PN-AAU-584
46464
A320577

# WORLD FERTILITY SURVEY

# 1972 - 1984

## 1984 SYMPOSIUM

CONNAUGHT ROOMS LONDON 24 - 27 APRIL 1984

---

Methodology Session 5

EVALUATION OF DATA QUALITY IN WFS SURVEYS: SUMMARY OF FOUR PAPERS*

N. Goldman
Princeton University

S. Rutstein
S. Singh
World Fertility Survey

*These papers are available as Background Papers for the Symposium:

1. Shea O. Rutstein, 'Assessment of data on age reporting'.
2. Noreen Goldman, 'Assessment of fertility data'.
3. Susheela Singh, 'Assessment of nuptiality data'.
4. Shea O. Rutstein, 'Assessment of data on infant and child mortality'.

COTENTS


1. INTRODUCTION 1

2. TYPES OF ERRORS 3

3. AGE REPORTING 5
Age Reporting in the Household Interview 7
Age Reporting in the Individual Interview 10

4. FERTILITY 13
Date Reporting 13
Omission of Live Births 13
Displacement of Dates of Birth 15
Estimates of Recent Fertility 18
Other Types of Errors in Birth Histories 21

5. NUPTIALITY 22
Date Reporting 23
Marital Status: Household and Individual Surveys 23
Comparison of the Age at First Birth and the Age at First Marriage 24
Comparison of Survey and External Sources 26

6. INFANT AND CHILD MORTALITY 28
Internal Checks Applied to the WFS Data 28
Age Pattern of Mortality 29
Sex Differentials in Mortality 30
Mortality by Birth Order and by Age of Mother at Birth 31
Trends in Mortality 31
Comparison with Indirect Estimates from Household Data 32
External Comparisons with Vital Statistics 32
Summary 32

7. CONCLUSIONS 33
References 36

APPENDIX A 40


Best Available Document

## 1. INTRODUCTION

That the evaluation of data should be a required step is a fundamental premise which few would question. This becomes even more necessary when the data are from retrospective surveys, in the less developed countries. Very early in its development, the World Fertility Survey recognized this need, and commissioned research on the techniques of evaluating retrospective fertility surveys. Because this was the first time a large number of such surveys had been carried out in developing countries, knowledge of the particular problems that might arise, and of the techniques for detecting them, was limited. The very existence of this set of surveys, therefore, greatly stimulated the development of methods of evaluating data quality.

The WFS'policy was to have an evaluation study done for each survey. Because of the time taken to have the basic illustrative reports or techniques of evaluation done, however, a few early surveys were unable to carry out such a study. In addition, the earlier evaluation reports varied greatly in their coverage even of the basic topics (age, fertility, nuptiality and infant mortality) because it took time for some degree of standardization in techniques and coverage to emerge. The evaluation workshops, six in all, and each including 3-5 countries, the first taking place in 1979, was the principal mechanism for trying out techniques and eventually selecting out a battery of essential tests and developing a somewhat standard approach for evaluation reports. They were also the main means of ensuring that these evaluations were performed, although in addition a few were done independently, by individual researchers. This report will draw heavily upon the national evaluation reports, but will also use the results of the relevant forthcoming WFS cross-national summaries, since the latter will contain uniform tables for all WFS surveys.

Two other comparative reports have been published, taking an overview of WFS data quality. The first in 1980 (Chidambaram, Cleland and Verma) was a preliminary, effort, looking for common types of errors, drawing on the illustrative analyses of data quality, on existing evaluation reports and cross national summary statistics, and covering some 19 countries. The second, published by the United Nations (1983) concentrated on fertility levels and trends, but also briefly looked at the other main demographic topics. The approach of this report was to carry out national level evaluations, devoting 8-10 pages per country, and then to summarize these in a

comparative chapter. Again, however, coverage was limited, to about half of WFS surveys, partly because of the availability of data tapes at the time the study was conducted. The present report covers all WFS countries, as far as possible: unavailability of external data is a limitation in some tables, and, in addition, two important exclusions exist. The Nigerian Fertility Survey cannot yet be included, but the final version of this report will include it; secondly Turkey has not allowed use of its data for comparative analysis, and consequently, except where published reports from the survey contain the needed statistics, Turkey is omitted. We take a comparative approach, looking for the common types of errors found in WFS surveys, paying less attention to country-specific problems.

This paper is a summary of a larger report on data quality, which is part of the assessment programme of the WFS. The larger report is not yet completed, but is in four sections, dealing with age reporting and infant mortality (Rutstein) fertility (Goldman) and nuptiality (Singh), which are available as background papers for this session.

This summary was specially prepared for the Symposium, and aims to present the main findings of the larger report Given space limitations, we were forced to exclude almost all tables from it, and readers who are interested in the full versions should refer to the Background Papers.

## 2. TYPES OF ERRORS

A few general types of errors may be recognized. The first is omission, of events for the respondent (eg live-births or unions) or of individuals (eg members of the household or eligible respondents from the individual survey). The second important type of error is misreporting of dates of events (eg age of household members or of the respondent, dates of children's births and deaths, and dates of starting and ending marriages). If such misreporting is not random, but is systematic, it will produce biases. Thus, while omission is a fundamental problem, misreporting of dates will only become a serious issue when it produces biases, or displaces events in particular directions. These two types of errors are, to some extent, to be expected because these are retrospective surveys, depending upon the recall of events and dates of events in the past, sometimes in the distant past. Moreover, they will be exaggerated among populations where low literacy and in general, low level of modernization, mean that knowledge of dates of vital events is of little relevance, and where there are no other cultural factors requiring knowledge of dates, to counter balance this.

A further source of error is sample design. Although all possible precautions are taken to design representative samples, errors may still arise, and these are very difficult to detect, although comparison with external data can show up this type of defect. The fact that only surviving women can be in the sample may itself produce an unavoidable bias in analysis of earlier periods.

Yet another source of error are the questions themselves: if they are poorly worded, or if insufficient probing is allowed for, or if mistranslations occur, the data obtained may not be that intended. Even the manner in which recording and coding of information is done can result in unforeseen errors. Often these kinds of mistakes are only learned by trial and error. A final potential source of error in dating is imputation. The imputation programme which was specially developed for use by WFS has proved very useful, in general. However its correct use depends on knowledge of the form of reporting which is common in a given society (reporting in rounded, completed and projected years) and the wrong assumption can cause errors where the percentage of imputed dates is high and varying over time, as in Bangladesh (Chidambaram and Pullum 1981). Although simulation experiments

showed that imputation made less difference to general substantive conclusions than to quantitative results, it seems that any uniform approach to imputation does not accurately mimic reproductive behaviour in the real world, and it would be advisable to switch to an imputation algorithm that more nearly reflects real reproductive behaviour to avoid the introduction of systematic bias (Trussell, 1984).

The approach we take here is to apply a battery of tests to identify common errors that exist in the data. These fall into two basic types, internal consistency tests and validation of WFS data against external sources. Although a further mechanism for evaluation, post-enumeration surveys, exists, we do not deal with this, since it will be covered elsewhere. We do not attempt, in any depth, to explain why these errors occurred. The above discussion is our main contribution in this regard. This paper will proceed by summarizing the results of each of the four main sections of the larger report (age reporting, fertility, nuptiality and infant mortality). Although the final report of this project will comment on the effect of the interaction of these factors on the data quality of each, (especially age-reporting with other factors), we have not yet been able to achieve this synthesis because of the pressure of time.

## 3. AGE REPORTING

The correct determination of age is crucial for the analysis and understanding phenomena of practically all demographic phenomena: it is used implicitly or explicitly in most calculations of levels, trends, effects and correlations. Incorrect ascertainment of the respondent's age can and usually will bias estimates of fertility, nuptiality and mortality levels and trends as well as the analysis of any other characteristic that changes with age or which has been determined by reference to age. Particularly disastrous biases can occur if age has been estimated by the use of the variable which is to be the subject of the analysis, for example studying parity by age when some women have had their ages estimated on the basis of their numbers of children ever born. While these points apply mainly to age as obtained in the individual interview, age in the household survey is crucial for ever-married samples because it is forms the denominator for fertility and nuptiality analyses. In addition , since age obtained in the household survey is used to determine eligibility for the individual interview, it is important for both all-women and ever-married samples. We will look at the reporting of age in both the household and individual surveys.

It should not be surprising that in many societies, the knowledge of one's exact age is rather hazy, and therefore is probably less well reported than other events in a person's life. In societies where the registration of births is not common, or where no particular importance is placed on the knowledge of age since childhood, a person will probably have neither reliable documentary evidence nor a firm basis on which to increment age as the years pass. It is likely that in these situations, current age or date of birth is rarely if ever required in daily life. Only when dealing with official matters may it be required. For a woman, the situation is likely to be compounded by her lower education and the sex role division, so that either her husband or her father represents her in official matters. In addition, even though documentary evidence can be used to determine current age, unless the document was obtained in early childhood, it too may lead to an erroneous report.

It is at the household interview that the first report of age is obtained for all household members. Since any adult could have provided the information, proxy reports of age occurred for many eligible respondents, possibly introducing error. Note, however, that in the three countries with evidence on proxy reporting, such reporting seems only slightly less consistent than self-reporting. In addition, when the interviewer had to estimate current age on the basis of physical appearance, and/or the milestones reached in the person's life, it is likely that such appearances and milestones will usually be related to the phenomena under study and thus bias the results. In many cases, an estimate of an eligible respondent's current age will be based on the number of children she has borne, or the age of the oldest or the youngest of her children. Evidence from the tape-recorded interviews in Bangladesh (Thompson et. al., 1982) shows that many women's ages were estimated by taking the age of their oldest child, adding one year and then adding the common age at marriage of fifteen years. Where the age of an eligible woman is not known, it is plausible that interviewers are likely to place respondents about the middle of the age range, usually between ages twenty five and forty. From evidence presented below and from other studies, it appears that such a centralizing tendency did occur in many surveys.

Many biases can result from incorrect reporting of age. Means and proportions, and all analyses based on age cohorts will be affected. In addition analyses looking at age at an event (births or marriages) will be affected if the date of these events are correctly reported, but age of the respondent is misreported. This would also bias analyses comparing cohorts or calendar year periods. The possibility of biases of the type indicated above guide and justify our examination of the quality of age reporting.

In order to detect errors in data, we must in general make comparisons. The standard against which we compare our data for internal consistency checks will be other individual items of the same data set and a priori notions of distributions and their 'smoothness' or lack thereof. For external checks, we compare distributions of independent data sets, such as other surveys, censuses and/or registration statistics. There is a third category of quasi-independent checks. For WFS work this would include comparisons made between the individual survey data and the household schedule data and comparisons with models, such as stable population, model life tables, model nuptiality schedules, etc. In this section we look at internal and external consistency checks for age reporting in the household and internal tests for the individual survey data.

## AGE-REPORTING IN THE HOUSEHOLD INTERVIEW

### Quality of Reporting

As an indication of the likelihood that age is well-reported, Myers index and the United Nations combined index are used to measure conformity to expected age structures. The Myers index measures discrepancy from smooth trends of five-year age-sex groupings. Nine countries have values exceeding 60 on the UN Index, indicating very poor reporting of the age-sex structure. Pakistan, Cameroon, Sudan, Panama, Benin, Ghana, Fiji, Ivory Coast and Trinidad and Tobago in decreasing order. Large scale international migration and a large population living outside of households can raise the value of the index, and this may contribute to the case of Trinidad and Tobago, and possibly Ghana, but not the other cases listed above. Only five countries, Syria, Thailand, Peru, Mexico and Jamaica, have index values less than thirty, and all are above twenty, indicating some distortion of the age-sex structure.

In the evaluation reports, most household age distributions have been compared with either censuses or other surveys. In general, when compared with the external data, the household distributions show either the same or a somewhat reduced tendency toward digit preference. Apart from heaping, misreporting of age groups is about the same in the household survey as in previous censuses or surveys, except around the upper age limit of eligibility of the individual survey, where it is worse for females in many of the household surveys.

Using the UN Index to compare the household survey age-group distributions with an external data source, only Egypt, Lesotho (large household survey), Morocco, and Nepal are definitely less distorted than the external source, while twenty are definitely more distorted. Most of this extra distortion is from two sources: the boundary effect and a lack of men. The lack of men, particularly at ages 20 to 49, also occurs in many of the external sources, but is not as prevalent as in the household surveys. Because of the nature of the household surveys, communal living arrangements, which primarily house men in these ages, were not covered. Additionally, the emphasis on obtaining respondents for the individual survey may have led interviewers to regard men as less important, and particularly they may not have wanted to return to a single-person male household to do the household interview.

Exclusion at the Eligibility Boundaries

One important criteria for selecting women for the individual interview was age. Most countries had 49 as the upper age limit, while a few went to age 50, one to 54 (Cameroon) and one to 44 (Venezuela). The lower age bound in most countries was 15 years; however, several countries which also included only ever-married women, used no lower age bound and some used 10 or 12 years. Costa Rica and Panama used 20 years as the lower age limit for eligibility and the Caribbean countries, Guyana, Jamaica, and Trinidad and Tobago excluded from eligibility women aged 15-19 who were full-time students.

Given that age was used as a criteria for eligibility in all WFS surveys, the erroneous report of age on the household schedule of women near the boundaries could lead to biases due to the exclusion of potentially eligible women. In order to get an idea of the amount of exclusion, age and sex ratios were calculaced for the five-year age groups straddling the boundary ages. If women had been displaced in the age distribution to the age-groups immediately outside the age boundaries, the age ratio for these groups would be high and the sex ratio would be low. If they had come, as is thought likely, from the neighboring groups, then the age and sex ratios just inside the boundaries would be low and high, respectively. (If there were no 'boundary effect' then the age-sex ratios would be similar across the boundaries.)

Almost all surveys show exclusion of women at the upper age limit of eligibility; out of 39 surveys, only six (Colombia, the Dominican Republic, Kenya, Malayia, Peru and Thailand) show little evidence of a boundary effect. Twenty-four countries show a very strong effect of a transfer of women to above the upper age boundary and in four the effect is not as strong. Conversely, in four other countries, Bangladesh, Pakistan, Sri Lanka and Syria, there is a strong effect of a shift into the eligible age range.

There are several indications that the reason for this transference is that the interviewer deliberately did so in order to reduce the effort she would have to make to interview the older women, who are less educated and

have longer birth histories. The fact that the 'boundary effect' also occurs strongly in both Cameroon, with an upper age limit of fifty-four, and in Venezuela, with a limit of forty-four, is strong circumstancial evidence that the error is largely due to interviewer's bias. The experience of Lesotho, where the 'maxi-household' survey did not show this anomaly, but where the 'mini-household' survey, from which women were selected, did show a strong 'boundary effect', also supports our argument.

Sex ratios at the upper boundary also indicate that in most countries the transfer over the boundary has been selective for women. In twenty-seven countries sex ratios are more than five points lower for the age group just below the boundary than for the group just above. Only six countries, Bangladesh, Benin, Morocco, Pakistan, Sri Lanka, and Syria show higher sex ratios for the lower age group, indicating an inward shift of women. In only two of these countries, Benin and Morocco do the the age ratios show a contradictory direction.

The misreporting of age at the lower boundary appears to occur much less frequently than at the upper boundary. In only seven countries, Bangladesh, Benin, Costa Rica, Ghana, Kenya, Nepal and Panama, is the age ratio for the group just inside the boundary less than 90. The largest transfer out of the eligible ages has occurred in Kenya, followed by Costa Rica and Panama, the only countries where the lower limit was 20 years of age.

A more refined index, combining the upper and lower boundary effects allowed classification of countries by the degree of the effect:*

| | |
|---|---|
| Little effect: | DR, PE, CO, MY, BN, SY, SD, KR, TH |
| Some effect: | MX, EG, VE, MOR, JO, PA, CR |
| Strong effect: | BD, EC, PH, NP, KE, SL, TN, TT, SN, TK, PT, MAU |
| Very strong: | YE, JM, ID, GH, FJ, LS, HJ, IC, PK, PA, CM |

*See Appendix A for meaning of country-name abbreviations.

## AGE-REPORTING IN THE INDIVIDUAL INTERVIEW

The core individual questionnaire obtained the respondent's age by asking, 'In what month and year were you born?' (Q. 107), and in case she did not know, the interviewer was to ask, 'How old are you?' (Q. 108). The interviewer was instructed to 'record the best estimate'. (WFS Basic Documentation No. 1: Core Questionnaires. Subsequently, the core individual questionnaire was modified to always ask age, in the form of 'How old are you?', as well as the date of birth. The modifications noted that it was very important to collect both pieces of information, although the question on age could be asked after the birth history. Both the interviewers' and supervisors' instructions stress the importance of checking the consistency of dates of events and ages (during the interview, by the interviewer) and specifically that the respondent must have been at least twelve years old when she had her first live birth, first pregnancy or entered her first marital union. If a woman was found to be below the age limit for eligibility (or never married for ever-married surveys), the interviewer was to mark the questionnaire with 'INELIGIBLE'.

Most countries followed the recommended procedures. However, in countries where ages and dates were thought to be difficult to obtain, they were recorded on an age-event chart and historical calendars were used. Age-event charts were used in Benin, Ivory Coast, Nigeria, Senegal, Egypt, Mauritania, Morocco, and Sudan in Africa, and in Indonesia, Korea, Jordan, Syria, Turkey and Yemen A.R. in Asia. Calendar charts were used in Korea, Malaysia and Nepal. In Ghana, Kenya, Mauritania, and Senegal especially extensive probing was used (See Singh, 1983 for further information on the collection of current age data).

Month and year of birth were given by over half the respondents in only 3 of 12 African surveys, and in only 7 of 13 Asian surveys, but in all 13 American surveys, month and year were given by over 80 per cent. (Chidambaram and Sathar, 1984). The authors show that complete reporting of respondent's birthdate increases with decreasing age and increasing urbanization, as well as with increasing education level. Out of 13 studied surveys, only three South Asian countries (Bangladesh, Nepal and Pakistan) had less than half the women with seven or more years of education report their complete birthdate.

Myers' and Whipple's indices were calculated for the ever-married populations between the ages of 20-49. These indices show the extent of heaping on preferred digits, for example on ages ending in 0 and 5. We classified countries as good, acceptable and unacceptable on each, then produced the following joint classification*:

Good on Both indices: TH, PH, VE, PT, TN, CR, FJ. MY, KR, PA (10 countries)
Good on one, unacceptable on the other: JM. PE,MX, PY, TT ( 5 countries)
Acceptable on both indices: SN, BD, CO, GY, LS, EC, SL, IC (8 countries)
Acceptable on one only, not the other: SY, PK, DR, BN, MOR, PK (6 countries)
Unacceptable on both indices: ID, KE, GH, HT, EG, CM, JO, NP, MAU, SD, YE (11 countries).

If rounding or heaping of the kind measured by Myers and Whipple's indices were random, the biassing effect should dissapear when properly grouped ages are used. We looked at five-year age-group, and again made use of age-ratios for the analysis. The problem of ever-married samples was solved by using proportions ever-married from the household to estimate the size of the whole age-group. Thus the method will not be purely evaluating individual survey data, but since many analyses will use such all-women estimates, the approach is justified. We expect the proportions to decrease consistently, as age increases, in the absence of real variations due to factors such as wars, famines and migrations.

However we found anomalous patterns in many countries. Using an index based on the age-ratios, we find that although eleven countries had poor data by this test, they are not all the same as those found unacceptable for heaping. Six countries which had unacceptably high heaping indices had acceptable 5-year distributions (Ghana, Jordan, Egypt, Cameroon, Mauritania and Indonesia) while a few countries with acceptable heaping indices (Bangladesh, Paraguay, Senegal and Lesotho) have unacceptable five-year age distributions (Bangladesh, Paraguay, Senegal and Lesotho). Countries which are unacceptable in both are Nepal, Dominican Republic, Haiti, Yemen A.R., Kenya and Sudan.

A closer analysis was made to determine which age-groups were deficient or excessive. Nine countries had no problematic five-year age-groups or only had a deficiency in the oldest or youngest group (GH, EG, PH, EC, VE, CR, MX, JM and PT). All other countries had more serious problems, either with excessive groups only (TH, GY), or deficient groups only (MAU, MOR, SY, BD, NP, ID, CO, PE), while the remaining 16 countries had both types of anomalous age-groups. A common error was that the 45-49 group was deficient, and also that the 30-34 group was deficient. In contrast the 25-29 was much more likely to be an excess group than to be too small a group. (See original paper for details on each country).

## 4. FERTILITY

### DATE REPORTING

As a preliminary step, the proportion of births for which actual months and years were reported, is considered. It is assumed that dates are more accurate when month and year are supplied, rahter than the year only or years ago or any other form. Reporting is more complete in Latin America and less complete in Africa and Asia, although for a few countries the actual form in which dates were given is no longer available, either because it was edited out at an earlier stage or because the type of birth history or the form of recording ensured that all responses were converted to calendar years. Among countries where the information survived, the worst cases are Bangladesh, Benin, Mauritania and Yemen A.R. Nevertheless in these countries, as in all others, the date of the last birth was in general reported with higher frequency than dates of earlier births, reiterating the problem of recall being related to recency of events.

### OMISSION OF LIVE BIRTHS

Without the existence of external reliable data sources, there are no easy methods for estimating the level of omission of births in WFS Surveys. The techniques used can, in certain circumstances, point out substantial omissions, but do not indicate the severity of the omission nor the presence of less severe misreporting.

One straightfourward test is to examine the mean number of children ever-born by age: in the absence of fertility increases in the past, and of omission, it should continually increase with age. The expected pattern was found for all countries except Mauritania, Morocco, Bangladesh, Pakistan and Indonesia, where the lower mean number of live births for 45-49 year-olds compared to the 40-44 age-group suggests that either the oldest cohort has not reported all of its births, or that transference of more fecund 45-49 year-olds into age 50-54 occurred in the household interview, or both.

Comparison of survey results on mean parity with an external source also provides a minimal test of coverage of live births: if survey estimates are the same as or higher than the external source, then survey coverage is at least as good as or better, than the external source; but even in this situation, some omission could have occurred in the survey, and the test would not show this. Reconstruction of mean parity from the survey for the same year as the external source did not show any cases where survey coverage was worse: in a few cases agreement was very close and in several cases, especially for older age-groups, the surveys achieved substantially better coverage.

Sex ratios at birth, by time periods, were examined to see whether older women failed to report all of their female children (or female deaths) in distant periods before the survey. Although high sampling errors associated with sex ratios makes this a hazardous task, it seems that this type of error occurred in Mauritania, Sudan (North), Bangladesh and Pakistan:

| | Sex Ratios at birth (males per 100 females) Years before survey | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 |
| Mauritania | 109 | 113 | 108 | 111 | 120 | 128 | (118) |
| Sudan (N) | 109 | 99 | 109 | 103 | 109 | 139 | (189) |
| Bangladesh | 101 | 105 | 104 | 102 | 112 | 120 | 127 |
| Pakistan | 106 | 105 | 111 | 110 | 115 | 124 | (138) |

Note: Parentheses indicate fewer than 100 female births.

In the absence of rising infant and child mortality, the percentage of children ever born who have died should increase with the age of the mother, because older women would have had more exposure (an exception is the 15-19 age group because the children of teenage mothers have a high risk of death). With only a few exceptions, the expected pattern is found. While this observed absence of irregularities shows that the data are not severely distorted, it is still possible that some omission of infant deaths occurred.

Examination of reported parity by single year age-cohorts for Nepal revealed omission which did not show up in the mean parities of five-year age groups. Heaped ages 35, 40 and 45 had lower fertility than neighbouring ages, presumably because women who give rounded ages (ie probably do not know their age) are more likely to omit live births.

In general, tests for omission of live births did not show any cases of severe problems, and the WFS surveys achieved better coverage than external sources. While these are conforting results, we must remember that these are minimal tests of data quality; the surveys may be as good as, or better than external sources, but we have no absolute means of checking on the completeness of coverage itself. In addition the absence of irregularities may not necessarily indicate accuracy, although it is a reason for having more trust in the data.

DISPLACEMENT OF DATES OF BIRTH

Misreporting of dates of births is due mainly to the difficulty of recalling events in the past, but is exaggerated where knowledge of these dates is in any case poor. Thus it will be worse among older women or among women with several children or for early births, which would be further back in time. Recent births are likely to be dated more accurately, even by older women, simply because of the recency of the events, but also because errors would produce relatively large age misstatements of young children. A typical form of displacement is that births are moved forwards, closer to the date of the survey. Combined with accurate reporting in the recent past, this would result in a concentration of births in the period five to fifteen years before interview, giving the appearance of an apparent rise in fertility in earlier periods, followed by a decline in more recent periods, the 'Potter effect' (Potter 1977). Where a real decline also occurred, this pattern will

exaggerate the real trend. While this is a commonly observed pattern of misreporting, however, it should not be forgotten that several countries have also experienced true increases in fecundity and fertility after the 1940's (Collver, 1965; Lesthaeghe, 1984; Mati et al 1975; Roberts 1975; Sukdeo 1973; Singh 1982; Tekse 1967; Who 1975).

The trend in the median age at first birth for age-cohorts 20-24 to 45-49 will exhibit an unexpected trend (typically a decline from the oldest age-group to younger age groups), rather than either remaining constant or rising if displacement of the date of the first birth occurs. If no such displacement occurs, the expected pattern would be for it to remain stable or to rise at younger ages, especially if a recent fertility decline has taken place. About half of all countries show the acceptable pattern of a recent increase in the age at first birth. However, in addition, two-thirds indicate a higher age at first birth for the 45-49 cohort than for the next oldest one or two cohorts. For example in Kenya the pattern is:

| Age cohort | 30-34 | 35-39 | 40-44 | 45-49 |
|---|---|---|---|---|
| Median age at first birth | 18.6 | 18.8 | 19.5 | 20.4 |

In some countries only the oldest cohort is distorted, but in several two or three older cohorts are affected. The reasons for these implausible patterns are misreporting of the age at first birth, misreporting of the age of the respondent or omission of some early births.

Examination of cumulative fertility at successive ages for the three oldest cohorts reinforced the findings from trends in the median age at first birth. In the majority of WFS surveys, women aged 45-49 have fewer births by a specified age than do women aged 40-44; and in some cases women aged 40-44 have fewer than women aged 35-39.

For example, in the case of Tunisia, the pattern is as follows:

| Mean Number of Children-ever-born | | | | |
|---|---|---|---|---|
| Cohort | At age | | | |
| | 20-24 | 25-29 | 30-34 | 35-39 |
| 45-49 | 1.10 | 2.74 | 4.46 | 5.84 |
| 40-44 | 1.30 | 2.91 | 4.50 | 5.69 |
| 35-39 | 1.38 | 3.06 | 4.55 | 5.70 |

As seen here, the difference in births was 'made up' by age 35-39, in Tunisia, as it was in many other surveys (eg Egypt, Syria, Thailand and in most Latin American countries), but in some countries these differences persist even at older ages. If we assume that the level of fertility has not risen in the past, then the persistence of differences at older ages indicate both omission of some births as well as misreporting of dates of births (seen in Benin, Cameroon, Ivory Coast, Kenya, Lesotho, Morocco, Sudan (N), Yemen A.R., Bangladesh, Nepal, Pakistan, Indonesia, Haiti, and to a lesser extent, in Philippines, Dominican Republic, Jamaica and Mexico). Misreporting of the age of the respondent can also contribute to the patterns observed, but in addition some real rises in fertility have been documented, especially where major problems of primary and secondary sterility had existed, and these would mimic the misreporting pattern.

A serious consequence of this type of displacement is concentration of births in an intermediate period, producing an apparent rise in fertility from the earliest periods, and a recent fertility decline where none occurred, or exaggerating real trends. Where a real decline has occurred however it is not always possible to detect overreporting of births for a particular period. The pattern in cumulative fertility up to age 30-34 was examined for the four most recent five-year periods, for evidence of anomalies. Although firm conclusions should be based on detailed analysis of all period-cohort rates, these are sufficient to indicate the existence of misreporting in five African, four Asian or Middle Eastern and two Latin American countries. For example low fertility values are found in periods more than ten years ago in Cameroon, Ivory Coast and Yemen A.R., and more than 15 years ago in Kenya and Bangladesh. A few of the worst examples demonstrate the pattern, but most countries have much less severe anomalies than these:

| Country | Years prior to survey | | | |
|---|---|---|---|---|
| | 0-4 | 5-9 | 10-14 | 15-19 |
| Kenya | 5.2 | 5.5 | 5.7 | 5.1 |
| Mauritania | 4.2 | 4.9 | 4.6 | 4.2 |
| Sudan (N) | 3.9 | 4.9 | 4.7 | 4.3 |
| Bangladesh | 4.5 | 6.2 | 6.0 | 5.2 |

ESTIMATES OF RECENT FERTILITY

The level of current fertility is one of the most important pieces of information collected by WFS surveys. While some countries may show incorrect trends in earlier periods before the year of interview, it is even more relevant to evaluate the accuracy of fertility estimates obtained for the five-year period immediately before interview. One useful technique is comparison of the surveys'TFR (based on cohort-period fertility rates) with a recent estimate from an external source, which is what was done here. Two main types of situations emerged: in the first, WFS survey estimates agree closely with external estimates (14 of the 25 countries with available external estimates) and in the second, external estimates are too low to provide any useful estimation of the reliability of WFS estimates (9 of the 25 countries). In the remaining two countries (Pakistan and Venezuela) the comparable external estimate was slightly higher than the survey estimate. An encouraging finding is the reliability of recent fertility estimates in two cases where trends for earlier periods were distorted (Kenya and Nepal).

A second technique used to evaluate recent fertility estimates is the P/F ratio, an internal consistency test which, unlike the first technique, could be applied to most countries. P/F ratios compare reported cumulative fertility with a synthetic cohort estimate of cumulative fertility, based on fertility rates for the recent five-year period. This may be done for age or

duration (of marriage or motherhood) groups. Motherhood duration P/F ratios have the advantage of being less distorted by changes in fertility which arise from a changing age at first birth. P/F ratios should approximate unity, in the absence of fertility change or reporting errors. Deviations from 1.0 which are the same at all ages or durations may reflect reference period error for a particular period and they would then provide an adjustment factor for reported fertility rates. Declining P/F ratios by age usually indicate omissions of birth by older women; while increasing ratios indicate a true fertility decline (Brass et al, 1968; Hobcraft et al 1982). Age and motherhood duration P/F ratios were examined here.

The results show plaussible P/F ratios for most durations of motherhood, for several countries where no decline in marital fertility is believed to have occurred. These countries include several which had distorted fertility trends in periods before the survey - Benin, Ivory Coast, Kenya, Mauritania, N. Sudan, Syria, Yemen A.R., Nepal and Pakistan, and this result suggests that they probably had good reporting of births at least for the recent five-year period. In addition the expected pattern of increasing ratios with age and duration for countries where the age at marriage/first birth has risen and fertility has declined, is also observed.

Some anomalies were found for older cohorts in a few countries when P/F ratios for age-groups were examined, however, suggesting omission of births, which had already been indicated by other tests (Cameroon, Lesotho, Kenya, Mauritania, North Sudan, Yemen A.R., Bangladesh and Nepal):

Cameroon

| | Age-groups: | | | | | |
|---|---|---|---|---|---|---|
| | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 |
| P/F Ratios | 0.99 | 0.97 | .96 | 0.92 | 0.88 | 0.82 |

| | Years since first birth: | | | | |
|---|---|---|---|---|---|
| | 5-9 | 10-14 | 15-9 | 20-24 | 25-29 |
| P/F Ratios | 1.01 | 1.02 | 1.01 | 1.00 | 1.03 |

The absence of distortion for motherhood P/F ratios is probably due to a selection bias for women at higher durations - given the limitation of WFS samples to age 49, they would all have married at young ages, and probably have high fertility.

Although these two techniques by and large indicate that WFS fertility estimates for the five years before survey are usually of good quality, this does not say that rates for a shorter period (eg one year) before survey are equally reliable. The very high sampling error for single year rates (Little 1982) and the finding that in more than half of 15 surveys analysed, more births were recorded in the past year, than in the preceding years before survey (Goldman and Westoff 1980), suggests that rates for the one-year before survey should not be used. However estimates based on the last two or the last three years before survey are much more accurate than the single year rates (Goldman and Westoff 1980; Hanenberg 1982). Five years rates have the advantage of further reducing sampling error as well as of minimizing age or date misstatement.

OTHER TYPES OF ERRORS IN BIRTH HISTORIES

Detailed evaluation reports have found errors in some surveys of a different kind from those discussed so far. In large part they concern the effect of age-reporting errors on fertility estimates. For example in the Dominican Republic parity for the 35-39 age-group was too high, because of selective transference of high parity women from neighboring age-groups; in addition, underreporting of births by those over age 40 (due both to omission of births and age reporting errors, including exclusion of high-parity 45-49 year-olds from the individual interview) resulted in spurious trends prior to survey (Guzman 1980). Errors of this type occurred in Turkey, Nepal, Haiti, Senegal and Pakistan, also.

An analysis of Egyptian data concluded that overstatement of the age of young women, especially those aged 15-19, caused on apparent recent decline in marital fertility at young ages and an apparent recent increase in the age at marriage (Coale, 1983). Age-overstatement for teenagers, especially those who have reached puberty, are married or have a child, occurs frequently in South Asia and Africa (United Nations 1967). This type of error may have occurred in WFS surveys in Fiji, Philippines, Sri Lanka and Thailand, suggested by the widening discrepancy for the 15-19 age-group between survey estimates of fertility and external estimates, for periods further in the past, compared to recent periods (Makinson 1984). If 15-19 year-olds are younger than reported in both external sources and WFS surveys, then estimates will yield greater discrepancies in earlier, as opposed to more recent periods, because WFS-based estimates for earlier periods are based on increasingly older age-groups, most of which would have better age-reporting (exceptions may arise at the oldest ages). Age-misreporting of 15-19 year olds, even if it happens only in the household survey, is a serious error for surveys with ever-married individual samples, because the household population forms the denominator for fertility rates.

## 5 Nuptiality

WFS surveys collected data on two main aspects of nuptiality, current marital status and retrospective marriage histories. Each of these can suffer from specific types of error, differentially affecting data analysis. A classic problem in the reporting of current marital (or union) status is that formerly married women are classified as 'single' or never married. This is important where surveys cover ever-married woman only, since omission of these women can bias overall fertility estimates as well as estimates of the amount of of time spent exposed to the risk of pregnancy. The main issue with the second aspect of nuptiality is misreporting of the dates of marriages or unions, most importantly the date of the first union. This issue is the main topic dealt with in this chapter. Its chief impact is on any analysis of the age at first marriage or union, and on marital fertility rates which are based on time spent exposed by ever-married women.

We evaluate the quality of nuptiality data against an objective but ideal criterion, that the aim is to record all sexual exposure. In fact this was not the intention of most WFS surveys; their aim was to obtain dates of all socially recognized unions. Thus our evaluation is relative to the maximum coverage of exposure, which must be relaxed in the real world. In practical terms, this issue effects mainly societies where informal sexual unions exist, and in such societies some proportion of births occurring outside of recognized unions must be accepted as reality rather than a problem of data quality. Although we do not know what this proportion is, we use information on premarital births as a check on quality, because its variation across countries in the same region, or across age-groups in the same country, may identify countries or groups with especially poor reporting. This issue is a crucial one in evaluating the quality of nuptiality data, but because it arises only in some regions and cultures, our measures of this reporting problem may seem culture-bound. However it is inevitable that countries where informal unions occur will have greater difficulties in obtaining high quality data on nuptiality, and it is desirable that indicators of data quality should reflect this basic difference in the quality of data on this topic.

DATE REPORTING

As in the case of dates of births of children, we looked at a measure of the completeness of reporting, in this case, the proportion reporting at least the calendar year for the date of the first union. Allowing for the fact that this already included imputation in several Latin American countries, we find that African and Middle Eastern countries usually had 70-90 per cent reporting a calendar year, three Asian countries (Bangladesh, Nepal, and Indonesia) and one Caribbean country (Jamaica) had very low proportions able to give the year of the first union.

Indices of heaping on rounded calendar and duration years (values ending in digits 0 and 5 in both cases) were calculated. Substantial heaping for duration was found in five out of the 12 African countries, in Yemen A.R. and in Nepal. Calendar year heaping was noticeable in Lesotho, in five Asian countries, and in all Latin American/Caribbean countries. The absence of any heaping in a few countries known to have poor reporting may be explained if reporting of age at the first union was the alternative to a calendar date, since our indices do not reflect heaping on preferred ages. Heaping in the Americas is largely due to the common occurence of various types of informal unions, especially as the first union.

MARITAL STATUS, HOUSEHOLD AND INDIVIDUAL SURVEYS

Surveys with ever-married samples, which were able to check the consistency of married, widowed, divorced and separated statuses only, but by definition not the single status, generally found a very high level of consistency between the two interviews. The few all-woman samples which made this comparison found slughtly higher proportions ever-married (Cameroon, Senegal and Venezuela) or a small shift towards consensual unions, away from married and single (Dominican Republic). In contrast, Haiti found lower proportions ever-in-union in the individual survey. Although differences are in general small, the results suggest that ever-married samples are likely to suffer from exclusion of a small proportion of formerly married women who are classified as single in the household survey.

## COMPARISON OF THE AGE AT FIRST BIRTH AND THE AGE AT FIRST MARRIAGE

It has been suggested that the age at first birth may be a more reliable point from which to measure exposure, than age at first marriage, especially where informal unions are common because of the difficulty of accurately dating the first union. The trend across cohorts in the median ages for these two points are examined here for their relative reliability, to see whether the difference between the two is acceptable. We also looked at the overall proportion with a negative first birth interval to evaluate the reporting of the age at first marriage.

As we may have expected, sub-saharan Africa and the America have quite high proportions with negative first birth intervals, countries with 10 per cent or more being Benin, Cameroon, Ivory Coast, Kenya, Colombia, Ecuador, Paraguay, Peru, Costa Rica and Jamaica. This high incidence of negative first birth intervals probably implies some omission of early unions, but in these societies some proportion of births do occur from very brief relationships which may not be considered a union, either by the woman or by some minimum objective criteria of what is a union.

A rise in the median age or no change, from older to younger ages, are plausible trends in the age at first union. A U-shaped or continuous decline trend is much less acceptable. The same expectations apply to the age at first birth, except that the U-shaped pattern is somewhat more plausible, given the possibility of improvements in health and fecundity overtime, with increased modernization. The results showed acceptable trends of continuous rise or stability in the age at first union for under half of all countries (15 out of 40 countries), mainly Asian/Pacific countries. The majority of African and American countries have U-shaped trends, which suggest omission of the first union by older women.

For example the following cases demonstrate the common patterns:

| | Pattern | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 |
|---|---|---|---|---|---|---|---|
| Kenya | U-shaped | 18.5 | 18.1 | 17.5 | 17.5 | 17.7 | 18.5 |
| Senegal | U-shaped | 16.7 | 16.3 | 15.6 | 15.6 | 15.6 | 16.1 |
| Sudan (N) | Irregular | 18.6 | 17.0 | 15.7 | 16.2 | 15.9 | 16.2 |
| Colombia | U-shaped | 21.0 | 20.7 | 20.2 | 19.8 | 20.7 | 20.9 |
| Mexico | U-shaped | 20.4 | 20.1 | 19.7 | 19.6 | 19.3 | 20.0 |
| Malaysia | Rise | 21.8 | 20.9 | 19.4 | 18.1 | 17.9 | 16.9 |

Alternatively, if the exclusion of some 45-49 year olds from the individual survey was selective of women who married at young ages (as it appears to be for high fertility women) this could also partly explain these unexpected findings. Evidence suggesting that reporting error by older women is an important contributing cause is found in the fact older cohorts 'make up' their low proportion ever-married at young ages (eg under age 20) by older ages. This pattern was found in several Latin American and African countries which also had implausible trends in the median age at first marriage. An example of this 'making up' pattern, for Senegal is shown:

| Per cent married at age | Age-cohorts | | | |
|---|---|---|---|---|
| | 30-34 | 35-39 | 40-44 | 45-49 |
| 17 | 73 | 72 | 68 | 64 |
| 19 | 86 | 85 | 82 | 80 |
| 21 | 94 | 93 | 92 | 91 |
| 23 | 96 | 96 | 96 | 95 |

We expect that the age at first birth would be better recorded because the high incidence of pre-marital births suggests that the two sets of events were independently recorded ie inteviewers did not typically estimate the age at first union from the age at first birth. Nevertheless, the results show that 15 countries with U-shaped trends in the age at first union still had U-shaped trends in the age at first birth, while stability was observed for 10 other cases with different types of trends. Moreover 13 cases changed from more acceptable trends (continuous rise or no change or U-shaped) to less acceptable trends (U-shaped, irregular or continuous decline). The lack of change for the majority of countries with a U-shaped trend in age at first union, is striking.

We may conclude either that both measures suffer from reporting problems, or that the consistency in the pattern of trends for both measures argue that the pattern is real. For example displacement of both the date of first marriage and the date of first birth by older cohorts, combined with a recent rise in both, could cause the U-shaped pattern in both measures (15 countries had this combination). The same errors could also produce the combination of an apparently stable trend in the age at first marriage and a U-shaped trend in the age at first birth, if displacement cancels out a real rise in the age at marriage.

However these results do not strongly suggest that the age at first birth is a more reliable measure of the start of exposure than the age at first marriage. This does not cancel out other existing reasons for prefering the age at first birth, such as the greater plausibility of the U-shaped pattern for the measure, the apparent independence of reporting of the two items, and the likelihood of omission of short first unions, especially by older women, for whom the event would have taken place 20 or more years before, especially where informal unions are common. We stress that these tests detected few reporting problems for the Asian/Pacific countries who form the majority of the 16 countries which showed little or no error.

## COMPARISON OF SURVEY AND EXTERNAL SOURCES

Evaluation reports typically compare both the proportion ever-married and distribution by marital status with an external source. We looked at the simple comparison only, proportions ever-married, for the external source closest to the survey date. Comparisons were made using survey proportions reconstructed to the date of the external source, in all cases.

The typical pattern observed is that WFS surveys find higher proportions ever-married than do the external sources. The difference between the two (averaged across age-groups) is positive (survey higher) in all but four cases where small negative differences occur. Four Latin American countries show a large average difference (8-13 per cent), while the Caribbean countries show quite large differences when all unions are considered, because censuses omit some informal union types which the surveys cover (see evaluation reports for Caribbean results). The more typical difference is positive, but smaller, however: 3-5 per cent in 13 countries, mainly American and African ones, and 0-2 per cent in slightly under half of the 37 countries covered here, mainly those in Asia. The improvements in Latin America and the Caribbean in particular are notable, reinforcing the success of the surveys in their use of a wider definition of unions.

The problem of greater discrepancies arising for comparisons with external sources further back in time, discussed in Section 4 for fertility , can affect nuptiality data also. Since these increasing discrepancies are due to age-reporting errors for younger women, especially those aged 15-19, we can rely on the retrospective data of older women for proportions ever-married at younger ages in earlier periods of time, more than on external sources. Given our reservations about data for older women in the previous section, this reliance would have to be cut off by age 35-39 or 40-44, depending on the country.

The average per cent difference between the two sources for the two youngest age-groups (15-24) was compared with the average per cent difference at all ages, as a means of checking on the possibility that the sources mainly differed at these young ages. Only four countries showed a difference of 4 per cent or more between the two averages. Two of these cases did have an 8-year gap between the two sources, but on the other hand, five other surveys with equally long gaps did not show large discrepancies between the two sources for the two youngest age-groups. However, the evaluation reports which compared at least two external sources (usually at about 5 and 15 years before the surveys) did find a greater discrepancy at young ages for the earlier period, compared to the later period, lending some support to the occurrence of of age-reporting errors for young married women (see reports for Mexico, Peru and Philippines).

## 6. INFANT AND CHILD MORTALITY

To produce estimates of infant and child mortality, the dates of birth for all children and ages at death for dead children are required. The WFS birth histories do provide such information, although estimates made from them may be biased.

As for other aspects of the data, there are no definitive tests of quality except where complete vital registration occurs, which is not the case for most of the less developed countries covered by the WFS. In fact, many countries lack any national direct estimates of infant and child mortality apart from the WFS. Comparisons with vital statistics can be made, however, to show gross errors, since lower estimates from the survey would undoubtedly mean that the data are deficient. Because of this, the internal consistency checks becomes especially useful. These divide into two groups: those on the basic data and those on the estimated mortality rates. For the basic data we are limited to checking the plausibility of the pattern of births through time and the reporting of age at death. In order to check the estimates of mortality, we can examine the plausibility of age patterns, trends over time and differentials according to sex, age of mother at birth, parity, education, type of areas of residence, etc. Only the most deficient data are likely to produce implausible patterns and so these checks are not very conclusive. In addition, what may seem implausible, such as a rise in mortality over time or higher urban than rural mortality may truly be the case.

### INTERNAL CHECKS APPLIED TO THE WFS DATA

The percentage of deaths for which the age, either in years or months, was missing was examined. The required data on age at death was maintained in an ungrouped format for only 29 countries. In twenty two of the twenty nine countries, less than two per cent of the deaths were missing age at death in both year and month. In Benin, Lesotho and Haiti about six per cent were missing; in Ghana about five per cent; in Mauritania about four per cent and in Fiji and Tunisia about ten per cent of the deaths have missing data codes for months, eight per cent in Portugal and four per cent in Senegal and Yemen. We suspect that much of this is due to a woman saying her child died at a given age in years and was either not asked, or did not know exactly how many months longer he lived. Cameroon is a more extreme case of the same type of error: 40 per cent of deaths lacked data on months, but had the age in years completed, because of the questionnaire design.

We would expect that deaths that occurred longer ago would be more subject to missing age at death and in general this was found to be true, although the effect is not very strong. Four countries, however, show more missing data for later born children: Mauritania, Tunisia, Yemen and Jamaica. This pattern may be indicating omission of earlier deaths.

For the countries with ungrouped ages at death (except Cameroon) we looked at the extent of heaping on certain ages at death. We classified countries on the basis of the per cent of deaths at 0 to 60 months that occurred at months 6, 12, 18, 24, 30 and 36:

| | |
|---|---|
| Less than 10% : | Korea, Trinidad & Tobago, Portugal |
| 10 to 19% : | Nepal, Philippines, Guyana, Jamaica, Fiji |
| 20 to 29% : | Ivory Coast, Kenya, Lesotho, Senegal, Jordan, Malaysia, Haiti, Bangladesh |
| 30 to 39% : | Benin, Ghana, Egypt, Morocco, Sudan, Tunisia, Yemen |
| 40% and above : | Mauritania |

Heaping on month twelve is especially crucial for the estimation of infant mortality rates. Ten countries have more than ten per cent of births in months 0 to 30 occurring at month 12: Benin, Ivory Coast, Egypt, Mauritania, Morocco, Sudan, Tunisia, Jordan, Syria, and Yemen.

AGE PATTERN OF MORTALITY

The most likely children to be omitted, it is thought, are those who died soon after birth. We therefore examined the proportions of infant mortality that is neo-natal. As mention above, a number of countries asked date of death in preference to age at death. In these cases a low percentage of neonatal deaths would not necessarily indicate omission, but would mean that neonatal was understated and post-neonatal overstated. Also a decrease in the proportion neonatal with earlier time periods would in general occur if mortality were higher at those times, so one must be careful in judging a data set to be subject to omission.

Only three countries, Syria, Malaysia, and Philippines, show substantially low levels of neonatal mortality in the most recent five-year period and one, Trinidad & Tobago, shows a very high level. In both Malaysia and the Philippines date of death was asked (also in Trinidad and Tobago), so that only Syria shows evidence of omission in the most recent five year period.

A number of countries however show substantial decreases in the proportion neonatal in earlier periods. In eight cases, this occurs during the 15-19 year period before interview, or earlier (Kenya, Jordan, Korea, Philippines, Thailand, Colombia, Peru and Panama). In a few cases, the 10-14 year period may also show this pattern (Syria, Nepal, Costa Rica and Trinidad and Tobago). Only in Turkey and Malaysia does this error occur as recently as the 5-9 year period before interview. The proportion declines consistenty from recent to earlier periods, in Haiti, which is difficult to explain.

SEX DIFFERENTIALS IN MORTALITY

It is suspected that given a stronger preference for children of one sex than the other, omission would be higher for the less preferred sex. Therefore, a study of sex differentials in mortality could reveal omission. We should look for abnormally high or low ratios of ratios of the male to female rates that would indicate omission that was sex selective. The 'West' model life table at level 7 give a ratio of male to female rates of 117 and a ratio at level 22 of 136. Since these levels are likely to encompass our rates, we will use these as limits to the normal range. We must be careful, however, since the presumed direction of preference may have the opposite effect in reporting. For example, greater care may be given to boys, but a greater reluctance to disclose such deaths may also occur. We must also be careful to distinguish omission from the effects of sampling errors.

Only one country, Portugal, has a ratio above 140 that would indicate omission of girls who died. However, several countries have ratios below 110: in Africa, Cameroon, (107), Lesotho (106), Morocco (106), and Tunisia (102), in Asia, Nepal (103), Pakistan (105), Jordan (85), Syria (92), and Thailand (108), in the Americas, Peru (105), Paraguay (103), and Panama (109). These findings support the argument of greater care being given to boys, resulting in lower than expected mortality for them, in these countries. In the case of Tunisia, however, the expected relationship was found for neonatal rates, and only in the post-neonatal rates was there an exceptionally low ratio, possibly because of differential childcare.

## MORTALITY BY BIRTH ORDER AND BY AGE OF MOTHER AT BIRTH

The pattern of infant and child mortality according to order of birth and age of mother is usually described as a 'J' or a 'U' in that as order and age rise, mortality first falls and then rises. These patterns can be disturbed by omission. In fact it is thought that first-born children and children of young mothers, especially those born a while before the survey are more likely to have been omitted.

For infant mortality in the period 0 to 4 years prior to the survey, seventeen countries have lower or about the same mortality for first births as for second and third births, but no countries show lower mortality for births to mothers at less than 20 years of age than at 20 to 29, although for Lesotho, Philippines and Jamaica the differences are small. The explanation seems to lie in the effect of birth intervals, since first births are not affected by the presence of a previously born child and therefore have a comparative advantage (See Hobcraft et al., 1983).

## TRENDS IN MORTALITY

We looked at mortality levels for time periods in the past (restricted to children whose mothers were 20 to 29 years at their birth). Several countries show substantial rises in the most recent period in mortality under five Mauritania (23 point rise), Bangladesh (22), Pakistan (15), Paraguay (10), Guyana (10). Of these, only Mauritania, Bangladesh, and Pakistan also show an increase in neonatal rates.

However, only four countries, Senegal, Lesotho, Paraguay and Costa Rica show lower rates 15-19 years before the survey than the next earlier period. Nevertheless, we should be careful in concluding that mortality always declines and that any deviation is due to omission or other error. A study of mortality estimates of a second fertility survey in the Dominican Republic, showed the same calendar patterns of mortality as the earlier survey (Hobcraft and Rodriguez, 1982), that had previously been thought as evidence of omission (Guzman, 1980).

## COMPARISON WITH INDIRECT ESTIMATES FROM HOUSEHOLD DATA

Timaeus (1984) has compared the proportions dead of children according to current age of mother from eleven household surveys with those of the individual survey. He finds that only in Korea and Colombia are the proportions very close. In Yemen the proportions are much lower and in the other eight countries the proportions are higher in the household survey.

He is unable to provide a consistent explanation of the higher proportions. Comparing indirect estimates from the household survey data with direct estimates for mortality under age five, he finds that on the whole the figures are rather close, but that in Yemen A.R., Morocco, and Mauritania the trends diverge and in the latter, the household trends look much better (the household data show a small decline, while the individual data show a substantial rise).

## EXTERNAL COMPARISONS WITH VITAL STATISTICS

Comparisons with the rates from the United Nations demographic Yearbooks, made by Rutstein (1983), have shown that the direct estimates of mortality from the birth histories are as high or higher than vital statistics. The principal differences lie in the neonatal rates, which except for the countries that asked date of death, are substantially higher than those of the vital statistics.

## SUMMARY

Based on the checks above, some surveys indicate deficiencies on several of them. Those countries in alphabetical order are Egypt, Fiji, Indonesia, Lesotho, Mauritania, Paraguay, Philippines, Sudan, Syria, Tunisia, and Yemen. Several things should be stressed though:

1) Practically all surveys showed discrepancies on one or more tests

2) The evaluation reports have shown that most of the serious errors of omission occur more than fifteen years prior to the survey, when truncation begins to seriously affect the data

3) Comparisons with vital statistics and other external sources show that the data on mortality collected by the WFS are by far the best such data for most countries, including most of those in the list above.

## 7. CONCLUSIONS

Beyond the details of evaluating each individual topic, it would be helpful to be able to make some general statements about the quality of WFS survey data. Four questions of interest are: how did the surveys perform relative to external sources; are there any grouping of countries according to data quality; are current estimates accurate; and are data on trends over the past 15-20 years usable.

On the questions of comparable quality with external sources, survey results were usually found to be better, with one exception. In coverage of live-births and infant and child deaths, as well as in the recording of exposure within unions, the surveys did better than external sources. In the case of informal unions in societies where they are common, the surveys achieved considerably better coverage than external sources. However surveys were not as successful in obtaining high quality data on age: digit preference was the same or lower in WFS household surveys compared to censuses or other sources but the UN age index showed that about half of WFS household surveys were more distorted than the external source. In comparison, age reporting in the individual survey by respondents was better, but we do not usually have a comparison with external sources for this restricted age-range.

It will come as no surprise to hear that the countries with most problems in data quality are mainly African; but in addition, a few countries from the South Asian and American regions also had poor results. Using only age-reporting and fertility results to rank countries, since these are the two most crucial and problematic areas, we find that seven countries had severe problems on both - Kenya, Lesotho, Sudan (N), Yemen A.R., Bangladesh, Nepal and Haiti. Three countries had severe problems on one and some problems with the other of these two main topics (Benin, Cameroon and Dominican Republic). A further two countries had marked problems principally with age reporting, (Senegal and Paraguay) while five others did so, mainly with fertility (Ivory Coast, Morocco, Mauritania, Pakistan and Indonesia). Finally the age-group 45-49 is biased for one or more substantive topic for the majority of countries.

Current estimates of fertility and of infant and child mortality are of goood quality in the majority of countries, often superior to estimates from vital statistics and other external sources. However rates based on single calendar years are not to be recommended because of the high sampling variation. Rates for the last five years are reasonable, and even two- or three- year rates can be used, but a tendency for heaping of births in the year preceding the survey has been observed.

Reliable fertility trends for a 15-20 year period before the survey was one of the major expected benefits of using a complete birth history. However one type of reporting error that commonly occurred in such histories was event displacement, particularly in the form of a shift by older women of distant births towards the survey date. In more than half of all surveys (mainly in Latin America and some part of Asia), such displacement is minor and produces distortions only in the earliest periods. Thus, for these countries, trends for the part 15-20 years can be used without difficulty. However, in a number of surveys (mainly in Africa and in South Asia), spurious trends were found for the most recent ten or fifteen years, because of event displacement alone or the combination of displacement and age misstatement. These reporting errors are manifested in the form of a trend of rising fertility, from the earliest periods, up to the 5-9 or 10-14 years period before the survey, then either stability or a smaller decline. One qualification to the general conclusion that such a trend is evidence of reporting errors is that some countries or parts of countries have in fact experienced a true increase in fertility; thus, especially in the case of African countries, part of the observed trend, though probably not all of it, may be real (Lesthaeghe, 1984).

WFS' decision to apply the retropective birth history in surveys of developing countries was an innovative one at the time it was taken, in the early 1970's. A large part of the demographic world was very sceptical of the possibility of success of this demanding technique for collecting fertility information, in countries where any data collection was difficult. This was especially true of specialists in techniques of indirect estimation. However the decision has been vindicated by the quality of the results obtained and their richness, in all but a few countries. This has now been recognized by some previous sceptics (e.g Preston, 1984). In the few most problematic countries, it is possible that the history would have been better omitted, and a simpler approach used.

The high quality of the trend data on infant and child mortality was a further unexpected outcome of the use of retrospective histories.

Perhaps because of fears about the quality of data that would be produced by WFS surveys, the organization was guided by its Program Steering Committee into putting a great deal of resources first into the development of the methodology of evaluation, and then to its application in each country. Proceeding in this direction was both necessary and useful. However, ultimately, the stress in the national evaluation reports fell on the application of a number of detailed tests or checks on quality, instead of being placed on reaching a final series of best estimates. It is hoped that more emphasis will be put in the production of a set of preferred estimates, as one of the goals of future evaluations of surveys data.

## REFERENCES


Abdel-Aziz, A.(1983). Evaluation of the Jordan Fertility Survey. WFS Scientific Report no 42.

Ali, I. (1983). Evaluation of the Syrian Fertility Survey 1978. WFS Syrian Monograph (forthcoming).

Balkaran, S. (1982). Evaluation of the Guyana Fertility Survey 1975. WFS Scientific Report No 26.

Booth, H.and I.Alam (1983). The data and their quality (Pakistan). WFS Pakistan Monograph, (forthcoming).

Brass, W. and A.J. Coale 1968. Methods of analysis and estimations, pp 88-142 in the Demography of Tropical Africa, eds W. Brass et al. Princeton, Princeton University Press.

Céspedes, Y. (1982). Evaluation of the Peru National Fertility Survey 1977-78. WFS Scientific Report no 33.

Chidambaram, V.C. and T.W. Pullum 1981. Estimating fertility trends from retrospective birth histories: sensitivity to imputation of missing dates. Population Studies, vol 35.

Coale, A.J. (1983). Assessment of fertility trends in Egypt, taking account of the Egyptian Fertility Survey. Unpublished Manuscript.

Collver, A.O. (1965). Birth rates in Latin America: New estimates of historical trends and fluctuations. University of California, Berkeley, Institute of International Studies, Research Series Monographs, no 7.

El-Deeb, B. (1981). Evaluation of the Egyptian Fertility Survey 1980. WFS Scientific Report forthcoming.

Florez, C.E. and N. Goldman (1980). An analysis of nuptiality data in the Colombia National Fertility Survey. WFS Scientific Report no 11.

Goldman, N., A.J. Coale and M. Weinstein (1979). The quality of Data in the Nepal Fertility Survey. WFS Scientific Report no 6.

Goldman, N. and C.F. Westoff (1980). Can fertility be estimated from current pregnancy data? Population Studies, Vol 34.

Gueye, L. (1983). Enquête Sénégalaise sur la Fecondité: Rapport d'Evaluation. WFS Scientific Report (forthcoming).

Guzman, J.M. (1980). Evaluation of the Dominican Republic National Fertility Survey 1975. WFS Scientific Report no 14.

Hanenberg, R. (1982). Current Fertility. WFS Cross National Summaries no 11.

Hobcraft, J.N., N. Goldman and V.C. Chidambaram (1982). Advances in the P/F ratio method for the analysis of birth histories. Population Studies vol 36.

Hobcraft, J. and G. Rodriguez 1982. The Analysis of Repeat Fertility Surveys: Examples from Dominican Republic, WFS, Scientific Report No 29.

Hobcraft, J.N., J.W. McDonald and S. Rutstein 1983. Childspacing effects on infant and early child mortality. Population Index vol 49(4).

Hunte, D. (1983). Evaluation of the Trinidad and Tobago Fertility Survey 1977. WFS Scientific Report no 44.

Ines Herrera de Rivadeneira, M. (1984). Evaluación de la Encuesta Nacional de Fecundidad de 1979 de Ecuador. WFS Scientific Reports (forthcoming).

Jemai, H. and S. Singh (1984). Issues of Demographic Measurement. Paper to be Presented at WFS Symposium, London, April 1984.

Lesthaeghe, R. (1984). Fertility and its proximate determinants in sub-Saharan Africa: The record of the 1960's and 70's. Paper to be presented at the IUSSP Seminar on Integrating Proximate Determinants into the Analysis of Fertility Levels and Trends, London 1984, April 29-May 1.

Little R.J.A. (1982). Sampling errors of fertility rates from the WFS. WFS Technical Bulletin no 10.

Makinson, C. (1984). Age overstatement among young women and its effect on estimates of fertility and proportions married at young ages. Unpublished Manuscript.

Mati, J.K.G. et al (1971). The importance of anaemic pregnancy in Nairobi and the role of malaria in the aetiology of megaloblastic anaemia. Journal of Tropical Medicine and Hygiene, vol 74.

National Academy of Sciences. Committee on Population and Demography; 1982 Estimation of recent trends in fertility and mortality in Bangladesh. Report no 5.

Odorica, M and J.E. Potter (1981). Evaluation of the Mexican Fertility survey 1976-77. WFS Scientific Report no 21.

Potter, J. (1977). Problems in using birth-history analysis to estimate trends in fertility. Population Studies 31.

Preston, SH. (1984). Mortality in childhood: lessons from WFS. In Reproductive Change in Developing Countries: Insights from the World Fertility Survey, J.G. Cleland and J. N. Hobcraft (eds). Oxford University Press, Forthcoming.

Reyes, F. (1981). Evaluation of the Republic of the Philippines Fertility Survey 1978. WFS Scientific Report no 19.

Roberts, G.W. (1975). Fertility and Mating in four West Indian populations. Jamaica, ISER, University of the West Indies.

Rutstein, Shea O. 1983. Infant and Child Mortality: Levels, trends and demographic differentials, WFS, Cross National Summaries, No. 24.

Schoemaker, J.F. (1984). Evaluación de la Encuesta Nacional de Fecundidad del Paraguay de 1979. WFS Scientific Report. Forthcoming

Singh, S. (1982). Evaluation of the Jamaica Fertility Survey 1975-76. WFS Scientific Report no 34.

Sukdeo, F. (1973). Malaria Eradication and Population Growth in Guyana. University of Guyana, Georgetown, Guyana.

Supraptilah, B. (1982). Evaluation of the Indonesian Fertility Survey 1976. WFS Scientific Report no 38.

Tardieu, C. (1984). Evaluation des Données de L'Enquête Hatienne sur la Fecondité. WFS SCientific Report. Forthcoming.

Tekse, K. (1967). Population and Vital Statistics in Jamaica, 1832-1964. Kingston, Jamaica: Department of Statistics.

Thompson, L.V., M.N. Ali, and J.B. Casterline (1982). Collecting Demographic Data in Bangladesh: Evidence from Tape-recorded Interviews. WFS Scientific Reports no 41.

Timaeus, Ian 1984. 'Estimation of Fertility and Mortality from WFS Household survey' Background Paper for WFS Symposium, London 1984.

Timaeus, I. and K. Balasubramanian (1984). Evaluation of the Lesotho Fertility Survey 1977. WFS Scientific Report (forthcoming).

Trussell T.J. (1984). Evaluation of date imputation in World Fertility Surveys. Paper to be Presented at WFS Symposium, April 1984, London.

Uner, S. (1983). Evaluation of the Turkish Fertility Survey 1978. WFS Scientific Report no. 43.

United Nations (1976). Manual IV. Methods of Estimating basic demographic measures from incomplete data. ST/SOA/Series A/42. Population Studies no 42. New York, United Nations 1983.

United Nations (1983). Fertility Levels and Trends as Assessed from Twenty World Fertility Surveys. New York. Doc ST/ESA/SER.R/50.

Vielma, G. (1982). Evaluation of the Venezuela Fertility Survey 1977. WFS Scientific Report no 35.

World Health Organization (1975). The epidemiology of infertility. Technical Report Series no 582. Geneva. WHO Press.

Yatim, M.M. (1982). Evaluation of the Malaysian Fertily and Family Survey 1974. WFS Scientific Report no 27.

**APPENDIX A**

Abbreviations of countries' names:

| | | | |
|---|---|---|---|
| BN | Benin | FJ | Fiji |
| CM | Cameroon | ID | Indonesia |
| GH | Ghana | KR | Korea, R. of |
| IC | Ivory Coast | MY | Malaysia |
| KE | Kenya | PH | Philippines |
| LS | Lesotho | TH | Thailand |
| NG | Nigeria | CO | Colombia |
| SN | Senegal | EC | Ecuador |
| EG | Egypt | PY | Paraguay |
| MAU | Mauritania | PE | Peru |
| MOR | Morocco | VE | Venezuela |
| SD | Sudan | CR | Costa Rica |
| TN | Tunisia | DR | Dominican R. |
| JO | Jordan | MX | Mexico |
| SY | Syria | PA | Panama |
| TK | Turkey | GY | Guyana |
| YE | Yemen A.R. | HT | Haiti |
| BD | Bangladesh | JM | Jamaica |
| NP | Nepal | TT | Trinidad & Tobago |
| PK | Pakistan | PT | Portugal |
| SL | Sri Lanka | | |

DOC 0342E