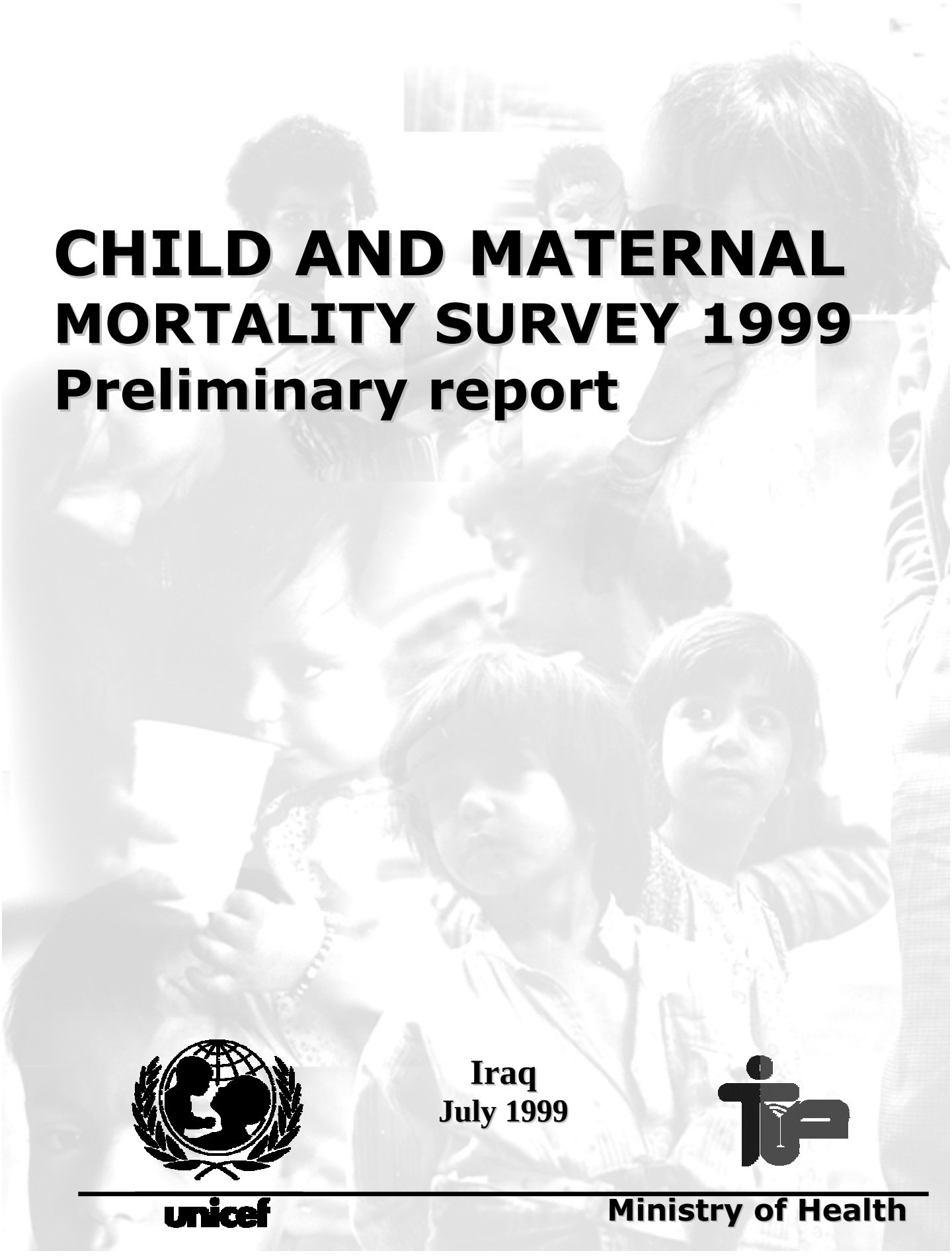


CHILD AND MATERNAL MORTALITY SURVEY 1999
Preliminary report

Iraq
July 1999

unicef

Ministry of Health

Acknowledgments

This survey was carried out in partnership between the Government of Iraq and UNICEF. The Government's contribution was itself a partnership of major ministries, organizations and institutions. These organizations were brought together with UNICEF in a Government/UNICEF Survey Steering Committee. The level of cooperation was exemplary throughout and contributed significantly to the quality of this survey.

From the *Ministry of Health* both the *Preventive Health Department* and the *Statistical Department* were closely involved in all aspects of the survey. This included planning, sample design, and preparation of the questionnaire and survey training manual. Of particular note is the *Preventive Health Department's* contribution in fielding the team of data collectors and supervisors as well as the data entry team in Baghdad. Similarly the *Department of Surveys and Research* and the *Department of Demography and Population Studies* from the *Central Statistical Organization* were closely involved in all aspects of the survey but were particularly invaluable in identifying households to be surveyed by their actual physical address. This made the job of the data collectors just that much easier and faster. From the *University of Baghdad College of Medicine*, both the *Department of Community Medicine* and the *Department of Gynecology and Obstetrics* contributed to all phases of this project, as did the *Community Medicine Department* of the *Saddam Medical College*.

Mr. Mohammed Ali of the *London School of Hygiene and Tropical Medicine* headed a team of consultants fielded by UNICEF to support this survey. He and his team worked with the Government throughout the survey process from planning the survey, sample design, training, preparation and review of questionnaire and training manual, through to data editing, analysis and the report writing. *Dr. John Ssebuliba* from the *Institute of Statistics and Applied Economics, Makerere University, Kampala, Uganda* spent many days working on the data for the survey and also made a substantial contribution to the survey report.

Dr. Iqbal Shah of WHO, Geneva provided generous support in reviewing the survey methodology, fieldwork techniques, data cleaning processes, data checks and the first drafts of the survey report. *Dr. Ahmed Abdul-Mun'im,* of *the Pan Arab Project for Child Development, Alexandria* and *Mr. Bernard Barrère* of *Macro International Inc./DHS* brought "fresh" eyes to this survey and went over both the methodology and results in great detail. Their searching questions and their support in seeking the answers have given the whole survey team an even greater level of confidence in this survey and its results.

Contents

Chapter 1

Introduction

Borders indicated do not necessarily accurately reflect current internal administrative borders between governorates or international borders

Child mortality is a critical measure of the well being of children. Immediately after the gulf conflict an International Study Team carried out an extensive Iraq-wide mortality and nutrition survey. The findings from this survey showed a three-fold increase in under-five mortality from before the conflict to the first half of 1991. However, since 1991 there has been no countrywide child mortality survey, and the subsequent mortality level has been the source of considerable speculation over the last few years.

Recent malnutrition surveys in Iraq have shown that the adverse underweight level of under-five children has increased two-fold since 1991. Since an increase in malnutrition is usually associated with increased child mortality, it is likely that mortality has also increased.

The purpose of the 1999 Iraq Child and Maternal Mortality Survey is to measure the levels and trends of child mortality over the past 20 years, at the country level, by region, and by other key population characteristics; and to establish a baseline for assessing future trends in Maternal Mortality. Considerable care has been taken at every stage in the design and implementation of this survey so that it can produce high quality estimates of child mortality. Several international consultants have been involved in various stages of the survey, and the results in this report have also received critical scrutiny from a group of survey and mortality experts.

This Survey is the result of a partnership between the Government of Iraq and UNICEF, and has also been supported by WHO through the provision of technical expertise in reviewing the survey methodology and results. The survey covers Iraq, excluding the three autonomous governorates of Dohouk, Erbil and Al-Suleimaniyah (see map). This preliminary report presents the first findings from the survey, and will be followed by a more comprehensive report after further analysis of the data.

Chapter 2

Survey Methodology

This chapter gives a brief account of the methodology used to carry out the survey. It includes: the sample design and its implementation, questionnaire design and pretest, data collection, field supervision and editing, response rates and data processing.

Sample design and implementation

The sample of the 1999 Iraq Child and Maternal Mortality Survey (ICMMS) was designed to provide representative estimates of child mortality by region and by key background characteristics (sex of the child, residence and education of the mother). This sample was also used to produce estimates of the maternal mortality ratio for the country as a whole. Taking these requirements, as well as time and resources constraints into account, a sample size of 24,000 household was arrived at for the survey.

The sample frame for the survey is the 1997 Population Census, which covered the entire population of Iraq, excluding the autonomous region of Dohouk, Erbil and Al-Suleimaniyah governorates. Administratively, this area is divided into 15 governorates containing 79 districts (Qada'a).

The sample design, based on this frame, selected all districts, and thence used a three-stage stratified design in each district. The first stage of sampling selected two sub-districts from each district by probability proportion-to-size (PPS). Each selected sub-district was stratified into urban and rural parts and these divided into clusters (Majal) of households. At the second stage, clusters were selected systematically with PPS from each stratum separately; the PPS measure was based on the number of households in each cluster according to the 1997 Population Census.

Within each selected cluster, 15 households were selected from the address list created by the 1997 Population Census using systematic random sampling. All eligible women (ever married women aged 15-49 years) were identified during the household interview operation and selected for inclusion in the sample.

Questionnaire design and pretest

The questionnaire was aimed at obtaining data on child and maternal mortality, and little additional information was collected beyond that needed to derive the mortality estimates. The questionnaire drew upon worldwide experience of deriving mortality estimates, by using relevant parts of the Demographic and Health Survey (DHS) core questionnaire and the DHS maternal mortality module. The survey questionnaire has six sections

Household basic information
Respondent's basic social characteristics
Respondent's demographic characteristics
Respondent's reproductive history (full birth history)
Cause of death for children who died after January 1991.
Maternal mortality modules (direct sisterhood method)

The standard DHS child mortality module was used without modification. The DHS maternal mortality module was modified to limit the data collected for male siblings. This was done at the request of the survey technical committee, which included members of the Iraq Ministry of Health and the Central Statistical Office. The committee asked that only the name and the sex of the male siblings be collected on the questionnaire. However, for consistency checks, interviewers were instructed to enquire about the survival status and current age or age at death of the male siblings, but not to record this information on the questionnaire.

The questionnaire was translated to Arabic, translated back to English independently, and modifications were made to the Arabic questionnaire where needed.

The pretest for the questionnaire was carried out in Baghdad by a team consisting of five field supervisors. Thirty-two households were randomly selected and visited during four days in December 1998. Problems encountered in the pre-test were discussed during the training of supervisors.

Data collection

Training of field staff was carried out in Baghdad, in two parts: supervisor training and interviewer training. Supervisors were trained in English over a four-day period during the first week of February 1999, together with a team of 14 resource persons. A week later the interviewers were trained in Arabic by these resource persons in two parallel sessions. Materials drawn from the DHS and the Gulf Child Health Survey (Iraq 1989) manuals were used extensively in the supervisor training. A survey manual for interviewers and supervisors, in Arabic, was finalized after the interviewer training sessions.

Survey staff were recruited from the health sector. Supervisors were senior medical officers, and interviewers were recent female graduates from medical schools.

Fieldwork started on the 20th of February and was completed on the 17th of March. A total of 186 staff, including 16 governorate supervisors, 16 team leaders and 154 interviewers were responsible for data collection. Two governorate supervisors and two team leaders were assigned to Baghdad; each of the remaining 14 governorates were assigned one supervisor and one team leader. At least 50 percent of the supervisors and team leaders, and all interviewers were female.

Field supervision and editing

Considerable care was taken in trying to achieve a high response rate and obtain quality data. The team leader did not make any changes to the questionnaire, but was responsible for ensuring that all sample households were contacted, all eligible women interviewed, and responses completed for all relevant mortality questions. If inconsistencies were found the interviewer was asked to resolve them, going back to the household if necessary. The governorate supervisor again checked sample household coverage and the questionnaires passed from the local supervisor, and also carried out several checks on the internal consistency of responses.

In order to monitor changes to the original questionnaire responses, the interviewers had to enter responses in ballpoint. This is an unusual step since most surveys in Iraq use pencil for recording responses, but was accepted by the Government of Iraq so that any subsequent change would then be obvious. Any such change had to be initialed by the field staff person making the change. UNICEF staff visited all governorates during the field work and also observed the training of supervisors and interviewers. Two international consultants were involved in the training of supervisors. Governorate supervisors passed on the completed questionnaires to the central office in Baghdad for the final editing and recording of open-ended questions (such as the cause of death for children) before data entry.

Table 1: Results of household and individual interviews, Iraq* 1999

	Number	Response rate (%)
Households		
Selected	23400	
Interviewed	23920	99.7
Eligible women		
Identified	23161	
Interviewed	23105	99.8

* Excluding the autonomous region of Dohouk, Erbil and Al-Suleimaniyah governorates.

Table 1 provides a summary of the response rates of the survey.

Out of the 23,920 successfully interviewed households, 21048 had at least one eligible respondent.

The intensive field supervision and editing, household call-backs, short questionnaire, and well-organized training and field operations all contributed to the very high response rate.

Data processing

After the final edit in Baghdad, the questionnaires were entered onto computer using an entry program developed with EPI-INFO version 6.

Two distinct phases of machine data editing were implemented: during data entry and after data entry. During data entry, editing of data was restricted to the structure of the data file, questionnaire skip patterns, and the range of valid values for each data field. Special codes were used to identify any missing data in the questionnaire. The data entry operation was observed by an international consultant throughout the entire process. An additional international consultant, responsible for specifying the subsequent data edits, also observed the data entry operation periodically. At the end of each day's data entry, the resulting electronic file was copied to the UNICEF Iraq Country Office.

After data entry, the editing activities concentrated on consistency checks between data fields in order to verify the internal consistency of information throughout the questionnaire. These were carried out in the UNICEF Iraq Country Office by international consultants, and resolved in conjunction with the Government of Iraq staff involved in data processing. During the data processing operation, UNICEF staff had full access to the data files and completed questionnaires.

Thirteen computers were used for data entry. By working two shifts, six days per week, the data processing staff completed the data entry and editing of data by the end of May 1999.

Respondent characteristics

The main focus of the 1999 Iraq Child and Maternal Mortality Survey (ICMMS) is to estimate child and maternal mortality. However, a small number of background characteristics of eligible women were collected and are reported here.

Table 2: Percent distribution of ever-married women aged 15-49 years, by selected background characteristics, Iraq* 1999

Background characteristics	%
Place of residence	
Urban	64.7
Rural	35.3
Schooling	
Never attended	29.5
Primary	48.2
Intermediate	8.4
Secondary	7.0
University or higher	6.9
Current age	
15-19	6.0
20-24	15.5
25-29	20.8
30-34	18.7
35-39	15.6
40-44	12.5
45-49	10.9
Mean age (years)	*32.2*
Marital status	
Currently married	93.3
Widowed	4.5
Separated	1.5
Divorced	0.7
Overall (%)	100.0
Number of women	23105

* Excluding the autonomous region of Dohouk, Erbil and Al-Suleimaniyah governorates.

Out of the 23920 interviewed households, 21048 had at least one eligible respondent (ever-married woman aged 15-49 years, usually resident in the household), with a total of 23105 eligible respondents.

Table 2 shows the distribution, in percent, of respondents by place of residence, schooling, current age, and marital status. Overall, around two-thirds of the respondents live in urban areas and one-third in rural.

The majority of respondents have either never attended school, or attended only primary school. The distribution of ever-married women in the sample by age is similar to the 1987 Population Census. The majority of respondents are aged 25-39 (55 percent), 6 percent are 15-19, and around 11 percent are 45-49. Well over 90 percent of the ever-married women in the sample are currently married; the remaining 7 percent are either widowed (4.5 percent) or separated or divorced (2.2 percent). As is typical in the Middle East region, a high proportion (61percent) of marriages are to a cousin or other relative.

Child Mortality

The birth history section of the survey questionnaire is the source for data used to derive the mortality estimates presented in this section. Mortality rates are estimated directly from the information in the birth history on a child's birth date, survivorship status and the age at death reported for children who died. The following rates are used to assess child mortality.

Infant mortality rate
the probability of dying between birth and exact age one year
Under-five mortality rate
the probability of dying between birth and exact age five

Table 3: Infant and under-five mortality rates per 1000 live births, by five-year period preceding the survey, Iraq* 1999

Period preceding survey *(in years)*		Infant mortality rate	Under-five mortality rate
		($_1q_0$)	($_5q_0$)
0-4	(1994-1999)	107.9	130.6
5-9	(1989-1994)	78.9	91.5
10-14	**(1984-1989)**	**47.1**	**56.0**
15-19	(1979-1984)	54.1	67.1

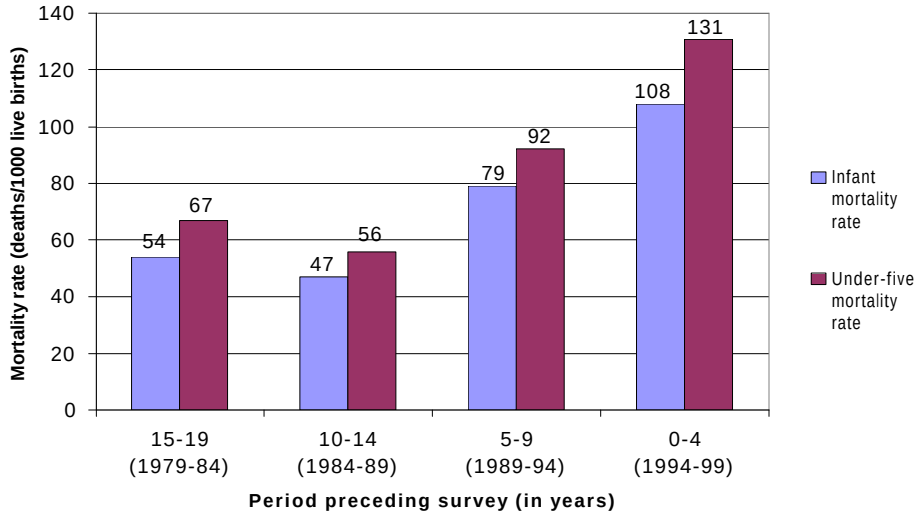
* Excluding the autonomous region of Dohouk, Erbil and Al-Suleimaniyah governorates.
(Five year periods are from March to March e.g. March 1994 to March 1999)

Table 3 presents child mortality rates for the 20 years preceding the survey. The table indicates that both the infant mortality rate (IMR) and the under-five mortality rate (U5MR) consistently show a major increase in mortality over the 10 years preceding the survey. More specifically the results show that IMR has increased from 47 deaths per 1000 live births for the period 1984-89, to 108 deaths per 1000 live births for the period 1994-99. U5MR has increased over the same time period from 56 deaths per 1000 live births to 131 deaths per 1000 live births. These results are also shown in graph 1 on page 11

These mortality results show a more than two-fold increase over a ten year time span.

Table 4 shows IMR and U5MR rates, for the most recent five-year period, place of residence, schooling of mother and sex of the child. Rural mortality rates are higher than urban rates, and rates for males are higher than for females.

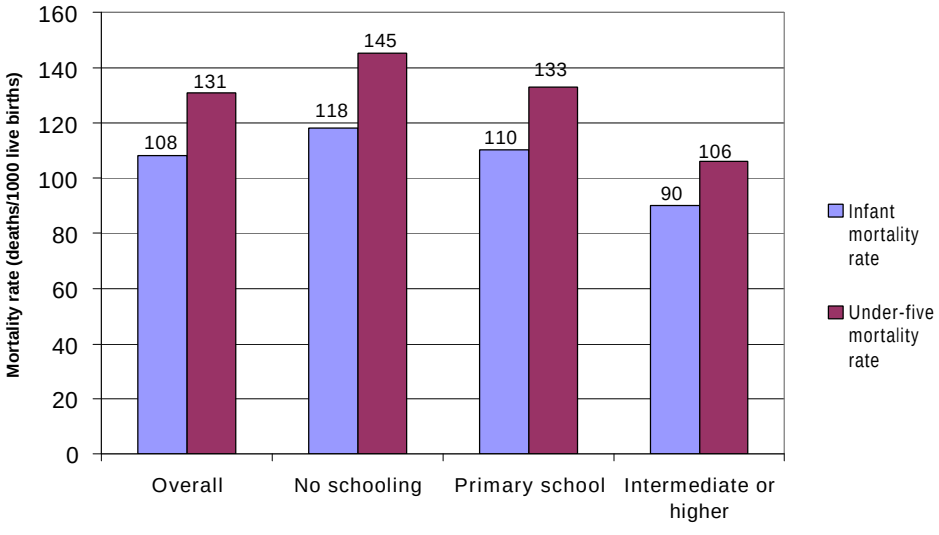
Graph 1: Infant and under-five mortality rates, Iraq* 1999



* Excluding the autonomous region of Dohouk, Erbil and Al-Suleimaniyah governorates.

Respondents with low levels of education have children with higher mortality rates than those with high levels of education (see Graph 2), a situation found in many other countries.

Graph 2: Infant and under-five mortality rates by mother's schooling, Iraq* 1999



* Excluding the autonomous region of Dohouk, Erbil and Al-Suleimaniyah governorates

Table 4: Infant and under-five mortality rates per 1000 live births by background characteristics for the last five-year period (1994-1999), Iraq* 1999

Background characteristics	Infant mortality rate ($_1q_0$)	Under-five mortality rate ($_5q_0$)
Place of residence		
Urban	102.1	120.9
Rural	116.4	144.9
Schooling		
Never attended	117.7	144.8
Primary	110.1	132.9
Intermediate or higher	89.8	105.7
Sex of the child		
Male	112.5	135.6
Female	103.0	125.3
Overall	107.9	130.6

* Excluding the autonomous region of Dohouk, Erbil and Al-Suleimaniyah governorates.

Data quality

A retrospective birth history, such as that included in this survey, is susceptible to several possible data collection errors. First, only surviving ever-married women aged 15-49 years were interviewed; therefore, no data were available for children of women who died. The resulting mortality estimates will be biased if the fertility of surviving women and non-surviving women differ substantially. In Iraq, this bias is likely to be very small or negligible.

Missing birth dates can bias results, particularly if the missing birth dates are for women with lower education and hence higher child mortality. However, reporting of both year and month of birth is very high in the survey, as can be seen from table 5. One of the reasons for these high levels of reporting is likely to be the ration cards kept by every household, in which the birth date of every person in the household is given.

A commonly observed error in survey data, especially by older women, is the omission of children ever born or those who died. If average parity of women aged 45-49 is lower than that of women 40-44 and there is no (historical) reason for this, it is probably because of omission of live births by the former. This pattern is generally because the births to older women involve a prolonged recall period, and that their infants and children might have experienced excessive mortality, making it difficult to remember the number of all births. The selective omission of births and deaths, by age of women was evaluated from the survey data and no evidence was found to suggest a greater omission of live births or of dead children by calendar year or sex.

Table 5: Distribution of births by calendar years for living, dead, and all children, according to both month and year reported and sex ratio, Iraq* 1999

	Percentage with complete birth date[1]			Sex ratio at birth[2]		
Year	Living	Dead	All	Living	Dead	All
1999	99.7	93.9	99.2	**	**	**
1998	99.8	98.3	99.7	104.0	117.8	105.4
1997	99.5	97.6	99.2	104.0	109.4	104.6
1996	99.3	95.9	98.9	105.5	118.4	107.0
1995	99.2	97.0	98.9	100.3	114.5	102.0
1994	99.1	94.6	98.6	108.9	124.9	110.7
1993	98.9	94.6	98.4	107.4	109.0	107.6
1992	99.1	94.8	98.6	103.2	112.0	104.3
1991	99.0	96.2	98.7	105.5	118.9	107.1
1990	98.8	93.0	98.4	101.4	158.6	104.1
1989	99.1	88.8	98.5	103.4	159.2	106.0
1988	98.9	90.4	98.4	102.2	136.4	104.0
1987	98.9	89.6	98.3	100.8	123.2	102.1
1986	98.4	86.7	97.7	98.0	122.8	99.3
1985	98.9	88.2	98.2	103.2	135.1	104.9
1984	98.6	86.5	97.9	109.3	163.2	111.9
1983	98.7	86.6	97.8	100.2	138.1	102.6
1982	98.2	89.5	97.6	90.9	103.7	91.7
1981	97.5	85.7	96.7	100.1	145.0	102.7
1980	98.1	87.2	97.2	102.6	112.3	103.4
before 1980	96.9	85.6	95.8	98.1	145.4	101.9
Overall				102.4	125.1	104.4
Number of births	90446	9471	99917			

* Excluding the autonomous region of Dohouk, Erbil and Al-Suleimaniyah governorates.

[1] Both year and month of birth

[2] Number of males per 100 females

** Survey conducted in March, therefore incomplete data for 1999

The sex ratio of living and dead children by calendar year of birth was also examined, but no major selective omissions were found (see table 5).

More serious and complex errors in timing occur from the systematic displacement of birth dates by the mother nearer to, or further from, the time of the survey. Systematic errors in dating births have a characteristic pattern, concentrating births in the period 5-14 years before the survey, at the expense of births in earlier periods, and perhaps even from the most recent five-year period. A number of checks of the survey data were made, but no evidence for such displacement errors was found.

Mortality estimates are based only on those births reported by ever-married women of reproductive age at the time of the survey, and these are truncated because women past age 49 are not interviewed. As the time period extends further into the past, the resulting censoring of information becomes progressively more severe. Therefore, results presented for more than 15 years before the survey should be interpreted with caution.

Of the 99,917 births, year of birth was reported for all births, but month of birth was missing for 1.9 percent of births. Imputation of the month of birth was undertaken by following standard procedures. In order to examine the effect of imputation, analyses were performed both on imputed and unimputed data. A comparison of the two showed no substantial difference between the two sets of estimates

Maternal Mortality

Data collected in the survey allow estimation, using the direct approach, of adult female mortality, as well as maternal mortality. The direct approach uses information on the age of surviving sisters, the age at death of sisters who died, and the number of years since the sister died. Thus data can be aggregated to determine the number of person-years of exposure to mortality risk and the number of sisters deaths occurring in defined calendar periods. Rates of adult female mortality or maternal mortality are obtained by dividing maternal deaths (or adult female deaths) by person-years of exposure.

The estimation of adult sister and maternal mortality by the direct method requires reasonably accurate reporting of the number of sisters the respondent ever had, the number that have died, and the number who died of maternity-related caused. There is no definitive procedure for establishing the completeness or accuracy of retrospective data on sibling's survivorship.

Table 6: Numbers and rates of all adult female and maternal deaths by age group, in the ten-year period (1989-99) before the survey, Iraq* 1999

Age group	Deaths		Mortality Rates per 1000 women-years of exposure		Maternal deaths as a percent of adult female deaths
	All	Maternal	All	Maternal	
5-19	117	34	1.15	0.34	29.1
0-24	173	65	1.52	0.78	37.6
5-29	131	48	1.19	0.44	36.6
0-34	157	56	1.68	0.60	35.7
5-39	123	38	1.78	0.55	30.9
0-44	107	27	2.47	0.63	25.2
5-49	68	1	3.07	0.05	1.5
5-49	876	269	1.58	0.52	30.7

Maternal Mortality Ratio (MMR) per 100,000 live births = 294

* Excluding the autonomous region of Dohouk, Erbil and Al-Suleimaniyah governorates.

Table 6 presents age-specific numbers of adult female and maternal deaths reported in the survey, together with resulting mortality rates per 1000 women-years of exposure. Maternal deaths as a percent of adult female deaths are reported in the last column of table 6.

Although the rate of maternal mortality may appear low at 1 per 2,000 women-years of exposure, the proportion of maternal deaths (31percent) shows that maternal mortality is a leading cause of deaths in the last ten years among women of reproductive age.

The maternal mortality rate can be converted to a maternal mortality ratio, and expressed per 100,000 live births, by dividing the mortality rate by the general fertility rate operating during the same time period. An estimate of the general fertility rate was not available from the survey, so data from the 1987 Census was used. Table 6 shows a maternal mortality ratio of 294 deaths per 100,000 live births.

Data quality

The quality of the data used to estimate maternal mortality rates can be assessed by evaluating the plausibility and stability of the overall adult female mortality. If estimated rates of adult mortality are implausible, rates based on a subset of deaths, those due to maternal causes, are also likely to have serious problems. Provided that maternal deaths are as likely to go underreported as non-maternal deaths, the proportion of adult female deaths due to maternal causes can still be useful indicator of the burden of maternal deaths in the population.

Table 7: Number of sisters reported by respondent and completeness of reported data on sister's age, age at death (AD) and years since death (YSD), Iraq* 1999

Sisters		N	%
All		78528	100.00
	Living	71175	90.64
	Dead	7345	9.35
	Unknown	8	0.01
Living		71175	100.00
	Age reported	71006	99.76
	Age missing	169	0.24
Dead		7345	100.00
	AD & YSD reported	6270	85.36
	AD missing	140	1.91
	YSD missing	913	12.43
	Both AD & YSD missing	22	0.95

* Excluding the autonomous region of Dohouk, Erbil and Al-Suleimaniyah governorates.

Table 7 provides an assessment of completeness of reported data on sister's age, age at death and years since death. As can be seen, the completeness of data is high.