

CHAPTER 11

MATERNAL MORTALITY

11.1 Introduction

The 1997 JPFHS collected data suitable for estimating maternal mortality by both direct and indirect procedures (Graham et al., 1989; Rutenberg et al., 1991). The estimates are calculated from data on the survivorship of all live births of the respondent's natural mother (i.e., respondent's siblings).

The direct approach to estimating maternal and adult mortality makes maximum use of the available data, such as information on the age of surviving siblings, the age at death of siblings who died, and the number of years prior to the survey that the sibling(s) died. The data can be aggregated to determine the number of person-years of exposure to mortality risk and the number of sibling deaths that occurred in well-defined calendar periods. Rates of maternal mortality or adult mortality are obtained by dividing maternal deaths (or adult deaths) by person-years of exposure.

The indirect approach to the estimation of maternal mortality, i.e., the *sisterhood method*, has simpler requirements than the direct method. None of the data on dates and ages of sisters are used, and data obtained from respondents about all sisters are used to estimate the lifetime risk of dying from maternal causes. However, such an estimate does not apply to a specific reference period, since it combines the mortality experience of women during the previous 50 years. Nonetheless, as Graham et al. have pointed out, combining data from respondents age 15-49 into a single estimate narrows the reference period to about 12 years prior to the survey. The biggest drawback of this method is the uncertainty of how accurately it estimates current maternal mortality (unless one assumes that mortality has been relatively constant over the years).

11.2 The Data

Each respondent was first asked to give the total number of her mother's live births. Then she was asked to provide a list of all children born to her mother (beginning with the firstborn), and whether or not each of those siblings was still alive at the survey date. For living siblings, current age was collected; for deceased siblings, age at death and year of death (or years since death) were collected. Interviewers were instructed that when a respondent could not provide precise information on siblings' age at death or number of years since death, approximate quantitative answers were acceptable. For sisters who died at age 15 or older and were married or ever-married at the time of death, in order to determine whether the death was maternity-related, the respondent was asked: "Was [NAME OF SISTER] pregnant when she died?" If the answer was no, the respondent was then asked, "Did she die during childbirth?" If the death was neither during pregnancy nor childbirth, one additional question was asked: "Did she die within two months after the end of a pregnancy or childbirth?"

Table 11.1 shows the number of siblings reported by respondents and the completeness of the reported data on current age, age at death, and years since death. Survival status of siblings was reported for all but two siblings. The sex ratio¹ of enumerated siblings (number of brothers per 100 sisters) was 115,

¹ Sex ratio is defined as number of males per 100 females.

Table 11.1 Data on siblings

Number of siblings reported by female survey respondents and completeness of reported data on sibling age, age at death (AD) and years since death (YSD), Jordan 1997

Sibling	Sisters		Brothers		All siblings	
	Number	Percentage	Number	Percentage	Number	Percentage
All siblings	41,211	100.0	43,325	100.0	84,536	100.0
Living	36,828	89.4	38,436	88.7	75,264	89.0
Dead	4,383	10.6	4,887	11.3	9,270	11.0
Status unknown	0	0.0	2	0.0	2	0.0
Living siblings	36,828	100.0	38,436	100.0	75,264	100.0
Age reported	36,822	100.0	38,427	100.0	75,250	100.0
Age missing	6	0.0	9	0.0	14	0.0
Dead siblings	4,383	100.0	4,887	100.0	9,270	100.0
AD and YSD reported	4,331	98.8	4,840	99.0	9,172	98.9
AD missing	4	0.1	6	0.1	9	0.1
YSD missing	32	0.7	26	0.5	58	0.6
Both AD and YSD missing	16	0.4	15	0.3	31	0.3

which is the same as the ratio in the international data (i.e., sex ratio at birth of 113-115). For surviving siblings, reporting of age was complete. In the case of dead siblings, reporting of age at death and years since death was complete for 98.9 percent.

Although the type of information collected in the survey permits estimation of maternal mortality by the direct method (as indicated at the beginning of this chapter), it will not be used here because the 1997 JPFHS sample is too small. The direct method is not designed for low-mortality settings such as in a country like Jordan where the infant mortality rate is less than 30 per 1,000 births, the majority of births (93 percent) are at health facilities, and most deliveries (97 percent) are by trained medical personnel. Table 11.2 shows that among the mortality data for all sisters there were only nine maternal deaths during the period 1991-97, 11 during 1984-90, and 21 overall during 1984-97.

Table 11.2 Mortality data

Number of female deaths and maternal deaths by age and period, Jordan 1997

Age	1991-1997		1984-1990		1984-1997	
	All deaths	Maternal deaths	All deaths	Maternal deaths	All deaths	Maternal deaths
15-19	34	0	17	1	52	1
20-24	19	0	13	3	32	3
25-29	9	4	6	3	15	7
30-34	21	1	11	2	32	4
35-39	10	3	12	1	22	4
40-44	15	1	6	1	21	2
45-49	14	0	3	0	18	0
Total 15-49	122	9	68	11	192	21

11.3 Indirect Estimates of Maternal Mortality

The indirect sisterhood method is used here as an alternative to the direct method.² The indirect approach requires a smaller sample and provides an overall estimate of maternal mortality for sisters of all respondents combined, an estimate that pertains to approximately 12 years prior to the survey. When dealing with small samples, it is preferable to use the overall estimate because it is subject to less sampling variability. In this case, the data are aggregated by five-year age groups of respondents. For each age group, information on the number of maternal deaths among all sisters of respondents and on the number of “sister units” of risk is used to estimate lifetime risk of dying from maternal causes.

The indirect estimates of maternal mortality are given in Table 11.3. When aggregating the data over all respondents, the lifetime risk of maternal death is 0.0051 (column f). This can be transformed into an estimate of the maternal mortality ratio of 79 maternal deaths per 100,000 births, applicable to a period around 1985. This level is the lowest among the 14 countries for which the DHS program has collected maternal mortality data as of 1995 (Stanton et al., 1997). It should be emphasized that the standard errors of estimates presented here are large and the results should be interpreted with caution.

Age group	Number of respondents (a)	Number of sisters 15+ (b)	Adjustment factor (c)	Sister units of risk exposure (d=b×c)	Maternal deaths (e)	Lifetime risk of maternal death (f)=(e)/(d)	Proportions of dead sisters dying of maternal causes (g)
15-19	2,523	8,102 ^a	0.107	867	0.0	0.0000	0.0
20-24	2,050	6,582 ^a	0.206	1,356	3.1	0.0023	14.9
25-29	1,790	5,746 ^a	0.343	1,971	8.9	0.0045	19.6
30-34	1,395	4,718	0.503	2,373	17.1	0.0072	33.6
35-39	1,036	3,463	0.664	2,299	10.8	0.0047	19.1
40-44	778	2,546	0.802	2,042	12.7	0.0062	23.4
45-49	593	1,723	0.900	1,551	10.2	0.0066	17.8
Total (15-49)	10,165	30,408		12,458	63.4	0.0051	19.2
Total fertility rate (TFR) 1983-87 ^b			6.4 children per woman				
Maternal mortality ratio (MMR) ^b			79 per 100,000 live births				

^a The number of sisters for these age groups are inflated by a factor equal to the average number of sisters to respondents age 30+.

^b $MMR = (1 - [1 - \text{Lifetime risk}]^{1/TFR}) \times 100,000$, where TFR represents the total fertility rate 10-14 years preceding the survey.

² It is recognized that the direct method has more advantages than the indirect method. Stanton et al. (1997) summarized these advantages as follows:

- it allows calculation of rates/ratios for well-defined reference periods;
- it allows monitoring of trends;
- it permits analysis of maternal mortality by parity or other characteristics;
- it permits several data quality checks.