ADULT AND MATERNAL MORTALITY 15

Earlier in this report, estimates of mortality during the first years of life were presented and discussed. Early childhood mortality varies substantially as an index of social and economic development and thus tends to be predictably high in disadvantaged settings. Mortality during later childhood and adolescence is, on the other hand, relatively low in all societies, but begins to rise with age starting in the late teenage years. The pattern and pace of the rise in adult mortality with increasing age is tied closely to the occupational profile, fertility pattern, and epidemiological characteristics of a population. Two aspects of adult mortality dynamics are of particular interest in the Zimbabwean context. First, given tremendous rises in the prevalence of HIV infection and AIDS (discussed in the previous chapter) over the last decade, Zimbabwe is expected to continue to suffer increases in both female and male adult mortality in the near term. Second, mortality related to pregnancy and childbearing (maternal mortality) is an important indicator for women's and reproductive health programmes in the country.

The 2005-06 ZDHS questionnaire included a sibling history, which is a detailed account of the survivorship of all of the live-born children of the respondent's mother (i.e., maternal siblings). These data allow direct estimation of overall adult mortality by sex, as well as maternal mortality in particular. The direct approach to estimating adult and maternal mortality maximises use of the available data, using information on the age of surviving siblings, the age at death of siblings who died, and the number of years ago the sibling died. This approach allows the data to be aggregated to determine the number of person-years of exposure to mortality risk and the number of sibling deaths occurring in defined calendar periods. Rates of maternal mortality are obtained by dividing maternal deaths in a calendar period by person-years of exposure to death. Similarly, adult mortality rates are obtained by dividing female or male adult deaths in a calendar period by person-years of exposure to death.

15.1 DATA

To obtain the sibling history, each respondent was first asked to give the total number of her mother's live births. The respondent was next asked to provide a list of all of the children born to her mother starting with the first-born. Then the respondent was asked whether each of these siblings was still alive at the survey date. For living siblings, current age was collected; for deceased siblings, age at death and years since death were collected. Interviewers were instructed that when a respondent could not provide precise information on age at death or years since death, approximate but quantitative answers were acceptable. For sisters who died at ages 12 years or above, three questions were used to determine whether the death was maternity-related: "Was [NAME OF SISTER] pregnant when she died?" and if negative, "Did she die during childbirth?" and if negative, "Did she die within two months after the end of a pregnancy or childbirth?" An additional question determined whether the death was due to an accident or other violent act.

The estimation of adult and maternal mortality by either direct or indirect means requires reasonably accurate reporting of the number of sisters and brothers the respondent ever had, the number who have died, and (for maternal mortality) the number of sisters who have died of maternity-related causes. There is no definitive procedure for establishing the completeness or accuracy of retrospective data on sibling survivorship. However, the 2005-06 ZDHS sibling history data do not show any obvious defects that would indicate poor data quality or systematic underreporting.

Table 15.1 shows the number of siblings reported by the respondents and the completeness of the data reported on current age, age at death, and years since death. Of the 47,069 siblings reported in the sibling histories of ZDHS respondents, survival status was not reported for 24 (less than 0.1 percent). Among surviving siblings, current ages (used to estimate exposure to death) were not reported for less than 1 percent of siblings. Among deceased siblings, complete reporting of age at death and years since death was nearly universal. For 98 percent of deceased siblings, both age at death and years since the death (or year of death) were reported. In 2 percent of cases, either the age at death or the years since death (or year of death) was missing, while for 1 percent of deceased siblings both of these items were missing. Rather than exclude siblings with missing data from further analysis, information on the birth order of siblings in conjunction with other information was used to impute the missing data.[1] The sibling survivorship data, including cases with imputed values, were used in the direct estimation of adult and maternal mortality.

Table 15.1 Data on siblings

Number of siblings reported by survey respondents and completeness of the reported data on age, age at death (AD), and years since death (YSD), Zimbabwe 2005-2006

	Females		Males		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
All siblings	23,720	100.0	23,349	100.0	47,069	100.0
Surviving	20,383	85.9	19,778	84.7	40,161	85.3
Deceased	3,327	14.0	3,557	15.2	6,884	14.6
Missing information	10	0.0	14	0.1	24	0.1
Surviving siblings	20,383	100.0	19,778	100.0	40,161	100.0
Age reported	20,256	99.4	19,665	99.4	39,920	99.4
Age missing	127	0.6	114	0.6	240	0.6
Deceased siblings	3,327	100.0	3,557	100.0	6,884	100.0
AD and YSD reported	3,246	97.6	3,464	97.4	6,710	97.5
Missing only AD	45	1.3	50	1.4	95	1.4
Missing only YSD	14	0.4	17	0.5	31	0.4
Missing both AD and YSD	23	0.7	26	0.7	49	0.7

15.2 DIRECT ESTIMATES OF ADULT MORTALITY

One way to assess the quality of the data used to estimate maternal mortality is to evaluate the plausibility and stability of overall adult mortality. It is reasoned that if estimated rates of overall adult mortality are implausible, rates based on a subset of deaths—i.e., maternal deaths in particular—are unlikely to be free of serious problems. As described above, levels and trends in overall adult mortality have very important implications in their own right for health and social programmes in Zimbabwe, especially given the AIDS epidemic.

[1] The imputation procedure is based on the assumption that the reported birth ordering of siblings in the history is correct. The first step is to calculate birth dates. For each living sibling with a reported age and each dead sibling with complete information on both age at death and years since death, the birth date was calculated. For a sibling missing these data, a birth date was imputed within the range defined by the birth dates of the bracketing siblings. In the case of living siblings, an age was then calculated from the imputed birth date. In the case of dead siblings, if either the age at death or years since death was reported, that information was combined with the birth date to produce the missing information. If both pieces of information were missing, the distribution of the ages at death for siblings for whom the years since death was unreported, but age at death was reported, was used as a basis for imputing the age at death.

15.2.1 Levels of Adult Mortality

Table 15.2 shows age-specific mortality rates for men and women age 15-49 for the period zero to six years before the 2005-06 ZDHS. These results allow an assessment of the recent level of mortality in the reproductive age population in Zimbabwe. Because the number of deaths on which the age-specific rates are based is not very large (between 100 and 700 deaths per age group for the total population), the estimated age-specific rates are subject to considerable sampling variation.

The results in Table 15.2 indicate that, overall, male mortality is slightly higher than female mortality in the reproductive-age population (13.3 and 12.7 deaths per 1,000 years of exposure, respectively). Mortality levels rise rapidly with age among both women and men. Rates plateau for women in the 35-49 year age group, while a levelling off in the rise for men is observed in the 40-49 year age group.

Table 15.3 Trends in adult mortality rates

Age-specific mortality rates for women and men age 15-49 based on the survivorship of sisters and brothers of survey respondents, Zimbabwe 1985-2006

Age	1994 ZDHS	1999 ZDHS	2005-06 ZDHS
WOMEN			
15-19	1.87	2.82	2.69
20-24	2.51	6.01	5.47
25-29	3.63	11.17	12.25
30-34	3.99	14.72	20.42
35-39	4.75	15.73	25.04
40-44	4.62	12.85	25.23
45-49	5.18	13.16	25.48
15-49	3.34	9.14	12.66[a]
MEN			
15-19	1.44	1.49	1.74
20-24	2.59	4.63	3.36
25-29	3.78	9.63	9.03
30-34	5.26	19.81	20.06
35-39	5.41	22.36	27.74
40-44	9.56	23.50	37.10
45-49	11.9	29.05	36.46
15-49	4.17	11.35	13.30[a]

Note: Rates for the 1994 ZDHS refer to the period 0-9 years before the survey, for the 1999 for the period 0-4 years before the survey, and for the 2005-06 ZDHS to the period 0-6 years before the survey.
[a] Rates are age-standardised.

Table 15.2 Adult mortality rates

Age-specific mortality rates for women and men age 15-49 based on the survivorship of sisters and brothers of survey respondents for the period 0-6 years preceding the survey, Zimbabwe 2005-2006

Age	Deaths	Exposure	Mortality rates
WOMEN			
15-19	62	23,130	2.69
20-24	138	25,229	5.47
25-29	264	21,517	12.25
30-34	346	16,921	20.42
35-39	314	12,535	25.04
40-44	211	8,374	25.23
45-49	130	5,102	25.48
15-49	1,464	112,807	12.66[a]
MEN			
15-19	37	21,374	1.74
20-24	80	23,983	3.36
25-29	195	21,567	9.03
30-34	338	16,867	20.06
35-39	324	11,664	27.74
40-44	266	7,176	37.10
45-49	158	4,320	36.46
15-49	1,398	106,951	13.30[a]

[a] Rates are age-standardised.

15.2.2 Trends in Adult Mortality

Table 15.3 shows the adult mortality rates observed in the 1994 ZDHS, the 1999 ZDHS, and the 2005-06 ZDHS. The table highlights the substantial rise that has occurred in adult deaths over the past 20 years in Zimbabwe. Mortality rates more than tripled among adults between 1994 and 2005-06. The rate of increase was extremely rapid between the 1994 and 1999 surveys when the impact of the AIDS epidemic was first being experienced. However, the comparison of the 2005-06 and 1999 rates suggests that adult mortality has continued to rise during the first half of this decade, by around 40 percent among women and 20 percent among men.

Figures 15.1 and 15.2 present the increases in the age-specific adult mortality between the 1994 ZDHS and the 2005-06 ZDHS. The largest increases in mortality rates are observed among women age 25 and over and among men age 30 and over. These age patterns are consistent with the age pattern of HIV infection in Zimbabwe (i.e., higher infection rates among women under age 30 than among men).

Figure 15.1 **Trends in Age-specific Mortality among Women 15-49, Zimbabwe 1985-2006**

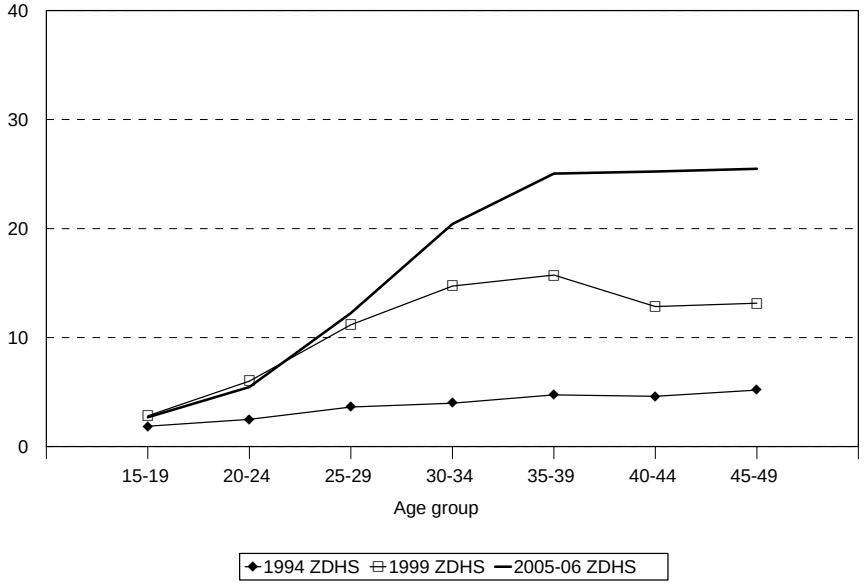
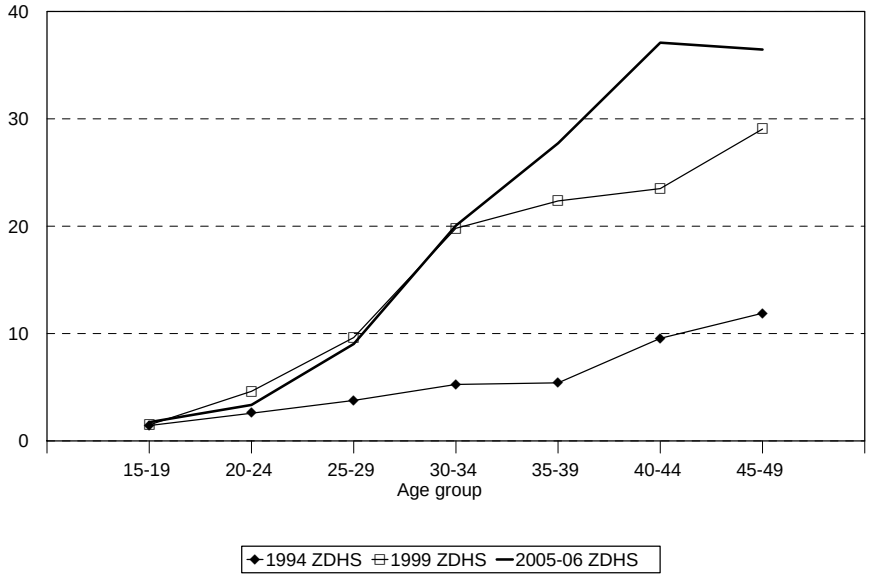


Figure 15.2 **Trends in Age-specific Mortality among Men 15-49, Zimbabwe 1985-2006**



15.3 DIRECT ESTIMATES OF MATERNAL MORTALITY

Table 15.4 Maternal mortality

Maternal mortality rates for the 10-year period preceding the survey, based on the survivorship of sisters of survey respondents, Zimbabwe 2005-2006

Age	Maternal deaths	Exposure (years)	Mortality rates (1,000)
15-19	9	34,196	0.25
20-24	18	34,920	0.50
25-29	23	29,348	0.79
30-34	28	22,771	1.21
35-39	26	16,473	1.59
40-44	16	10,823	1.46
45-49	3	6,220	0.51
Total 15-49	122	154,751	0.76[a]
General fertility rate[1]			0.137
Maternal mortality ratio[2]			555

[a] Rates are age-standardised
[1] Expressed per 1,000 woman-years of exposure
[2] Expressed per 100,000 live births; calculated as maternal mortality rate divided by the general fertility rate

Maternal deaths are a subset of all female deaths and are associated with pregnancy and childbearing. Two survey methods are generally used to estimate maternal mortality in developing countries: the indirect sisterhood method (Graham et al., 1989) and a direct variant of the sisterhood method (Rutenberg and Sullivan, 1991). In this report, the direct estimation procedure is applied.

Age-specific estimates of maternal mortality from the reported survivorship of sisters are shown in Table 15.4 for the 10-year period before the survey. These rates were calculated by dividing the number of maternal deaths by woman-years of exposure. To remove the effect of truncation bias (the upper boundary for eligibility for women interviewed in the survey is 49 years), the overall rate for women age 15-49 was standardised by the age distribution of survey respondents. Maternal deaths were defined as any death that was reported as occurring during pregnancy, childbirth, or within two months after the birth or termination of a pregnancy.[2] Estimates of maternal mortality are therefore based solely on the timing of the death in relationship to pregnancy.

The results in Table 15.4 indicate that the rate of mortality associated with pregnancy and childbearing is 0.76 maternal deaths per 1,000 woman-years of exposure. The estimated age-specific mortality rates display a plausible pattern, being generally higher during the peak childbearing ages than at the younger and older age groups. However, the age-specific pattern should be interpreted with caution because of the small number of events—only 122 maternal deaths for women of all ages. Maternal deaths represent 7 percent of all deaths to women age 15-49 during the 10-year period preceding the survey (122 maternal deaths/1,704 female deaths). The low proportion of maternal deaths could be due to an increase in nonmaternal deaths (e.g., AIDS-related deaths) or to underreporting of maternal deaths in the survey.

The maternal mortality rate can be converted to a maternal mortality ratio by dividing the rate by the general fertility rate during the 10-year period prior to the 2005-06 ZDHS. The maternal mortality ratio is expressed per 100,000 live births in order to emphasise the obstetrical risk of pregnancy and childbearing. The estimate of the maternal mortality ratio for the 10-year period prior to the 2005-06 ZDHS is 555 deaths per 100,000 live births, i.e., for every 1,000 births in Zimbabwe, there are just under six maternal deaths.

It should be noted that maternal mortality is a difficult indicator to measure because of the large sample sizes required to calculate an accurate estimate. (This is evidenced by the fact that the maternal mortality ratio is expressed per 100,000 live births, demonstrating that it is a relatively rare event.) As a result, the maternal mortality estimates are subject to large sampling errors. Thus, although the 2005-06 ZDHS maternal mortality ratio is somewhat lower than the 1999 estimate of 578, the difference between the two figures is not statistically significant. Thus, it is not possible to conclude that there has been any change in maternal mortality in Zimbabwe.

[2] This time-dependent definition includes all deaths that occurred during pregnancy and two months after pregnancy, even if the death was due to nonmaternal causes. However, this definition is unlikely to result in overreporting of maternal deaths because most deaths to women during the two-month period are due to maternal causes, and maternal deaths are more likely to be underreported than overreported.