INFANT AND CHILD MORTALITY 8

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This chapter presents levels, trends, and differentials in mortality among children under five years of age in Malawi. This information is relevant both for the demographic assessment of the population and for assessing the impact of child-survival-related programmes. Understanding patterns in mortality during early childhood also assists in the design of health interventions by identifying sectors of the population that are at high risk. The information is thus essential for planning and evaluating current policies. Unlike earlier demographic surveys in Malawi, the 2000 MDHS survey also collected information that allows assessment of perinatal mortality, which includes stillbirths (late foetal deaths) and early neonatal deaths.

8.1 Definitions, Methodology, and Assessment of Data Quality

Estimates of childhood mortality are based on information from the birth history section of the questionnaire administered to individual women. The section begins with questions about the aggregate childbearing experience of respondents (i.e., the number of sons and daughters who live with the mother, the number who live elsewhere, and the number who have died). For each of these births, more detailed information was then collected on the sex, the month and year of birth, survivorship status, and current age, or if the child had died, the age at death.

In this report, mortality in early childhood is measured using the following five rates:

Neonatal mortality: the probability of dying within the first month of life

Postneonatal mortality: the difference between infant and neonatal mortality

Infant mortality: the probability of dying before the first birthday

Child mortality: the probability of dying between the first and fifth birthday

Under-five mortality: the probability of dying between birth and fifth birthday.

All rates are expressed per 1,000 live births, except for child mortality, which is expressed per 1,000 children surviving to 12 months of age.

In developing countries like Malawi, population censuses and demographic surveys are the major sources of mortality data. Vital registration is another potential source of mortality data, but in Malawi unfortunately, the information is incomplete in coverage and unrepresentative of the population. Mortality information from the Health Management Information System (HMIS) does not provide a suitable basis for calculation of mortality rates from a population perspective because the system is facility-based and thus does not include data on deaths that occur outside the facilities. Given this prevailing reality, birth history data from surveys continue to provide for the most robust estimates of infant and child mortality.

The quality of mortality estimates calculated from retrospective birth histories depends upon the completeness with which births and deaths are reported and recorded. The most potentially serious data quality problem is the selective omission from the birth histories of births that did not survive, 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 the age at death, which may distort the age pattern of mortality. When selective omission of childhood deaths occurs, it is usually most severe for deaths that occur very early in infancy. If early neonatal deaths were selectively underreported, the result would be an unusually low ratio of deaths under seven days to all neonatal deaths and an unusually low ratio of neonatal to infant mortality. Underreporting of early infant deaths is more commonly observed for births that occurred longer before the survey; hence, it is useful to examine the ratios over time. Inspection of these ratios (shown in Appendix Tables C.5 and C.6) indicates that significant numbers of early infant deaths have not been omitted in the 2000 MDHS survey. First, the proportion of neonatal deaths that occur in the first week of life is high (67 percent) and is roughly constant over the 20 years before the survey (between 66 and 71 percent). Second, the proportion of infant deaths that occur during the first month of life is entirely plausible in level (42 percent) and is stable over the 20 years before the survey (varying between 38 and 44 percent). This inspection of the mortality data reveals no evidence of selective underreporting or age at death misreporting that would significantly compromise the quality of the MDHS rates of childhood mortality.

It is important to recognize that any method of measuring childhood mortality that relies on mothers' reports (e.g., full or abbreviated birth histories like those used in censuses and sample surveys) rests on the assumption that adult female 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 adult female mortality, these assumptions will seldom hold, and the resulting childhood mortality rates will be underestimated to some degree.

8.2 Early Childhood Mortality Rates: Levels and Trends

Neonatal, postneonatal, infant, child, and under-five mortality rates, by five-year periods preceding the survey, are shown in Table 8.1. Examining the most recent five-year period (0-4 years preceding the survey, or mid-1996 to mid-2000), under-five mortality is estimated at 189 per 1,000 live births, and infant mortality is estimated at 104 per 1,000 live births. This means that one in five children born in Malawi dies before reaching the fifth birthday. The age pattern of mortality shows that 22 percent of deaths under five occur during the neonatal period, while 33 percent occur during the postneonatal period, and 45 percent of deaths occur at age 1-4 years.

Table 8.1 Early childhood mortality rates

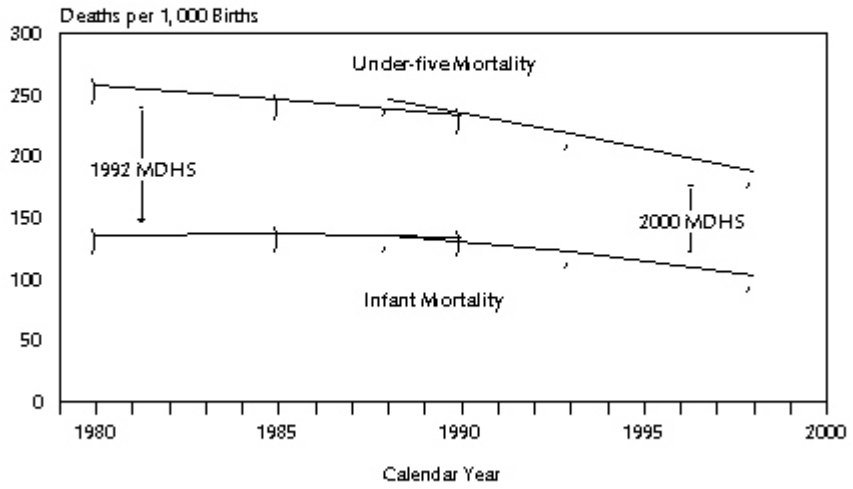
Neonatal, postneonatal, infant, child, and under-five mortality for five-year periods preceding the survey, Malawi 2000

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	41.8	62.0	103.8	94.6	188.6
5-9	50.4	72.3	122.7	110.5	219.7
10-14	51.9	83.6	135.5	129.4	247.4

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

There are two main ways of evaluating trends in under-five mortality. Both are represented in Figure 8.1. In the first approach, the 2000 MDHS data are used to construct mortality rates for successive periods prior to the survey. This approach indicates that under-five mortality has declined by 14 percent, from 220 deaths per 1,000 births in the period 5-9 years before the survey (i.e., 1991-1995) to 189 for the period 0-4 years before the survey (i.e., 1996-2000). This represents a *rate* of mortality decline of 2.8 percent per year during the 1990s.

Figure 8.1 **Trends in Infant and Under-five Mortality, 1992 MDHS and 2000 MDHS**



In the second method of estimating trends in mortality, estimates of mortality from two successive surveys are compared—in this case, the 1992 MDHS survey and the 2000 MDHS survey. The strength of this comparison derives from the fact the surveys used identical data collection instruments and sample design approaches. The estimate calculated from the 1992 MDHS data (for the period 1988-1992) is 234 deaths per 1,000, compared with 189 per 1,000 from the 2000 MDHS data (for the period 1996-2000). This represents a 19 percent decline, or 2.4 percent per year during the late 1980s and 1990s. Thus, the two approaches yield essentially the same picture, one of slowly declining under-five mortality over the last decade or so.

By looking at changes in neonatal mortality, postneonatal mortality, and child mortality (1-4 years), one can assess whether there has been a change in the age pattern of under-five mortality. This examination indicates that mortality at all ages under five years is undergoing a downward trend of roughly the same magnitude: about 20 percent over the past decade. In other words, the age pattern of under-five mortality has not changed substantially.

The causes of childhood mortality in the developing world are many and varied. Similarly, the causes of increases and decreases in under-five mortality are typically multifactoral. The decline in mortality at all ages, as described above, suggests that any explanation of the overall decline in under-five mortality will need to involve detailed examination of trends in numerous child-survival-related variables. This type of analysis of the causes of mortality decline in Malawi is beyond the

scope of this descriptive report. Still, some child-survival-related factors can be posited as potentially involved in the observed trends. Among those that would be expected to enhance child survival, researchers may look to improvements that reduce exposure to disease-causing agents. One important example of this would be the impressive gains made in the provision of clean water supplies to Malawi's rural population (Chapter 2). Increases in the percentage of mothers who have received formal education may also be examined in light of evidence linking education to improved recognition and response to disease symptoms, as well as improved disease prevention behaviours, including adoption of hygienic practices in the household and improved infant feeding. Of course, an important 1990s trend that would be expected to counterbalance, at least in part, these improvements are the direct and indirect effects of the HIV/AIDS epidemic. These issues, and others, will need to be addressed in the context of in-depth further analysis of the MDHS data and other data.

8.3 SOCIOECONOMIC DIFFERENTIALS IN CHILDHOOD MORTALITY

Table 8.2 presents mortality differentials by background characteristics such as urban-rural residence, region, district, and level of education of mothers. A ten-year period (1991-2000) is used to calculate the mortality estimates in order to have a sufficient number of cases in each category.

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 socioeconomic characteristics, Malawi 2000

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	29.8	52.7	82.5	71.3	147.9
Rural	47.9	68.8	116.7	106.0	210.4
Region					
Northern	40.9	60.7	101.5	76.5	170.3
Central	42.0	55.6	97.6	114.6	201.0
Southern	50.5	79.1	129.6	95.2	212.5
Mother's education					
No education	46.2	70.4	116.6	110.8	214.5
Primary 1-4	56.2	72.1	128.3	110.7	224.8
Primary 5-8	36.6	62.5	99.1	87.9	178.3
Secondary+	30.9	34.5	65.4	56.3	118.0
Districts					
Blantyre	37.8	68.3	106.1	94.7	190.7
Karonga	37.6	55.6	93.2	57.9	145.7
Kasungu	37.5	55.6	93.1	125.7	207.1
Lilongwe	42.4	56.1	98.5	105.0	193.2
Machinga	56.3	62.0	118.2	98.8	205.4
Mangochi	51.7	63.9	115.6	95.5	200.1
Mulanje	61.6	68.7	130.3	111.7	227.4
Mzimba	52.6	52.6	105.2	84.7	181.0
Salima	55.0	76.8	131.9	123.9	239.5
Thyolo	58.2	87.3	145.5	93.6	225.4
Zomba	42.6	108.4	151.0	76.7	216.1
Other districts	43.8	65.5	109.3	106.2	203.9
Total[2]	45.7	66.8	112.5	101.7	202.7

[1] Computed as the difference between the infant and the neonatal mortality rates
[2] Note that these rates are for the 10 years before the survey and thus differ from Table 8.1 which is based on the five years before the survey

As expected, urban mortality rates are generally lower than rural rates. The under-five mortality rate is 148 per 1,000 in urban parts of the country, compared with 210 per 1,000 in rural areas. The urban-rural difference is proportionately larger during the neonatal period than during the postneonatal and 1-4 age periods.

Comparing the three regions, the Northern Region has the lowest under-five mortality (170 per 1,000 live births), followed by the Central Region (201 per 1,000) and the Southern Region (212 per 1,000). On the other hand, the infant mortality rate is lowest in the Central Region (98 per 1,000 live births), followed by the Northern Region (102), and is highest in the Southern Region (130). The lower infant mortality rate in the Central Region is due to a lower postneonatal mortality compared with the Northern and Southern regions. These regional differences in the age pattern of under-five mortality was also observed in the 1992 MDHS survey; however, since that time, mortality in the Southern Region has declined at a slower pace, at all ages, than mortality in the other two regions.

Table 8.2 also presents childhood mortality rates in the 11 oversampled districts. Under-five mortality was lowest in the Northern districts of Karonga (146 per 1,000) and Mzimba (181 per 1,000) and was highest in Salima District (239 per 1,000), Mulanje District (227 per 1,000), and Thyolo District (225 per 1,000). For infant mortality, Karonga and Kasungu districts had the lowest rates (93 per, 1,000) while the highest rates were observed in Zomba (151 per 1,000), Thyolo (146 per 1,000), Salima (132 per 1,000), and Mulanje (130 per 1,000).

Mother's education is strongly linked to child survival. At all ages under five, higher levels of education are generally associated with lower mortality risks. As an exception to this pattern, children of women with no formal schooling have slightly lower mortality rates than children of women with one to four years of primary education. Children of women with a secondary education have much lower under-five mortality than children of other women. Strong education-related differentials are apparent during every age period.

8.4 Biodemographic Differentials in Childhood Mortality

Studies have shown that biodemographic factors impact survival chances of young children. These factors include sex of the child, age of the mother at birth, birth order, length of previous birth interval, and the size of the child at birth. Table 8.3 presents mortality rates for the ten years preceding the survey by selected demographic characteristics.

The MDHS results show that male children experience slightly higher mortality than female children, with under-five mortality rates of 207 and 199 deaths per 1,000 live births for males and females, respectively. This differential is apparent during the first year of life, but does not extend beyond the first birthday, suggesting that heritable, nonbehavioural factors are the cause of the difference.

Children born to younger mothers (under 20 years of age) and older mothers (over 40 years) had higher mortality than children born to mothers age 20-39 years (Figure 8.2). Children of mothers under age 20 are especially vulnerable, particularly in the first month of life. Neonatal mortality is 68 deaths per 1,000 among children of teenage mothers, compared with 38 per 1,000 among children of women age 20-29. The relationship between birth order and mortality shows the same U-shaped pattern, with first births and higher order births experiencing the highest mortality rates.

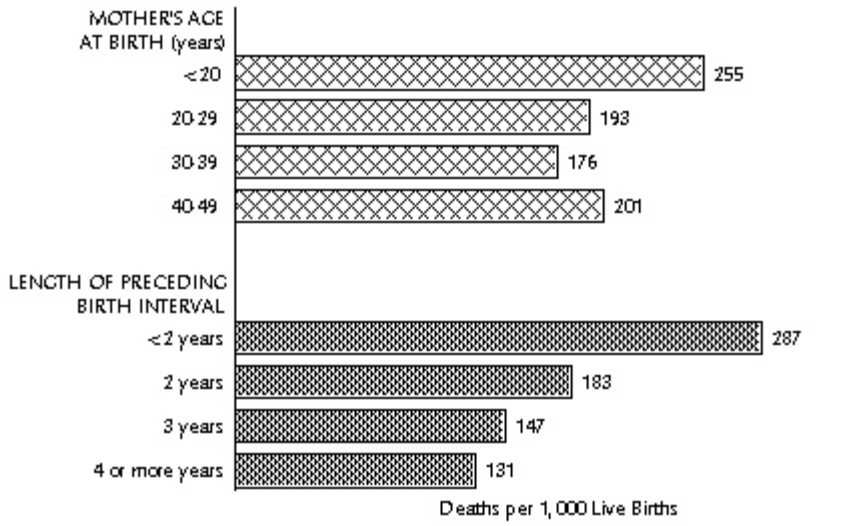
Table 8.3 Early childhood mortality by demographic characteristics

Neonatal, postneonatal, infant, child, and under-five mortality for the ten-year period preceding the survey, by demographic characteristics, Malawi 2000

Demographic 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	50.4	66.8	117.1	101.4	206.6
Female	41.1	66.8	107.9	102.0	198.9
Mother's age at birth					
< 20	67.6	80.6	148.2	125.6	255.2
20-29	37.7	66.6	104.3	99.2	193.1
30-39	40.5	55.6	96.1	88.6	176.1
40-49	67.4	61.3	128.7	82.6	200.6
Birth order					
1	59.9	80.0	139.9	114.4	238.3
2-3	41.6	67.6	109.2	103.7	201.6
4-6	36.1	59.2	95.3	91.8	178.4
7+	51.8	59.4	111.2	98.5	198.7
Previous birth interval[2]					
< 2 years	72.9	93.4	166.3	144.3	286.7
2 years	36.5	58.4	94.9	97.2	182.9
3 years	27.5	45.7	73.1	79.3	146.6
4 or more years	25.6	52.1	77.7	57.6	130.8
Birth size[3]					
Small or very small	82.7	71.0	153.7	na	na
Average or large	32.1	58.7	90.8	na	na

na = Not applicable
[1] Computed as the difference between the infant and the neonatal mortality rates.
[2] Excludes first-order births
[3] Rates for the five-year period before the survey.

Figure 8.2 Under-five Mortality by Biodemographic Characteristics



MDHS 2000

The most potent variable explaining variation in under-five mortality is the length of the interval between births. As the birth interval gets shorter, the risk of child death increases sharply. This pattern is most pronounced in the neonatal period, when a threefold difference in risk is observed between children with an interval less than 24 months (73 per 1,000) and those with a interval of 4 years or more (26 per 1,000). The findings suggest the potential for reducing the mortality risks of Malawian children by promoting family planning use and traditional practices (such as long durations of breastfeeding) to space children farther apart.

The size of a child at birth provides an important predictor of survival during early infancy. In the 2000 MDHS survey, mothers were asked whether their young children were very small, small, average, large, or very large at birth. A mother's perception of "size" is broadly correlated to her child's actual weight at birth. Newly born babies perceived by their mothers to be small or very small are much more likely to die in the first year of life (154 per 1,000 live births) than those perceived as average or larger in size (91 per 1,000 live births). The excess mortality associated with small size at birth is especially evident during the neonatal period.

8.5 Perinatal Mortality

The 2000 MDHS survey asked women to report on pregnancy losses and the duration of the pregnancy for each loss, for all such pregnancies ending in the five years before the survey. Pregnancy losses occurring after seven completed months of gestation (stillbirths) plus deaths to live births within the first seven days of life (early neonatal deaths) constitute perinatal deaths. When the total number of perinatal deaths is divided by the total number of pregnancies reaching seven months gestation, the perinatal mortality rate is derived. The routine collection of data to estimate rates of perinatal mortality is new to sample survey research in sub-Saharan Africa. An important consideration in the evaluation of the results of this new initiative is the quality or completeness of reports on stillbirths, which are susceptible to omission, underreporting, or misclassification (as early neonatal deaths). The distinction between a stillbirth and an early neonatal death may be a fine one, depending often on the observed presence or absence of some faint signs of life after delivery. The causes of stillbirths and early neonatal deaths are overlapping, and examining just one or the other can understate the true level of mortality around delivery. For this reason, it is suggested that both event types be combined and examined together.

Table 8.4 shows perinatal mortality rates, according to demographic and socioeconomic characteristics. At the national level, the perinatal mortality rate is estimated to be 46 perinatal deaths per 1,000. Perinatal mortality displays the expected U-shaped pattern in relation to age of the mother, with the youngest and oldest women having the highest rates. First pregnancies and pregnancies with a short preceding interpregnancy interval are also at high perinatal risk. First pregnancies have a perinatal risk of 63 perinatal deaths per 1,000, and pregnancies with a interpregnancy interval of less than 15 months carry a risk of 80 perinatal deaths per 1,000, compared with a risk of just 34 per 1,000 for pregnancies with an interpregnancy interval of 39 months or more.

Perinatal mortality is higher in rural areas (48 per 1,000) than in urban areas (35 per 1,000). At the regional level, the differences in perinatal mortality rates are minimal: 42 per 1,000 in the Northern Region, 46 per 1,000 in the Central Region, and 47 per 1000 in the Southern Region. It is, however, worth noting that perinatal mortality is higher for women with one to four years of primary education (52 per 1,000) than for those with no education (44 per 1,000) and those with secondary or higher education (42 per 1,000). These differentials are similar to those observed for under-five mortality.

Table 8.4 Perinatal mortality

Number of stillbirths and early neonatal deaths, and perinatal mortality rate for the five-year period preceding the survey, by background characteristics, Malawi 2000

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
Mother's age at birth				
<20	39	125	65.9	2,484
20-29	78	178	38.2	6,718
30-39	36	68	39.8	2,599
40-49	10	34	78.2	563
Previous pregnancy interval				
No previous pregnancy	43	130	62.5	2,779
<15 months	9	28	79.8	456
15-26 months	30	102	49.7	2,653
27-38 months	32	91	35.9	3,432
39+ months	49	53	33.7	3,044
Residence				
Urban	21	32	34.9	1,524
Rural	142	373	47.5	10,840
Region				
Northern	18	39	42.4	1,352
Central	78	168	45.9	5,365
Southern	67	197	46.8	5,647
Mother's education				
No education	48	125	43.8	3,945
Primary 1-4	51	154	51.7	3,961
Primary 5-8	55	103	42.9	3,666
Secondary+	10	23	41.7	791
Total	163	405	45.9	12,364

[1] Stillbirths are fetal deaths among pregnancies lasting seven or more months.
[2] Early neonatal deaths are deaths at age 0 to 6 days among live-born children.
[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 duration.