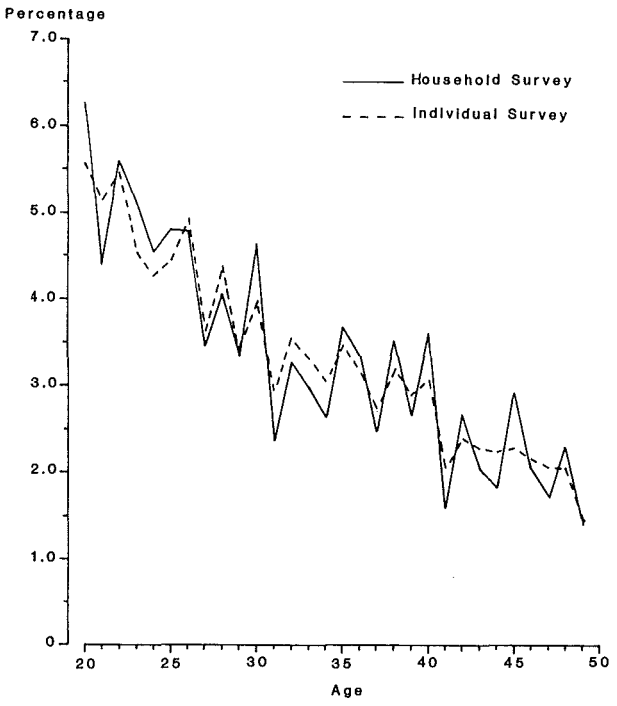

Figure 3 Single-Year Female Age Distributions According to the EMF Household and Individual Surveys

3 Nuptiality

The EMF collected a considerable amount of information on nuptiality. Information on current marital status was recorded for each person aged 15 years or more listed in the household questionnaire, and women selected for the detailed interview were asked to supply a complete marital history (*historia de uniones*) that included information on when the couple began living together, if this occurred earlier than the date of marriage.

It is worthwhile attempting to reach a conclusion as to the reliability of this information for two reasons. First, information on nuptiality is scarce in Mexico, and the data collected in this survey have greatly increased the stock of knowledge on a demographic variable that is of considerable interest in its own right. Secondly, although a specific effort was made in the individual survey questionnaire to separate the marital history from the maternity history, there is no

Table 2 Observed and Fitted Proportions Ever Married by Age

	Number of women			Proportion ever married		
Age	Ever Married	Never Married	Total	Observed	Fitted	Difference
15	54	876	930	0.058	0.054	.004
16	99	775	874	0.113	0.115	−.002
17	163	674	837	0.195	0.196	−.001
18	214	600	814	0.263	0.290	−.027
19	268	433	701	0.382	0.386	−.004
20	380	371	751	0.506	0.477	.029
21	299	227	526	0.568	0.560	.008
22	416	257	673	0.618	0.631	−.013
23	431	181	612	0.704	0.691	.013
24	405	140	545	0.743	0.741	.002
25	472	105	577	0.818	0.783	.035
26	477	97	574	0.831	0.816	.015
27	341	75	416	0.820	0.843	−.023
28	408	80	488	0.836	0.865	−.029
29	352	47	399	0.882	0.882	.000
30	499	57	556	0.897	0.896	.001
31	265	22	287	0.923	0.907	.016
32	357	39	396	0.902	0.916	−.014
33	232	27	259	0.896	0.924	−.028
34	294	22	316	0.930	0.929	.001
35	400	40	440	0.909	0.934	−.025
36	370	30	400	0.925	0.938	−.013
37	286	12	298	0.960	0.941	.019
38	398	25	423	0.941	0.943	−.002
39	307	13	320	0.959	0.945	.014
40	405	27	432	0.937	0.946	−.009
41	182	10	192	0.948	0.947	.001
42	303	16	319	0.950	0.948	.002
43	237	9	246	0.963	0.949	.014
44	206	11	217	0.949	0.950	−.001
45	326	22	348	0.937	0.950	−.013
46	242	9	251	0.964	0.951	.013
47	200	7	207	0.966	0.951	.015
48	267	10	277	0.964	0.951	.013
49	164	5	169	0.970	0.951	.019

Source: EMF Household Survey

reason for being sure that the answer to one set of questions did not have an important effect on the answers to the other. Specifically, erroneous recollection of the date of first marriage might well influence the date a respondent supplied for the first birth, even if the marriage information was not recorded until later in the interview. Similarly, an erroneous response to the question on date of first birth could have an effect on the respondent's answer as to the date of her first marriage. If one were to detect a sizeable misplacement error in the cohort nuptiality patterns, that would increase the likelihood of similar distortions in the fertility schedules for the same cohort.

3.1 THE HOUSEHOLD SURVEY

A useful way to take a first look at the household data is to examine the proportion of ever-married women by single years of age. These proportions are presented in table 2, which also shows estimated proportions that result from fitting the three parameter Coale marriage curve to the single-year data (Coale 1971). In spite of the substantial heaping on selected ages that is evident in the table, the increase in the proportion married with age is fairly smooth and the deviations from the fitted curve are, for the most part, small. One noticeable problem at the older ages is a tendency for the reported proportion married to be somewhat low at highly preferred ages such as 35, 40 and 45. This phenomenon is probably the result of a tendency to under-report marriage for women whose age is misreported.

Since the Coale marriage curve has been fitted to a similar data set collected in the household survey of the Colombian WFS, it is possible to make a rough comparison of the smoothness and regularity of the data collected in these two surveys by calculating, in each case, the sum of the absolute value of the deviations of the observed from the fitted proportions. It turns out that this sum is nearly twice as large in the Colombian survey (0.755) as in the Mexican (0.438) (Rodríguez and Trussell 1980).

Since not all women enumerated in the EMF household survey were selected for the individual interview, it is of interest to check for any bias with regard to marital status that might have been introduced either by the selection process, or by virtue of the likelihood that single women were more difficult to locate and therefore represented a disproportionate share of women unavailable for interview. (Note, however, that all but 3.5 per cent of the selected women were actually interviewed in the individual survey.)

The reported marital status distribution by five-year age groups in the household survey is given in table 3 both for women who were included in the individual survey and those who were not. There do not appear to be any systematic differences between the two distributions.

Another means of evaluating the quality of the household survey data on marital status is by comparison with the information provided in the detailed interview for the women included in both surveys. This was done using the matched file referred to earlier. Table 4 presents a cross-tabulation of the information from both sources. It is gratifying to note that 97.8 per cent of the respondents to

Table 3 Distribution by Reported Marital Status in the Household Survey of Women Eligible for the Individual Interview

Marital status	Age 15–19	20–24	25–29	30–34	35–39	40–44	45–49
A Women interviewed in the individual survey							
1 Single	0.033	0.363	0.153	0.091	0.064	0.058	0.042
2 Consensual union	0.242	0.097	0.093	0.119	0.114	0.089	0.077
3 Married	0.656	0.487	0.704	0.711	0.719	0.726	0.697
4 Separated, divorced or widowed	0.068	0.051	0.051	0.079	0.101	0.127	0.178
5 Unknown	0.000	0.001	0.000	0.000	0.003	0.000	0.004
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000
B Eligible women who were not interviewed							
1 Single	0.053	0.401	0.181	0.081	0.064	0.043	0.043
2 Consensual union	0.228	0.090	0.096	0.092	0.109	0.082	0.085
3 Married	0.632	0.449	0.648	0.747	0.724	0.761	0.681
4 Separated, divorced or widowed	0.087	0.058	0.072	0.081	0.103	0.115	0.187
5 Unknown	0.000	0.002	0.002	0.000	0.000	0.000	0.000
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 4 Distribution of Respondents According to Marital Status in the Individual Survey and the Household Survey

Household survey	Individual survey					
	Single	Married	Consensual union	Widowed	Divorced	Separated
Single	1037	3	3	2	0	22
Married	1	4814	18	1	0	15
Consensual union	2	14	768	2	0	6
Widowed	0	0	5	174	2	12
Divorced	0	0	3	1	34	8
Separated	12	3	10	3	7	319
No information	3	1	1	3	0	1

the individual survey may be found along the main diagonal of the table, indicating that the more detailed information provided by the women themselves in the individual survey was only at slight variance with the information obtained in the household survey. The largest proportion of re-classifications occurred for the relatively small number of women who were reported as divorced in the household survey. Overall, however, the two aggregate distributions are almost identical.

3.2 THE INDIVIDUAL SURVEY

Nuptiality, like fertility, is in essence a cohort phenomenon. It is usually the case, however, that the data available from traditional sources such as censuses and civil registration are best suited for calculating period, rather than cohort, measures of nuptiality. On the other hand, retrospective data such as that collected in the EMF marital histories are ideally suited for analysing cohort patterns of age at first marriage, as well as other aspects of cohort nuptiality such as separation, divorce and remarriage. Since the EMF is the first survey to collect marital histories from a national sample of the Mexican population, the information collected, if reasonably reliable, will provide the basis for greatly extending what is now known about nuptiality in Mexico.

There is, of course, sufficient reason to be sceptical about the quality of the information. In a society where universal literacy has yet to be achieved, and where cohabitation takes place within a variety of social, legal and religious frameworks, it is by no means certain that most women will be able to provide accurate dates for the different events required to complete a marital history. Rather than attempt to evaluate all of the information collected in these histories, we will pay particular attention here to the information on first marriages.[1] This focus is prompted not only by the important role that first marriage patterns play as a determinant of fertility, but also by virtue of the fact that there

Figure 4 Distribution (Per Cents) of Respondents by Duration since First Marriage

are analytical tools available for their evaluation that have yet to be developed for other aspects of nuptiality.

The first step in examining the EMF first marriage data is to check for noticeable 'heaping' or digit preference. Responses could conceivably be heaped on dates that: (1) represent a rounded interval of time before the survey, (2) yield a preferred age at first marriage, or (3) consist of a rounded or preferred calendar year. Looking at the distribution of all first marriage dates expressed in terms of years before the date of interview, shown in figure 4, it appears that at least some heaping of the first and third types did actually occur. The distribution shows slight peaks at durations 10 and 20, as well as at 16, 21, 26, 31 and 36 (roughly corresponding to calendar years 1960, 1955, 1950, 1945 and 1940).

In examining the age patterns of first marriage in different five-year cohorts of women interviewed in the individual survey we are concerned, in addition to smoothness and regularity of shape, with a reasonable progression from cohort to cohort in the mean age at first marriage. Since the distribution of age at marriage in individual cohorts is truncated by age at interview, in order to draw comparisons between cohorts it is necessary either to estimate what the mean age at first marriage will be in the different cohorts when they complete their experience, or to compare experience up to a certain age which is not greater than the age at

1. There are various ways that one could establish the date of 'first marriage' of ever-married women with the data collected in the individual survey. The principal ambiguity is whether to use the date when a union was formalized by legal or religious marriage or the date when the couple began living together, if this occurred earlier. The latter alternative was chosen because it was consistent with the practice of counting consensual unions as marriages, and also because the date when a couple began living together would be most closely related to the onset of fertility.

interview of the youngest cohort involved in the comparison.

One way of estimating eventual mean age at first marriage, and also of analysing smoothness and regularity of shape in the age pattern of first marriage for different cohorts, is to fit Coale's standard curve to the survey data. The procedure chosen here was to work with the conditional probabilities of marriage – that is the probability of marrying at a certain age conditional on marrying by the current age of the cohort – rather than marriage frequencies. By doing so, we avoid having to estimate the third parameter of the Coale model, the proportion of a cohort that eventually marries (C), and estimate only a_o and k, the two parameters that determine both the mean and the standard deviation of the curve. The fitting procedure involved maximizing the logarithm of the likelihood function with numerical techniques, no analytical expressions being available for the m.l.e.s (Rodríguez and Trussell 1980).

Estimates of a_o, k and the mean age at first marriage are shown in table 5 for the 6 five-year cohorts between the ages of 20 and 49. Certainly the most noticeable feature of these results is the smooth and nearly monotonic progression from cohort to cohort in the values of the three parameters: a_o declines steadily from 11.38 in the youngest cohort to 10.81 in the cohort aged 45–49 at interview; k falls from an estimated value of 0.86 in the youngest cohort to a value of 0.77 for women 40–44, but then increases to 0.81 in the oldest cohort; the mean age at first marriage, reflecting the combined influence of the shifts in a_o and k, follows a similar pattern declining sharply among the first three cohorts, falling only slightly among women 30–44, and then rising slightly in the oldest cohort.

Compared with similar results that have been obtained from fitting the Coale curve to cohort first marriage data from other surveys, these estimates from the EMF are quite believable and indicate that the data are of good quality. A common phenomenon encountered elsewhere is a tendency for the estimated mean age at first marriage to rise substantially among the last several cohorts, after either falling or remaining constant among the younger cohorts. In the WFS surveys conducted in Colombia and Nepal, such results were attributed to the inability of older women to supply accurate dates for their first marriage rather than to any real changes in nuptiality (Rodríguez and Trussell 1980; Goldman, Coale and Weinstein 1979). In the Colombian survey, for example, the lowest estimated mean age at first marriage (20.43) was obtained for the cohort aged 35–39 at interviews while the estimate for the cohort 45–49 was more than 1.2 years greater. In comparison, the much less significant turnaround of 0.3 years among the last two cohorts in the EMF seems extremely mild.

Table 5 Estimates of the Parameters of the Coale Model Fitted to Grouped Marriage and First Birth Data from the Individual Survey

Cohort	Estimates		
	a_o	k	μ
A First marriages			
20–24	11.383	0.861	21.167
25–29	11.131	0.825	20.505
30–34	11.122	0.778	19.957
35–39	11.045	0.772	19.813
40–44	10.974	0.769	19.705
45–49	10.812	0.812	20.036
B First births			
20–24	13.070	0.803	22.130
25–29	12.447	0.821	21.772
30–34	12.652	0.756	21.242
35–39	12.502	0.766	21.207
40–44	13.224	0.698	21.150
45–49	12.303	0.805	21.453

Since 'first marriages' are not always well-defined events in Mexican society, it is worth considering the use of age at first birth as a surrogate indicator of entry into the state of cohabitation. For our purposes, it is also of interest to find out if the cohort first birth schedules exhibit shifts in their age pattern similar to those found in the first marriage schedules. Consistency would reinforce the credibility of both. Since the Coale curve is theoretically equally valid for first births and first marriages, we can also use this standard as a basis for evaluating the EMF first birth data (Trussell, Menken and Coale 1979).

Estimates of the model parameters a_o and k, as well as the mean age at first birth, are shown for six EMF cohorts in table 5. Once again the mean age rises sharply in the two youngest cohorts, but is almost constant among the three cohorts between the ages of 30 and 44 at interview. As before, there is a small reversal in trend for the oldest cohort.

The implied average delay between first marriage and first birth – obtained by subtracting the estimated mean age at first birth from the estimated mean age at first marriage – appears to be reasonable for most cohorts. The difference between the two means increases slightly with the age of the cohort, but averages about 15 months, a figure close to that obtained by direct calculation for all women in the survey who had been married for at least five years (Mexico 1979: vol II, table 2.1.1). The only odd figure is that of 12 months for the cohort aged 20–24 at interview, which seems unreasonably low.

In a heterogeneous society such as Mexico's, it may be reasonable to expect that the majority of the serious errors in dating demographic events will be made by respondents with low educational attainment. In such a situation it might happen that real and accurately reported demographic change in the better educated half of the population, in combination with fictitious trends generated by misreporting in the other half, could yield an overall picture that presented no notable inconsistencies or irregularities. To attempt to uncover problems of this sort, here and elsewhere in this report, we will present separate tabulations for respondents who did not complete primary school. Overall they represent 63.8 per cent of the sample aged 20 and over, but the proportion that they constitute of each five-year cohort varies considerably, rising to 81.8 among respondents aged 45–49 at interview.

Table 6 shows the results of fitting the Coale curve to both first marriage and first birth data from EMF respondents with less than complete primary education. Here the mean ages at first birth and at first marriage are considerably

lower than those for the whole sample, and they show much less of a trend. While the mean ages for the youngest cohort are somewhat higher than for neighbouring cohorts, the overall trend is for the means to increase with the age of the cohort. The most significant increase is for the oldest cohort. On the whole, these results do not change greatly the conclusion arrived at for the whole sample. The oldest cohort is again the most problematic, but the data for all cohorts conform quite well to the standard curve. Evidently, a large part of the increase in both the mean age at first marriage and at first birth in Mexico can be accounted for by the secular increase in the proportion of women attaining higher levels of education.

3.3 THE 1978 CONTRACEPTIVE PREVALENCE SURVEY

The National Survey of the Prevalence of the Use of Contraceptives, undertaken in 1978, included a question on age at the time a woman first married or cohabited in a consensual union. While this was a smaller survey than the EMF, including only 3112 ever-married women, there are still enough respondents to fit the Coale curve to the data for five-year cohorts using the same maximum likelihood procedure applied to the EMF data. The results of this application are shown in table 7. In some ways they are disquieting: the estimates of the mean age at first marriage are lower than those from the EMF for the younger cohorts, but higher for the older cohorts. Taken together these estimates show much less of a trend than the EMF results, and yet the Prevalence data appear to conform quite well to the Coale model.

Table 6 Estimates of the Parameters of the Coale Model Fitted to Grouped Marriage and First Birth Data for Women with Less than Complete Primary Education in the Individual Survey

Cohort	Estimates		
	a_o	k	μ
A First marriages			
20–24	11.0	0.73	19.3
25–29	11.0	0.68	18.8
30–34	11.1	0.68	18.8
35–39	11.0	0.70	19.0
40–44	11.0	0.71	19.0
45–49	10.8	0.77	19.5
B First births			
20–24	12.7	0.69	20.6
25–29	12.2	0.71	20.3
30–34	12.6	0.65	20.0
35–39	12.4	0.72	20.5
40–44	13.4	0.63	20.6
45–49	12.3	0.77	21.0

Table 7 Estimates of the Parameters of the Coale Model Fitted to Grouped First Marriage Data from the 1978 Contraceptive Prevalence Survey

Cohort	Estimates		
	a_o	k	μ
15–19	13.0	0.63	20.2
20–24	12.6	0.69	20.5
25–29	12.4	0.72	20.6
30–34	12.2	0.74	20.8
35–39	12.1	0.71	20.2
40–44	11.9	0.74	20.2
45–49	12.1	0.70	20.0

Our inclination is to favour the EMF results, largely because the Prevalence Survey question was isolated and not included in a detailed marital history such as that included in the EMF questionnaire. The conflict between the two surveys does, however, make us wary of using goodness of fit to the Coale model as a criterion for evaluating the quality of survey data on nuptiality.

3.4 COMPARISON WITH THE 1960 AND 1970 CENSUSES

Using reported dates of marriage for first and for higher-order marriages, as well as data on type of union and dates and manner of dissolution for those marriages which were dissolved, distributions of marital status by age can be reconstructed from the EMF marital histories for specified dates in the past. Such distributions are shown in table 8 for the last two census dates (June 1960 and January 1970).[2] We note that in 1960, and to a lesser degree in 1970, the per cents single are considerably higher according to census data than as derived from the EMF marital histories. For the most part, these differences are reflected in lower proportions of women being classified in legal marriages or consensual unions in the censuses. This pattern does not hold up, however, in the comparisons for the older age groups in 1970. There the proportions of women in legal and consensual unions are virtually identical, but low proportions of separated or divorced women in the census data are offset by higher proportions single.

Since it seems unlikely that age at first marriage is greatly understated by the older respondents included in the EMF individual survey, our interpretation of the discrepancies in table 8 is that the bulk of the problem lies with the census data. The censuses, especially the 1960 census, seem to have underestimated the proportion ever married. A similar result was obtained when this procedure was applied to data from Colombian censuses and surveys (Flórez and Goldman 1980).

2. While it would have been possible to reconstruct marital status for women under 25 in 1950, unfortunately there is no tabulation from the 1950 census that the reconstructed distribution could be compared with.

Table 8 Reconstruction of Marital Status Distributions for Women by Five-Year Age Groups, for 1960 and 1970 Censuses (Per Cents)

Age	Single		Consensual union		Married		Widowed		Separated/ divorced	
1960[a]										
	EMF	Census	EMF	Census	EMF	Census	EMF	Census	EMF	Census
14–19	71.2	79.0	7.7	4.0	19.9	13.8	0.3	0.3	0.9	0.1
20–24	26.0	45.3	13.3	9.2	57.6	40.6	0.8	0.8	2.2	0.4
25–29	11.6	22.3	13.2	12.3	71.0	60.3	1.7	1.5	2.6	0.5
30–34	8.5	13.6	12.2	12.5	71.4	68.1	2.3	2.6	5.6	0.7
1970[b]										
15–19	71.9	78.8	7.3	5.1	19.7	15.0	0.1	0.2	0.9	0.9
20–24	31.1	38.5	11.0	10.4	54.7	48.2	0.9	0.7	2.3	2.2
25–29	13.6	17.4	13.4	12.3	68.9	66.1	0.8	1.4	3.3	2.8
30–34	7.4	10.4	14.8	12.1	70.6	71.7	2.9	2.4	4.3	3.4
35–39	5.6	7.8	10.7	12.6	74.4	71.8	3.4	4.0	6.0	3.8
40–44	5.5	7.3	11.4	11.5	69.3	70.3	6.2	6.7	7.7	4.2

[a] In the census, about 3 per cent of the women in each age group were classified as marital status unknown. Also, the separated/divorced category only refers to legal divorce in the case of the census but to separations and divorces in the case of the EMF. The oldest women in the EMF sample were under age 34 in June 1960 and thus the 30–34 age group is not strictly comparable for the two sources.

[b] The oldest women in the age group 40–44 from the EMF are under 43½ years of age.

4 Fertility

One of the main purposes of the EMF was to produce reliable estimates of the level and trend of Mexican fertility. A complete pregnancy history was included in the individual survey questionnaire, and questions regarding births that occurred in the last 12 months were included in the household questionnaire. The EMF data are important in the Mexican context not so much because birth registration is incomplete, but because births are often registered after a considerable period of time. This being the case, when specific efforts to induce families to register births are made, as in the 1973–5 period, the number of births reported in a given year can be quite different from the number of children that were born during the corresponding period. Also, the EMF is the first national level fertility survey to have been conducted in Mexico.

In spite of the fact that every effort may have been made to obtain reliable data on fertility in this survey, experience with other surveys in the WFS series carried out in Latin America and elsewhere in the world provides a basis for caution in interpreting the results. In several instances, maternity history data have been shown to yield distorted estimates of the trend in fertility (Hobcraft 1980; Guzmán 1980; Goldman, Coale and Weinstein 1980; and Brass 1978).

While as yet there is no definitive catalogue of the various kinds of distortion one might encounter in maternity history data, one type of error that seems to have occurred in several surveys involves a pattern of misplacing births towards the date of survey that, in effect, results in schedules of cohort fertility that are 'older' than those which would have obtained if all events had been accurately reported. In figure 5 it is shown how, when the experience of adjacent cohorts is compared for the purpose of measuring fertility change, such a pattern of misreporting can yield exaggerated estimates of fertility decline. A plausible explanation of this type of reporting error is offered in Potter (1977).[3] Other patterns of misreporting have been considered by Brass (1971 and 1978).

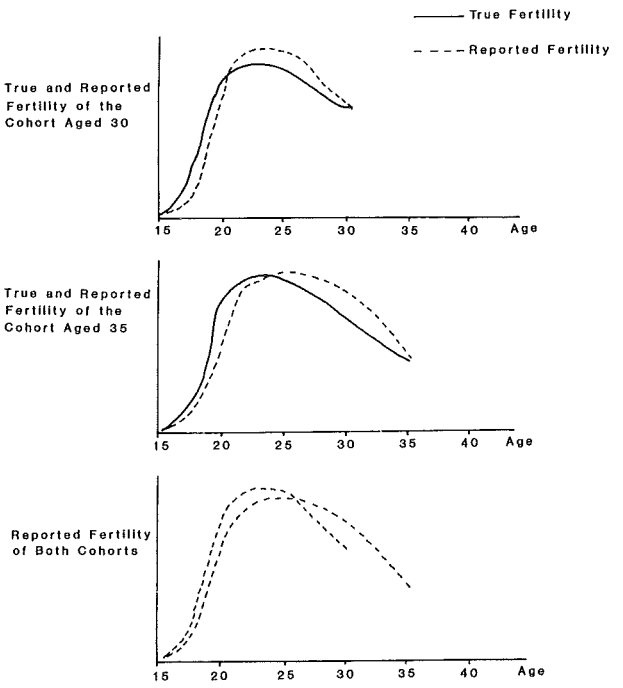

Figure 5 Event Misplacement towards the Date of the Survey

In the sections that follow we will inspect the EMF cohort fertility schedules for evidence of distortion, apply such probes for internal consistency as are available in an effort to detect both omitted events and poorly reported birth intervals, and compare the EMF fertility results with those that are available from other sources.

4.1 COHORT FERTILITY

Fertility rates can be calculated from maternity history data in a variety of ways. In this section we use cohort-period fertility rates (see Verma 1980). To avoid excluding any part of a respondent's experience, the timescale is constructed in terms of years before the survey, that is, events are located according to the difference between the date of their occurrence and the date of the interview. Cohorts are similarly based on age at interview rather than date of birth. In addition to cohort-period fertility rates, cumulative fertility has been calculated for both real and synthetic cohorts.

Panel A of table 9 shows fertility rates for five-year cohorts and periods. The picture is one of a moderate decline in fertility that has taken place in the 15 years preceding the survey. Rates for the period 10–15 years before the survey are generally the highest appearing in the table and those for earlier periods are, in the main, increasingly below these peak rates. Compared to results from other surveys, however, the differences between the peak rates and the rates at the same age for the earliest available period are not notably large. Still, it is not a trivial question to ask whether they are due to event misplacement or to omissions, since in the former event the apparent decline in fertility, especially at older ages, could turn out to be overestimated. The decline at younger ages is much less in doubt and is

3. In practice and on theoretical grounds this pattern is likely to occur in surveys where the maternity history is elicited beginning with the first rather than the most recent event.

Table 9 Cohort-Period Fertility Rates

Age of cohort at end of period	Central age	Years before the survey						
		0–4	5–9	10–14	15–19	20–24	25–29	30–34
A Cohort-period rates (per 1000 women)								
15–19	15	38	47	58	59	62	61	57
20–24	20	217	229	246	256	242	217	
25–29	25	294	325	335	327	308		
30–34	30	276	313	318	301			
35–39	35	231	248	262				
40–44	40	128	156					
45–49	45	50						
B Cumulative cohort rates (P)								
15–19	15	0.19	0.24	0.29	0.31	0.32	0.32	0.29
20–24	20	1.32	1.44	1.54	1.60	1.52	1.37	
25–29	25	2.91	3.16	3.28	3.15	2.91		
30–34	30	4.54	4.85	4.75	4.41			
35–39	35	6.00	5.99	5.72				
40–44	40	6.63	6.50					
45–49	45	6.75						
C Cumulative period rates (F)								
15–19	15	0.19	0.24	0.29	0.30	0.32	0.32	0.30
20–24	20	1.27	1.38	1.53	1.58	1.53	1.41	
25–29	25	2.75	3.01	3.20	3.21	3.07		
30–34	30	4.13	4.58	4.79	4.72			
35–39	35	5.28	5.82	6.10				
40–44	40	5.92	6.60					
45–49	45	6.17						
D P/F ratios								
15–19	15	1.02	1.00	1.00	1.02	1.01	0.99	1.00
20–24	20	1.04	1.04	1.01	1.01	1.00	0.98	
25–29	25	1.06	1.05	1.02	0.98	0.95		
30–34	30	1.10	1.06	0.99	0.94			
35–39	35	1.14	1.03	0.94				
40–44	40	1.12	0.99					
45–49	45	1.09						

Source: EMF Individual Survey

consistent with the rise in age at marriage and age at first birth analysed earlier in this report.[4]

The cumulative fertility figures for real cohorts in panel B of table 9 show that the average parity of the cohort 45–49 five years before the survey (when it was aged 40–44) was slightly less than the average parity of the cohort 40–44 at the time of the survey. The difference is more likely due to a greater proportion of omitted births in the older cohort than to any real difference in fertility. When similar comparisons are made for younger cohorts the difference is either negligible or of the opposite sign, indicating that differential rates of omission, if they exist, have been swamped by differences in cohort fertility.

It is often useful to examine data on first births, not so much because period rates are not likely to change (clearly

4. This conclusion is supported by a comparison (not presented here) of cumulative marital fertility for the more recent marriage cohorts with the cumulative marital fertility prevailing in the synthetic marriage cohort corresponding to the five-year period preceding the survey.

Table 10 Cohort-Period Fertility Rates, First Births Only

Age of cohort at end of period	Central age	Years before the survey						
		0–4	5–9	10–14	15–19	20–24	25–29	30–34
A Cohort-period rates (per 1000 women)								
15–19	15	25	32	37	38	41	39	40
20–24	20	85	80	87	87	86	79	
25–29	25	44	41	38	40	43		
30–34	30	13	13	11	15			
35–39	35	6	4	5				
40–44	40	2	2					
45–49	45	1						
B Cumulative cohort rates (P)								
15–19	15	0.13	0.16	0.19	0.20	0.22	0.20	0.20
20–24	20	0.59	0.59	0.63	0.65	0.63	0.60	
25–29	25	0.81	0.84	0.84	0.83	0.81		
30–34	30	0.90	0.91	0.89	0.88			
35–39	35	0.94	0.91	0.91				
40–44	40	0.92	0.92					
45–49	45	0.92						
C Cumulative period rates (F)								
15–19	15	0.13	0.16	0.19	0.19	0.21	0.21	0.20
20–24	20	0.55	0.57	0.63	0.63	0.64	0.60	
25–29	25	0.77	0.77	0.82	0.83	0.85		
30–34	30	0.83	0.84	0.87	0.90			
35–39	35	0.86	0.86	0.90				
40–44	40	0.87	0.87					
45–49	45	0.88						
D P/F ratios								
15–19	15	1.03	1.00	1.00	1.02	1.02	0.98	1.00
20–24	20	1.07	1.05	1.01	1.04	0.99	0.99	
25–29	25	1.06	1.09	1.03	1.01	0.95		
30–34	30	1.08	1.08	1.02	0.98			
35–39	35	1.09	1.06	1.01				
40–44	40	1.05	1.06					
45–49	45	1.05						

Source: EMF Individual Survey

changes from cohort to cohort in age at first marriage can have a pronounced effect on period first birth rates), but rather because the proportion of women that eventually become mothers is, in many circumstances, unlikely to change. Table 10 presents fertility calculations identical to those of table 9, but for first births only. Considering the results of fitting the Coale curve to cohort first birth data presented in the previous chapter, there is little that is surprising in table 10. The oldest cohort is the only one to show some indication that omissions or event misplacement have altered the age pattern of fertility. Of some interest, perhaps, is the relatively high proportion of mothers found among women aged 35–39 at interview.

Table 11 presents cohort period fertility calculations for all births for women with low (less than complete primary) education. In this subsample the apparent decline in fertility is both smaller and of more recent origin than the decline evident in table 9. What is more, the data are more clearly affected by omissions or event misplacement. The increase in fertility in the cell centred on age 15 is pronounced as one goes forward to the period 5–10 years before the survey. Similar increases, but of lesser proportion, are evident

Table 11 Cohort-Period Fertility Rates, Women with Less than Complete Primary Education

Age of cohort at end of period	Central age	Years before the survey						
		0–4	5–9	10–14	15–19	20–24	25–29	30–34
A Cohort-period rates (per 1000 women)								
15–19	15	71	82	90	80	75	74	62
20–24	20	287	297	297	284	269	238	
25–29	25	356	365	356	344	318		
30–34	30	313	343	335	316			
35–39	35	269	268	283				
40–44	40	145	174					
45–49	45	57						
B Cumulative cohort rates (P)								
15–19	15	0.36	0.42	0.46	0.41	0.40	0.38	0.32
20–24	20	1.86	1.94	1.90	1.82	1.73	1.51	
25–29	25	3.72	3.72	3.60	3.45	3.10		
30–34	30	5.29	5.31	5.12	4.68			
35–39	35	6.66	6.46	6.09				
40–44	40	7.19	6.96					
45–49	45	7.25						
C Cumulative period rates (F)								
15–19	15	0.36	0.41	0.45	0.40	0.38	0.37	0.31
20–24	20	1.79	1.90	1.94	1.82	1.72	1.56	
25–29	25	3.57	3.72	3.72	3.54	3.31		
30–34	30	5.14	5.44	5.39	5.12			
35–39	35	6.48	6.78	6.81				
40–44	40	7.21	7.65					
45–49	45	7.49						
D P/F ratios								
15–19	15	1.00	1.02	1.02	1.02	1.05	1.00	1.03
20–24	20	1.04	1.02	0.98	1.00	1.01	0.97	
25–29	25	1.04	1.00	0.97	0.97	0.94		
30–34	30	1.03	0.98	0.95	0.92			
35–39	35	1.03	0.95	0.89				
40–44	40	1.00	0.91					
45–49	45	0.97						

Source: EMF Individual Survey

for the cells centred on the ages of 20, 25 and 30. The decline in fertility between the two most recent periods is accentuated at age 40, non-existent at age 35, and relatively large at age 30. Although some unevenness has been introduced by the high parity of the cohort aged 35–39 at interview, this pattern of decline is not inconsistent with the pattern of decline that would be generated by event misplacement of the sort depicted in figure 5. Comparisons of cumulative fertility for adjacent real cohorts point to omissions in the two oldest cohorts. The P/F ratios for the period 0–5 years before the survey are consistent either with pronounced omissions in the older cohorts in combination with a real decline in fertility, or with a lesser incidence of omissions in combination with a spurious fertility decline generated largely by event misplacement.

4.2 CHECKS FOR INTERNAL CONSISTENCY

The information collected in the maternity history on dates of birth of live-born children could be affected by various

sorts of heaping or digit preference. One possibility is that respondents might tend to supply dates that were rounded either in terms of calendar years, or in terms of years before the survey. Another possibility is that in recording the pregnancy history, respondents estimate the length of intervals between events rather than the dates themselves. If this were the case, there might be a tendency to report intervals of rounded lengths with preference, say, for intervals of lengths that were multiples of six months.

To check for biases and distortions of this sort, a large number of tabulations were made both for live births and for all events. They showed some evidence of preference for dates occurring 10 and 20 years before the interview, but apparently no preference for rounded calendar years such as 1960 and 1970. There was also some mild heaping on rounded interval lengths, most pronounced for women with lower levels of educational attainment.

Overall, these results do not provide much evidence that births were not accurately dated in the maternity histories. What is more, here as elsewhere, it seems unlikely that the apparent absence of anomalies could have been the result of editing and imputation (Mexico 1979: vol I, pp 53–8).

Perhaps too much has been made of the means at one's disposal with which to probe for events omitted from birth history data. Suggested checks have been: the ratio of male to female births, in case respondents tended to omit more readily births of one sex or the other; the trend in infant mortality, in case the tendency to omit children who died some time ago at an early age was great enough to swamp the secular decline in child mortality; and the differential in mortality between the sexes, in case respondents were more likely to omit deceased children of one sex or the other. Such procedures have by now been applied to a number of surveys and they have usually done little to establish either the presence or absence of omissions. Mexico is no exception; the mortality calculations will be presented in the following chapter, but suffice it to say here that few, if any irregularities are present that would lead one to conclude that a large number of deceased children were left out of the birth histories.

The sex ratio at birth for all of the reproductive experience captured by the EMF was 1.035. Ratios for different periods and for first births only are shown in table 12. The ratios tend to fluctuate more than one might expect on the basis of sampling variation alone, but no systematic bias is evident.

One check that did produce significant results in the Nepal case was examination of parity by single years of age, where it was found that women reporting preferred ages such as 35, 40 and 45 appeared to under-report the number of children they had ever borne (Goldman *et al* 1979). In the Mexican case the age heaping is much less severe and no irregularities of this sort are evident for single-year cohorts.

Table 12 Sex Ratios at Birth

Years before the survey	Males per female	
	First births	All births
1–4	0.96	1.02
5–9	1.05	1.08
10–15	1.06	1.04
15–19	1.04	0.99
20–24	1.15	1.02

Source: EMF Individual Survey

4.3 COMPARISON WITH THE 1950, 1960 AND 1970 CENSUSES

The last three Mexican censuses have each included questions on and tabulations of children ever born to women of childbearing age. As was done earlier for marital status, the distribution of respondents by age group and by parity can be reconstructed for specified dates in the past, using the information on dates of births collected in the EMF maternity histories. If the census data were reliable and consistent, they would provide an excellent standard against which to compare the fertility of matching cohorts in the survey. In ideal circumstances, they would enable the analyst to detect and also to distinguish between omissions and event misplacement. Unfortunately, as can be seen in table 13, the Mexican census data on parity provide much less than an ideal standard.

The comparison indicates that the census data consistently underestimate cumulative fertility, but that the problem is progressively worse the earlier the census. This seems to be true for the mean number of children ever born as well as of the proportion of women who have become mothers.

Table 13 Reconstruction of the Proportion of Mothers and Parity by Five-Year Age Groups, for 1950, 1960 and 1970 Censuses

Age	Proportion of mothers		Mean number of children ever born	
	EMF	Census	EMF	Census
1950				
15–19	0.21	0.13	0.34	0.19
20–24	0.54	0.52	1.17	1.21
1960				
15–19	0.21	0.13	0.33	0.21
20–24	0.66	0.51	1.60	1.29
25–29	0.83	0.69	3.15	2.65
30–34	0.86	0.76	4.19	3.84
1970				
15–19	0.18	0.14	0.26	0.24
20–24	0.62	0.53	1.53	1.39
25–29	0.84	0.77	3.20	3.06
30–34	0.91	0.85	4.89	4.56
35–39	0.92	0.88	5.90	5.73
40–44	0.90	0.88	6.46	6.29

Table 14 Age-Specific Fertility Rates (Per Thousand), According to the EMF Individual Survey and Vital Registration

Age	1956–60			1961–5			1966–70			1971–2		
	EMF	Registered	% Difference	EMF	Registered	% Difference	EMF	Registered	% Difference	EMF	Registered	% Difference
15–19	153	110	39.1	152	101	50.0	131	92	41.9	114	97	17.3
20–24	323	310	4.4	315	300	4.9	319	289	10.3	302	287	5.4
25–29	318	321	−0.9	334	324	3.0	340	317	7.1	319	311	2.5
30–34				290	261	11.2	280	251	11.3	276	250	10.2
35–39							206	214	−4.0	190	210	−9.2
40–44										96	102	−5.8

Perhaps the one comparison that would call the survey into question is for women age 20–24 in 1950. There the census and survey figures are remarkably close. The inference that the survey estimates are as underestimated as those of the census is mitigated, however, by the small number of EMF respondents involved in the comparison (481), and the fact that none of them were more than 23½ at the time.

4.4 COMPARISON WITH REGISTERED BIRTHS

While birth registration is not perfect in Mexico, vital registration has been compulsory since 1859 and this well-established system constitutes an important independent source of fertility information with which the EMF results can be compared.

Age-specific fertility rates calculated from the EMF maternity histories and on the basis of registered births are shown in table 14 for 1955–60, 1961–5, 1966–70 and 1971–2. The comparisons were not extended beyond 1972 since it is highly probable that registration in 1973–5 was severely affected by a national programme that promoted the legalization of marriages of couples living in consensual unions as well as the inclusion of their children in the civil register. At the least, this programme shortened the traditional average delay between a birth and its registration, and it may have led to some duplicate registrations as well.

There is a consistent pattern to the comparisons shown in the table: the survey rate is much larger than the registration rate in the age group 15–19; there are small positive differences at 20–24 and 25–29; there is a substantial positive difference at 30–34; and beyond 35 there are small negative differences. Uppermost among the factors at work would seem to be the average delay in registration which results in births being registered not only at a later point in time but also at an older age of the mother. This effect shows up in the comparisons for those portions of the fertility schedule where the slope is greatest, such as in the age group 15–19, and at ages beyond 30. The positive difference at 30–34 would appear to result from a more tractable difficulty: the rates based on registered births were calculated using unadjusted numerators but a corrected age distribution was used for the denominators. It so happens that 30–34 is an age group slighted by Mexican women and thus the 'corrected' denominator will be excessive if women also misreport their age when registering their children. When the series of age-specific fertility rates is recalculated using registered births and an age distribution that retains the same pattern of age misreporting found in the censuses, the same comparisons show a monotonic decrease in the percentage difference between the survey and the registration rates moving from younger to older age groups.

Table 14 also shows that while the survey rates were similar in level if not in pattern to the registration-based rates in the 1971–2 period, the level of fertility shown by the survey for earlier periods was considerably higher. The fact that these discrepancies are not confined to just one or two periods leads us to believe that they are, by and large, the result of less complete and possibly later registration of births in these periods.

4.5 THE EMF HOUSEHOLD SURVEY

The questionnaire for the EMF household survey included a section on children born in the last 12 months by women who normally live in the household. The format was unusual in that these questions came near the end of the questionnaire and were not part of the line by line enumeration of household members. When a birth was listed, there was a question regarding the identification of the parents. Remarkably, for all but 60 births a satisfactory code was found for the identification of the mother in the definitive data file.

In the Mexican case, the household fertility results are of more than passing interest due to the general concern regarding the onset of fertility decline and changes in the national birth rate. The household data provide information equivalent to that collected in the maternity history for the year preceding the survey, but with the advantage that the sample of women entering in the denominators is 75 per cent larger.

Table 15 shows age-specific fertility rates calculated from the EMF household survey. The first three columns contain rates calculated from the household survey question on fertility in the last year (births recorded in months 1–11 before the interview), while the fourth shows rates estimated by the own-children method. For comparison, the fifth column contains rates calculated from the maternity histories of the individual survey. The first point to note is that women enumerated in the household survey who were selected for the individual survey appear to have slightly higher fertility than those who were not selected. One may suspect that this small (and perhaps statistically insignificant) difference might have resulted from 'contamination' by the individual survey maternity history leading to some corrections and additions to the household survey questionnaire, but the strict procedures employed in the field should have prevented any such changes from being made.

The rates calculated indirectly on the basis of children enumerated at age 0 in the household survey are almost identical to those calculated directly in column 3. The few differences that are to be found may be explained by our

Table 15 Age-Specific Fertility Rates (Per Thousand) in the Year Preceding the Survey, According to the EMF Household and Individual Surveys

Age at interview	Household survey				Individual survey
	Women selected for the individual survey	Eligible women not selected[a]	All	Own children	Months 1–12[b]
15–19	78	74	77	76	80
20–24	251	231	243	243	273
25–29	260	247	255	268	259
30–34	210	227	217	222	223
35–39	175	168	172	167	184
40–44	72	92	80	81	70
45–49	25	4	16	15	21
Total fertility rate	5.36 (5.49)	5.22 (5.34)	5.29 (5.41)	5.36	5.55

[a] Calculations used births recorded for months 1–11. No births were recorded for the twelfth month and month 0, the month of interview, is incomplete. The total fertility rate shown in parentheses is adjusted to account for children recorded in the questionnaire whose mother was not identified.

[b] These calculations could have been made using only months 1–11, but severe heaping on month 11 led us to include the twelfth month as well. Such heaping was not apparent in the household survey.

having used the same mortality correction factor (0.945) for children born to women of different ages rather than factors specific to each age group, which would have been more appropriate. This result suggests that interviewers paid close attention to the household roster when obtaining answers to the fertility questions included at the end of the household survey.

The age-specific fertility rates calculated for the last year of experience (months 1–12) recovered in the EMF individual survey are slightly higher than those calculated from the household survey. But in the case of women selected for the detailed interview, the difference in the total fertility rate becomes extremely small once the age-specific household rates are inflated for the 2.3 per cent of births recorded with an unidentified mother.

4.6 COMPARISON WITH THE 1978 CONTRACEPTIVE PREVALENCE SURVEY

The interviewing for the 1978 Contraceptive Prevalence Survey was done almost two full years after the interviewing for the EMF. Thus, age-specific fertility rates calculated for the year preceding the Prevalence Survey provide an indication of whether the fertility decline apparent from the EMF was sustained in the two-year period following the survey, and whether the low total fertility rates calculated for the year preceding the EMF are in line with the subsequent trend in fertility.

Age-specific fertility rates calculated for the eleven complete months preceding the Prevalence Survey interviews are shown in table 16 for first births and for all births. The Total Fertility Rate of 5.24 is slightly below that recorded for the year preceding the EMF. The sum of the age-specific first birth rates, however, is somewhat higher than that obtained from the EMF maternity histories for the two-year period preceding the survey. These results are the product of a very small sample of women (4332) and a simple question on date of last live birth that has not always produced reliable estimates of fertility in surveys and censuses conducted in other countries. What is more, there is some likelihood that the under-representation of younger childless women in the CPS sample may have led to an upward bias in the fertility rates for the first two age groups, especially for first births.

Table 16 Age-Specific Fertility Rates, According to the 1978 Contraceptive Prevalence Survey

Age	First births	All births
15–19	60	92
20–24	78	249
25–29	22	249
30–34	10	231
35–39	0	148
40–44	0	68
45–49	3	10
Total fertility	0.87	5.24

5 Mortality

The EMF maternity history included a question on age at death for all deceased children. Responses were coded in months if the child lived less than a year and in years if more than a year. This information constitutes an important increment to the present stock of empirical findings on child mortality in Mexico, a country where questions on surviving children ever born have not been included in previous censuses or national level surveys and where vital registration has either been relied on or subjected to ad hoc correction procedures.

In the following sections we probe the EMF child mortality data for internal consistency and compare the results of the individual survey with those from the vital registration system and the 1978 Contraceptive Prevalence Survey. Lastly, a few comments are offered regarding the results of the EMF household survey.

5.1 CHECKS FOR INTERNAL CONSISTENCY

Child mortality can be expected to behave in a predictable manner with regard to its historical trend, differentials between the sexes, the age of mother at birth, educational attainment of the mother, and also its age pattern. As mentioned above, it turns out that, at the level of analysis we have undertaken, there are few anomalies in the EMF results, which give every indication of being internally consistent.

Table 17 Probabilities of Dying by Exact Ages 1, 2 and 5 by Period and Sex

Life-table value	Years before the survey				
	0–4	5–9	10–14	15–19	20+
Both sexes					
$_1q_0$	0.0710	0.0779	0.0849	0.0942	0.1106
$_2q_0$	0.1048	0.0948	0.1046	0.1150	0.1475
$_5q_0$		0.1097	0.1187	0.1371	0.1798
Males					
$_1q_0$	0.0789	0.0853	0.0941	0.1074	0.1293
$_2q_0$	0.1095	0.1018	0.1160	0.1262	0.1694
$_5q_0$		0.1157	0.1287	0.1485	0.2013
Females					
$_1q_0$	0.0628	0.0700	0.0753	0.0812	0.0914
$_2q_0$	0.1000	0.0872	0.0928	0.1040	0.1250
$_5q_0$		0.1032	0.1082	0.1259	0.1577

Source: EMF Individual Survey

The life-table values $_1q_0$, $_2q_0$, and $_5q_0$ calculated from the EMF maternity history data by sex for various periods preceding the survey are shown in table 17. A steep secular decline in Mexican mortality is apparent in all three panels of the table and there is a monotonic progression to lower probabilities of survival the earlier a birth took place. The differences in child mortality by sex also appear to conform to world experience: only in the periods more than 15 years before the survey does the female advantage widen to the point where it might be suspected that deceased girls were differentially omitted from the histories.

Brass (1978) has suggested that it is especially worthwhile to check the time trend in the mortality of first order births when probing for omitted events. Life-table values calculated for first order births only are presented in table 18 for five-year periods preceding the survey. While the probabilities of dying before different ages are slightly lower in this table than in the previous one, this is to be expected since on average these children were born into households of higher socio-economic status.[5]

Table 19, in the same format, shows survival probabilities for the children of women with low educational attainment (less than complete primary) as compared with those for the children of women with more schooling. Once again the differences are in the expected direction and no anomalies seem to be present. In further analysis, however, it would seem worth probing further by differentiating between a larger number of categories for completed schooling.

The probability of dying before age two is shown in table 20 for four different periods according to mother's age at the time of birth of the child. As one would expect, mortality is greater at both extremes of the age distribution. This pattern is similar to that found in other surveys conducted in Latin America (Somoza 1980; Potter 1977).

Perhaps the most exacting test for consistency that was applied to the EMF mortality data was with regard to the age pattern of child mortality. On the basis of world experience it seems likely, if not certain, that the relation between infant mortality and mortality at ages 1–4 will conform to one of a number of possible patterns, and that the pattern will not change greatly over time. The standards chosen for this analysis were the four families of model life tables developed by Coale and Demeny (1966). Table 21 shows for four periods the level of mortality corresponding to the EMF values of $_1q_0$ and $_4q_1$ in the West family of

5. This follows from the fact that in Mexico women of low socio-economic status contribute more than proportionally to the pool of 'all births'.

Table 18 Probabilities of Dying by Exact Ages 1, 2 and 5 for First Births Only, by Period

Life-table value	Years before the survey				
	0–4	5–9	10–14	15–19	20+
$_1q_0$	0.0667	0.0724	0.0777	0.0867	0.1063
$_2q_0$	0.0914	0.0869	0.0855	0.1056	0.1371
$_5q_0$		0.0980	0.0982	0.1244	0.1580

Source: EMF Individual Survey

Table 19 Probabilities of Dying by Exact Ages 1, 2 and 5 by Period and Mother's Educational Attainment

Life-table value	Years before the survey				
	0–4	5–9	10–14	15–19	20+
Mothers with incomplete primary or less					
$_1q_0$	0.0784	0.0848	0.0909	0.1013	0.1167
$_2q_0$	0.1176	0.1044	0.1130	0.1258	0.1577
$_5q_0$		0.1224	0.1291	0.1509	0.1939
Mothers with complete primary or more					
$_1q_0$	0.0503	0.0520	0.0576	0.0567	0.0698
$_2q_0$	0.0697	0.0586	0.0670	0.0583	0.0794
$_5q_0$		0.0620	0.0718	0.0644	0.0857

Source: EMF Individual Survey

Table 20 Probability of Dying by Age 2 by Period and Age of Mother at the Child's Birth

Period	Age of mother						
	15–19	20–24	25–29	30–34	35–39	40–44	45–49
–1945	.2331	–	–	–	–	–	–
1946–1955	.1920	.1473	.1379	–	–	–	–
1956–1965	.1498	.1043	.1045	.0958	.1103	–	–
1966–1975	.0995	.0852	.0807	.0829	.1053	.1140	.2500

Source: EMF Individual Survey

Table 21 The Level of Mortality in the West Family Model Life Tables Corresponding to EMF Values for $_1q_0$ and $_4q_1$, by Period

Years before the survey	Level of West model life table	
	$_1q_0$	$_4q_1$
5–9	17.0	16.8
10–14	16.5	16.7
15–19	15.8	15.2
20–24	14.2	12.4

Table 22 Probabilities of Death at Ages under 5 According to the EMF and to Vital Registration, by Period

Life-table value	Years before the survey				
	1–4	5–9	10–14	15–19	20–24
EMF					
$_1q_0$	0.0711	0.0788	0.0848	0.0926	0.1119
$_4q_1$	–	0.0354	0.0367	0.0488	0.0784
$_5q_0$	–	0.1114	0.1184	0.1369	0.1815
Vital registration					
	(1971–4)	(1966–70)	(1961–5)	(1956–60)	(1951–5)
$_1q_0$	0.0544	0.0656	0.0667	0.0764	0.0882
$_4q_1$	–	0.0323	0.0385	0.0490	0.0673
$_5q_0$	–	0.0958	0.1026	0.1217	0.1496

model life tables. These results show that the Mexican experience recovered in the EMF conforms remarkably well to the standard, one that has been thought to be representative of Latin American experience in general. The only noticeable deviation is for the period 20–24 years before the survey where it appears that either some children dying in the first year of life may have been omitted from the histories, or their age at death may have been exaggerated.

5.2 COMPARISON WITH VITAL REGISTRATION

Since the coverage of the registration of childhood deaths in Mexico is largely a matter of speculation, the comparison of the EMF mortality estimates with those derived from vital registration is as much a check on one source as on the other. The probabilities of death in the first year of life and in the age interval 1–4, shown in table 22 for both sources for various periods, indicate that childhood deaths were more completely enumerated in the survey, but the difference appears to be largely confined to deaths occurring at age 0. The EMF estimates of infant mortality are consistently much higher than those based on vital registration, while the estimates of ${}_4q_1$ are roughly the same.

This result led us to extend the comparison of estimates of mortality from the two sources to the structure of mortality in the first year of life. Table 23 presents a comparison of the percentage distribution of deaths by age in months for two periods. In both periods, the proportion of deaths in the first month of life is much greater in the EMF than in the civil register. Apart from that difference, the pattern appears to be roughly similar with indications of mild heaping in both sources.

Table 24 shows probabilities of dying in the first year of life during specified age intervals for 1956–75, as calculated from the EMF and from the vital registration. The sizeable difference in neonatal mortality is to a slight extent compensated for by greater mortality in months 1 and 2 that may result from exaggerating age at death in the vital registration. The similarity between the sources of the probabilities of death in the remaining months is remarkable, to say the least.

5.3 COMPARISON WITH THE 1978 CONTRACEPTIVE PREVALENCE SURVEY

The 1978 Contraceptive Prevalence Survey was the first survey conducted in Mexico that included questions on children ever born and children surviving that did not include a maternity history. A comparison of the proportion of deceased children among children ever born to women in five-year age groups as calculated from the EMF and from the Prevalence Survey is provided in table 25. The much lower mortality indicated by the Prevalence Survey is clearly a sign of deficiencies in the data from this source rather than evidence of a drastic change in mortality in the short period between the two surveys.

Table 23 Percentage Distribution of Deaths under Age 1, by Age at Death in Months and by Period, According to the EMF Individual Survey and Vital Registration

Age in months	EMF	Vital registration
1956–65		
0	50.13	37.07
1–2	11.44	17.57
3–4	11.79	14.49
5–6	9.19	10.79
7–8	7.43	9.31
9–11	10.02	10.77
1966–75		
0	53.80	37.51
1	7.87	9.38
2	4.88	8.87
3	6.06	8.64
4	4.52	6.59
5	3.35	5.13
6	5.15	5.49
7	3.80	4.32
8	3.16	4.60
9	3.16	3.77
10	1.72	3.00
11	2.53	2.70

Table 24 Probabilities of Dying in the First Year of Life During Specified Age Intervals (in Months), by Period, According to the EMF Individual Survey and Vital Registration

Age interval (months)	1956–65		1966–75	
	EMF	Vital registration	EMF	Vital registration
0	0.0444	0.0265	0.0403	0.0225
1–2	0.0101	0.0126	0.0095	0.0110
3–4	0.0105	0.0104	0.0079	0.0091
5–6	0.0081	0.0077	0.0064	0.0064
7–8	0.0066	0.0066	0.0052	0.0053
9–11	0.0089	0.0077	0.0055	0.0057
${}_1q_0$	0.0887	0.0715	0.0749	0.0600

5.4 THE EMF HOUSEHOLD SURVEY

The questionnaire for the EMF household survey, in its last section, collected information on deaths of any members of the household occurring in the year preceding the interview. Unfortunately, the information is not very useful because of the relatively limited amount of experience recovered. A total of less than 600 deaths were listed and they are not sufficient to construct a full life table with values of much statistical significance. In short, the level and age pattern of mortality in the survey is roughly similar to that revealed by vital registration, but little more can be said. More would have been learned about Mexican mortality, perhaps, if a battery of indirect questions on orphanhood, widowhood, and surviving children ever born had been chosen instead of the direct questions included in the household survey questionnaire.

Table 25 Proportion of Deceased Children among Children Ever Born to Women in Five-Year Age Groups, According to the EMF Individual Survey and 1978 Contraceptive Prevalence Survey

Age	EMF	Prevalence survey
15–19	0.110	0.047
20–24	0.084	0.071
25–29	0.095	0.071
30–34	0.114	0.093
35–39	0.122	0.092
40–44	0.146	0.099
45–49	0.174	0.114

6 Conclusions

There are a number of conclusions that can be drawn from this report. First and foremost, the EMF undoubtedly constitutes a major addition to the fund of data available on the demography of Mexico. The survey gives every indication of having been carried out with care and the results seem, by and large, to be as free from response error as one could reasonably hope for.

More specific conclusions include the following. The survey offers convincing evidence of an increase in the mean age at first marriage that is occurring among women born after the mid-1940s, and the marriage history data clearly warrant further and more refined analysis. We add that the EMF nuptiality data appear to be significantly less affected by response error than the results of some other surveys in the WFS series that have been conducted in countries at a similar level of economic development.

The EMF maternity histories provide reasonably reliable results that make a significant contribution to documenting recent levels and trends in Mexican fertility. There seems to be no reason to doubt that the total fertility rate for the year preceding the survey was less than six, and the survey result of 5.55 seems entirely acceptable. The evidence concerning fertility change is somewhat more problematic. There is, of course, clear evidence that fertility declined in the years preceding the survey. The change at younger ages evident from the survey accords well with the marital history data and seems to be unchallengeable. There is the possibility, however, that the change at older ages may have been somewhat exaggerated as a result of event displacement by some of the less educated respondents included in the sample.

The survey data on infant and child mortality are remarkably free of inconsistencies and other indications of response error, especially as they pertain to the 20-year period preceding the survey. The EMF provides convincing evidence that infant mortality is considerably higher in Mexico than was previously thought to be the case, and constitutes the first secure point of comparison with which vital registration as well as subsequent surveys may be evaluated.

If this report has been relatively uneventful in terms of uncovering major defects in the demographic data collected by the EMF, some quite interesting weaknesses in the traditional data bases appear to have been found. First, there appears to be a significant bias in the census results on the marital status of and the number of children ever born to women of childbearing age. Secondly, the Mexican vital registration statistics appear to be affected by severe underreporting of infant deaths occurring in the first month of life, and by marked distortions in the shape, if not the level, of fertility.

A last observation is that the extra effort that went into the EMF in terms of collecting full marital and pregnancy histories appears to have paid off by providing results that are worthy of considerably greater confidence than those provided by a more recent Contraceptive Prevalance Survey that included a simpler battery of questions and was based on a smaller sample of respondents. This point has been acknowledged by the Family Planning Coordinating Agency, which has very recently conducted a larger and more detailed survey that will, we are sure, provide a basis for updating the demographic estimates presented in this report.

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