EARLY CHILDHOOD MORTALITY 8

8.1 BACKGROUND AND ASSESSMENT OF DATA QUALITY

In 1999, Zimbabwe was home for 1.7 million children under age five. Every year, about 400,000 babies are born in Zimbabwe; many do not survive to reach their first birthday. This chapter presents information on levels, trends and differentials in neonatal, postneonatal, infant, and child mortality. This information is important to both the demographic assessment of the population and the evaluation of health policies and programmes. Estimates of infant and child mortality may be used as inputs into population projections, particularly if the level of adult mortality is known from another source or can be inferred with reasonable confidence. Information on the mortality of children also serves the needs of agencies providing health services by identifying sectors of the population that are at high mortality risk.

The rates of childhood mortality presented here are defined as follows:

- **Neonatal mortality (NN):** the probability of dying within the first month of life,
- **Postneonatal mortality (PNN):** the arithmetic difference between infant and neonatal mortality
- **Infant mortality ($_1q_0$):** the probability of dying between birth and the first birthday
- **Child mortality ($_4q_1$):** the probability of dying between exact age one and the fifth birthday
- **Under-five mortality ($_5q_0$):** the probability of dying between birth and the fifth birthday.

All rates are expressed as deaths per 1,000 live births, except child mortality, which is expressed as deaths per 1,000 children surviving to the first birthday.

Information drawn from the questions asked in the birth history section of the women's questionnaire is used to calculate the mortality rates presented in this chapter. First, the respondents are asked a series of questions about their childbearing experience. In particular, they are asked to report the number of sons and daughters who live with them, the number who live elsewhere, and the number who have died. In the birth history, for each live birth, information is collected on sex, month and year of birth, survivorship status and current age, and age at death if the child died.

The quality of mortality estimates calculated from retrospective birth histories depends on the mother's ability to recall all of the children she had given birth to, as well as their birth dates and age at death. The most potentially serious data quality problem is the selective omission of births that did not survive from the birth histories, which will lead to underestimation of mortality rates. Other potential problems include displacement of birth dates, which may cause a distortion of mortality trends, and misreporting of age at death, which may distort the age-pattern of mortality.

Inspection of the data quality indicates that there is no evidence of selective underreporting or misreporting of age at death. First, the number of early infant deaths that have been omitted is insignificant, the proportion of neonatal deaths that occur in the first week of life is roughly constant over the 15 years before the survey (between 70 and 78 percent) and the proportion of infant deaths that occur during the first month of life is plausible (47 percent) and is constant over the 15 years preceding the survey (varying between 44 and 47 percent) (see Appendix C).

It is also important to note that any method of measuring childhood mortality that relies on mothers' reports (e.g., birth histories) rests on the assumption that female adult mortality is not high, or if it is high, that there is little or no correlation between the mortality risks of mothers and their children. In countries with high rates of female adult mortality, these assumptions may not hold and the resulting childhood mortality rates will be understated to some degree.

8.2 INFANT AND CHILD MORTALITY

Table 8.1 presents childhood mortality rates for three five-year periods before the survey. The data show that under-five mortality is 102 per 1,000 live births, which means that one in ten children born in the past five years did not live to their fifth birthday. Two in three of these deaths occurred before age one. During the same period, the deaths in each of the three relevant age segments are 29 per 1,000 for neonatal mortality (<1 month), 36 per 1,000 for postneonatal mortality (1-11 months), and 40 per 1,000 for child mortality (1-4 years).

Table 8.1 Early childhood mortality rates

Neonatal, postneonatal, infant, child, and under-five mortality for five-year periods preceding the survey, Zimbabwe 1999

Years preceding the survey	Neonatal mortality (NN)	Postneonatal mortality[1] (PNN)	**Infant mortality ($_1q_0$)**	Child mortality ($_4q_1$)	**Under-five mortality ($_5q_0$)**
0-4	28.9	36.2	65.0	39.6	102.1
5-9	23.3	30.6	53.8	24.4	76.9
10-14	19.3	20.5	39.8	20.0	59.0

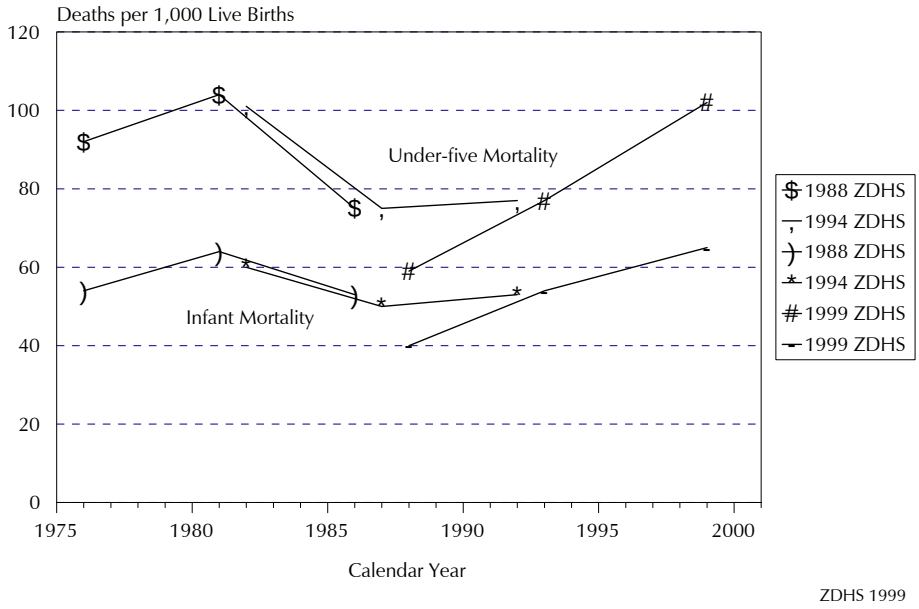
[1] Computed as the difference between the infant and the neonatal mortality rates.

The 1999 ZDHS data indicate that survival at all ages below five years had not improved from the period 1985-1989 to the period 1995-1999. To evaluate the quality of estimates on levels and trends in childhood mortality, estimates based on retrospective data from the present survey are compared with previously collected data of the same type. Figure 8.1 shows trends in infant and under-five mortality based on data from the 1988, 1994 and 1999 ZDHS surveys. The consistency between the data from the three surveys is remarkable. From the 1988 survey, infant mortality was estimated at 53 per 1,000 and under-five mortality at 75 per 1,000 for the 1984-1988 period, which are nearly identical to rates for the comparable calendar period from the 1994 survey. From the 1999 survey, infant mortality was estimated at 54 per 1,000 and under-five mortality at 77 per 1,000 for the 1989-94 period, which are nearly identical to rates for the comparable calendar period from

the 1994 survey. Furthermore, all surveys identify a drop of almost equal magnitude in infant and child mortality during the 1980s and an increase during the 1990s. Thus, there is clear indication of falling rates of early childhood mortality in Zimbabwe up until the late 1980s, after which there is a decline in child survival prospects.

Three possible explanations have been cited for the recent increase in childhood mortality rates (CSO and MI, 1995). They include the worsening of Zimbabwe's economic condition and the direct and indirect impact of the AIDS epidemic. Furthermore, to achieve significant health improvement, it was suggested that programmes need to address the underlying causes of poor health, such as poverty. In the five years since 1994, the economy of the country has declined dramatically, which may have altered household decisions on the use of health services facilities even more.

Figure 8.1 Trends in Infant and Under-Five Mortality 1988, 1994, and 1999



8.3 SOCIOECONOMIC DIFFERENTIALS IN EARLY CHILDHOOD MORTALITY

Table 8.2 shows differentials in infant and child mortality by residence, mother's level of education and type of antenatal care and delivery assistance. The mortality estimates are calculated for a ten-year period before the survey so that the rates are based on a sufficient number of cases in each category to ensure statistically reliable estimates.

Survival rates are much higher in urban than in rural areas. For example, the infant mortality rate is 47 in urban areas, compared with 65 deaths per 1,000 live births in rural areas (see Figure 8.2). There is substantial variation between provinces. For infant mortality, the rate in Mashonaland Central is twice as high as in Matabeleland North (87 deaths per 1,000 live births compared with 39). It is interesting to note that Harare and Bulawayo, being the most urbanised areas in the country, do not necessarily exhibit the best mortality condition.

Table 8.2 Early childhood mortality by socioeconomic characteristics

Neonatal, postneonatal, infant, child, and under-five mortality for the ten-year period preceding the survey, by selected socioeconomic characteristics, Zimbabwe 1999

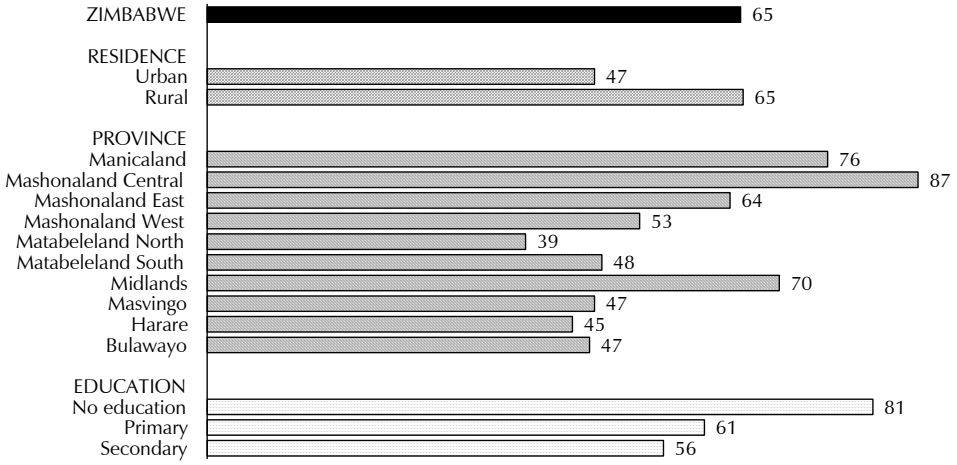
Socioeconomic characteristic	Neonatal mortality (NN)	Post-neonatal mortality[1] (PNN)	**Infant mortality ($_1q_0$)**	Child mortality ($_4q_1$)	**Under-five mortality ($_5q_0$)**
Residence					
Urban	21.8	25.4	47.2	22.8	69.0
Rural	28.2	37.2	65.3	36.7	99.7
Province					
Manicaland	34.3	41.3	75.6	54.4	125.8
Mashonaland Central	37.6	49.0	86.6	27.2	111.4
Mashonaland East	30.3	33.4	63.7	39.2	100.4
Mashonaland West	20.9	31.8	52.7	36.4	87.1
Matabeleland North	(17.4)	21.5	38.8	19.2	57.3
Matabeleland South	(25.3)	22.8	48.1	21.9	69.0
Midlands	34.5	35.2	69.7	29.9	97.6
Masvingo	11.5	35.7	47.2	23.0	69.1
Harare	17.9	26.6	44.5	27.4	70.7
Bulawayo	26.3	20.3	46.6	20.6	66.2
Mother's education					
No education	42.9	38.2	81.1	41.0	118.8
Primary	28.6	32.1	60.6	35.4	93.9
Secondary	20.3	35.3	55.6	27.6	81.7
More than secondary	*	*	*	*	21.3
Medical maternity care[2]					
No antenatal or delivery care	(64.2)	61.5	125.7	NA	NA
Either antenatal or delivery care	36.0	38.5	74.6	NA	NA
Both antenatal and delivery care	17.7	29.3	47.0	NA	NA
Total	26.2	33.5	59.7	32.5	90.3

Note: Rates in parentheses are based on 250 to 499 exposed persons. Rates based on fewer than 250 exposed persons are not shown (*).
NA = Not applicable
[1] Computed as the difference between the infant and the neonatal mortality rates
[2] Rates for the five-year period before the survey. Medical care is that given by a doctor, nurse, trained midwife, or received in a hospital, clinic, health center, or health post.

There is a strong negative association between a mother's level of education and children's survival; whereas the children of uneducated mothers experience an under-five mortality rate of 119 per 1,000, that of children of women with higher than a secondary education is only 21 per 1,000. This education-survival relationship is detected at all ages under five years. Better-educated mothers are likely to have greater knowledge of nutrition, hygiene, and other practices related to child care and are more likely to use health services.

Maternal care during pregnancy and delivery plays a significant role in the health of both mother and child and thus in the risk of early childhood mortality. The 1999 ZDHS data show that children born in the five-year period preceding the survey to women who obtained *both* antenatal

Figure 8.2 Infant Mortality by Background Characteristics, Zimbabwe 1999



Note: Rates are for the 10-year period preceding the survey except the rate for all Zimabwe (5-year period).

ZDHS 1999

and delivery care from medically trained persons are less than half as likely to die during infancy as children whose mothers received neither. Having either antenatal or delivery care decreases the mortality risks significantly.

8.4 BIODEMOGRAPHIC DIFFERENTIALS IN EARLY CHILDHOOD MORTALITY

The relationship between early childhood mortality and various demographic variables is examined in Table 8.3. In general, male children experience slightly higher mortality than their female counterparts. Infant mortality for males and females is 63 and 56 deaths per 1,000 births, respectively, while under-five mortality rates for males and females are 95 and 85 deaths, respectively.

The relationship between childhood mortality and mother's age at birth shows the expected U-shaped pattern at all ages under five years; with children of the youngest and the oldest women experiencing the highest risk of death. A similar, but less pronounced, pattern occurs for birth order. Generally, first-order births and very high-order births (seventh or more) have higher mortality rates than births of orders two through six. Data from the 1994 ZDHS show the same patterns.

Studies have found that a longer birth interval increases a child's chance of survival. Data from the 1999 ZDHS support this theory; children born less than two years after a preceding sibling are more than twice as likely to die in infancy as those born two to three years after a preceding sibling (112 compared with 44 per 1,000). This link between the pace of childbearing and child survival rates is observed in all age groups. These findings point out the potential for mortality reduction that could result from successful efforts to promote birth spacing in Zimbabwe.

Table 8.3 Early childhood mortality by biodemographic characteristics

Neonatal, postneonatal, infant, child, and under-five mortality for the ten-year period preceding the survey, by selected biodemographic characteristics, Zimbabwe 1999

Biodemographic characteristic	Neonatal mortality (NN)	Post-neonatal mortality[1] (PNN)	**Infant mortality ($_1q_0$)**	Child mortality ($_4q_1$)	**Under-five mortality ($_5q_0$)**
Sex of child					
Male	28.3	34.8	63.1	34.5	95.4
Female	24.1	32.2	56.2	30.5	85.0
Mother's age at birth					
< 20	34.5	31.6	66.1	33.0	97.0
20-29	24.9	33.3	58.2	33.9	90.1
30-39	21.2	32.6	53.9	27.9	80.3
40-49	*	57.0	89.1	(43.7)	(128.9)
Birth order					
1	30.6	35.0	65.5	25.1	89.0
2-3	22.4	30.9	53.3	34.1	85.6
4-6	26.4	28.8	55.1	36.5	89.6
7+	26.1	48.2	74.3	38.1	109.6
Previous birth interval					
< 2 years	53.7	58.1	111.8	48.7	155.1
2-3 years	17.7	26.4	44.1	37.1	79.6
4 or more years	21.2	32.7	53.9	25.0	77.6
Birth size[2]					
Small and very small	64.1	54.7	118.8	NA	NA
Average or larger	20.5	31.4	51.9	NA	NA
Don't know	162.2	160.2	322.4	NA	NA

Note: Rates based on 250 to 499 exposed persons are in parentheses. Rates based on fewer than 250 exposed persons are not shown (*).
NA = Not applicable
[1] Computed as the difference between the infant and the neonatal mortality rates.
[2] Rates for the five-year period before the survey.

A child's size at birth is an important indicator of the risk of dying during infancy, particularly during the first months of life. In the 1999 ZDHS, in addition to recording the actual birth weight, interviewers asked mothers whether the reference child was very small, small, average size, large, or very large at birth. This type of subjective assessment has been shown to correlate closely with actual birth weight. Newborns perceived by their mothers to be very small or small are twice as likely to die in the first year than those perceived as average or larger in size. As expected, the differential is especially large during the neonatal period.

8.5 PERINATAL MORTALITY

Table 8.4 presents the level of mortality at the earliest stage of life. The distinction between a stillbirth and an early neonatal death (deaths in the first week after birth) is recognised as a fine one. Furthermore, the causes of stillbirths and early neonatal deaths are closely linked, and examining one in isolation from the other can understate the true level of mortality around delivery. For this reason, deaths around delivery are combined into the perinatal mortality rate. Information on stillbirths is available for the five years preceding the survey and is collected using the calendar at the end of the women's questionnaire.

Table 8.4 indicates that the perinatal mortality rate for the country as a whole is 39 deaths per 1,000 pregnancies. The differentials in perinatal mortality across selected background characteristics of the mothers are similar to those in neonatal mortality. The rate increases with shorter pregnancy intervals and declines with women's education. However, unlike neonatal mortality, perinatal mortality is not lower in urban areas or provinces with urban characteristics (Harare and Bulawayo).

Table 8.4 Perinatal mortality

Stillbirths, early neonatal deaths and perinatal mortality rate by selected background characteristics for the ten-year period preceding the survey, Zimbabwe 1999

Background characteristic	Number of stillbirths[1]	Number of early neonatal deaths[2]	Perinatal mortality rate[3]	Number of pregnancies of 7 or more months duration in the last 10 years
Mother's age at birth				
<20	8	23	42.7	739
20-29	34	37	37.1	1,936
30-39	6	20	33.9	761
40-49	4	3	65.3	118
Previous pregnancy interval				
<15 months	4	13	55.1	304
15-26 months	14	16	44.5	681
27-38 months	8	4	19.4	599
39+ months	12	18	35.7	831
Residence				
Urban	21	26	40.5	1,164
Rural	32	58	37.6	2,390
Province				
Manicaland	8	18	44.3	568
Mashonaland Central	3	12	44.2	335
Mashonaland East	4	9	41.2	314
Mashonaland West	4	4	23.2	347
Matabeleland North	0	4	19.8	183
Matabeleland South	3	6	40.8	221
Midlands	8	13	45.2	454
Masvingo	5	2	18.3	359
Harare	13	12	44.4	562
Bulawayo	5	6	53.4	211
Mother's education				
No education	1	10	44.2	248
Primary	30	41	44.3	1,601
Secondary	22	32	33.1	1,632
Higher	0	1	13.3	73
Total	53	84	38.5	3,554

[1] Stillbirths are fetal deaths to pregnancies lasting seven or more months.
[2] Early neonatal deaths are deaths to live-born children at days 0 to 7 since birth.
[3] Perinatal mortality rate is the sum of the number of stillbirths and early neonatal deaths divided by the number of pregnancies of seven or more months of duration.

8.6 HIGH-RISK FERTILITY BEHAVIOUR

Typically, infants and young children have a higher risk of dying if they are born to very young mothers or older mothers, if they are born after a short interval, or if their mothers have already had many children. In the following analysis, mothers are classified as too young if they are less than 18 years old at the time of the birth, and too old if they are age 35 years or more at the time of the birth. A short birth interval is defined as less than 24 months, and a high-order birth is defined as occurring after four or more previous births (i.e., birth order 5 or higher). A birth may be at an elevated risk of dying due to a combination of characteristics.

The first column of Table 8.5 shows the percentage of births in the five years before the survey classified by various risk categories. Overall, 42 percent of births are in at least one high-risk category: 28 percent are in a single high-risk category, and 14 percent have multiple high-risk characteristics. The second column shows the risk ratios, which are calculated as the ratio of the proportion in a category who have died to the proportion in the reference category who have died. Births in the reference category are those who do not fall into any high-risk category (risk ratio equals 1.00). The primary factor leading to heightened mortality risk in Zimbabwe is short birth interval, as a single (1.71) or multiple high-risk factor, followed by high birth order (1.34). However, since the largest percentage of high-risk births in Zimbabwe are of high birth order (16 percent), this operates to reduce the associated risk ratios in the overall single high-risk category (1.3) and the overall multiple high-risk category (1.6).

The third column of Table 8.5 shows the distribution of currently married women by the risk category into which a currently conceived birth would fall. The data in the table shows that 29 percent of women are not in any elevated mortality risk category and 7 percent have only given birth once. Among those who are in a situation that causes an elevated mortality risk (64 percent of women), 30 percent have a single high risk and 34 percent have multiple risks. A comparison of this percentage with the distribution of actual births in the past five years indicates that without fertility control, the percentage of births falling into each of the multiple high-risk categories would rise from 14 percent to 34 percent.

Table 8.5 High-risk fertility behaviour

Percent distribution of children born in the five years preceding the survey by category of elevated risk of dying and the risk ratio, and percent distribution of currently married women by category of risk if they were to conceive a child at the time of the survey, Zimbabwe 1999

Risk category	Births in the 5 years preceding the survey		Percentage of currently married women[1]
	Percentage of births	Risk ratio	
Not in any high-risk category	32.5	1.00	29.2[a]
Unavoidable risk category (First births)	25.8	1.15	6.9
Single high-risk category			
Mother's age <18	7.5	1.02	1.1
Mother's age >34	0.5	0.89	3.8
Birth interval <24 months	3.7	1.71	11.8
Birth order >3	15.8	1.34	13.3
Subtotal	27.5	1.29	30.0
Multiple high-risk category			
Age <18 & birth interval <24 months[2]	0.2	3.43	0.4
Age >34 & birth interval <24 months	0.0	-	0.1
Age >34 & birth order >3	10.5	1.39	24.7
Age >34 & birth interval <24 months and birth order >3	0.9	1.79	2.7
Birth interval <24 months and birth order >3	2.6	2.35	6.0
Subtotal	14.2	1.62	33.9
In any avoidable high-risk category	41.7	1.40	63.9
Total	100.0	NA	100.0
Number of births	3,559	NA	3,609

Note: Risk ratio is the ratio of the proportion dead among births in a specific high-risk category to the proportion dead among births *not in any high-risk category*.
NA = Not applicable
[1] Women are assigned to risk categories according to the status they would have at the birth of a child, if they were to conceive at the time of the survey: current age less than 17 years and 3 months or older than 34 years and 2 months, latest birth less than 15 months ago, or latest birth being of order 3 or higher.
[2] Includes the combined categories *age <18* and *birth order >3*.
[a] Includes sterilised women