

This chapter presents levels, trends, and differentials in mortality among children under five years of age in Tanzania. Specifically it includes details on neonatal, postneonatal, infant, and child mortality. Additional information is provided on high-risk fertility behaviour among Tanzanian women. Rates of infant and child mortality reflect a country's level of socioeconomic development and quality of life. The analysis provides an opportunity to assess programmes aimed at the reduction of infant and child mortality in Tanzania. The information is essential for planning and updating current policies.

7.1 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 began 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, 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.

This information is used to directly estimate mortality rates. 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 Tanzania, population censuses and demographic surveys are the major sources of mortality data. Vital registration is another source of mortality data in Tanzania, but unfortunately, the information is not widely used because it is incomplete and disproportionately represents the urban population. Also, mortality information from the Health Management Information System (HMIS) does not reflect the mortality picture from a population perspective, because it is facility-based data and thus does not include deaths that occur outside of facilities. The Adult Morbidity and Mortality Project (AMMP) in Tanzania reported that 60 percent of child deaths in Dar es Salaam took place in a hospital; however, in Morogoro, only 20 percent of children died in a hospital. In this case, birth history information from surveys gives the most robust estimates of infant and child mortality. Estimates of mortality from the censuses employed indirect techniques that adjust reported data for expected errors, while estimates from the series of TDHS surveys are based on data as reported directly, with no adjustments. Results from direct estimates are viewed

with a certain degree of uncertainty since they can underestimate mortality rates. Women tend to omit the deaths of babies who died shortly after birth or deaths that occurred early in infancy. The incidence of omission or misstatement of date of birth and age at death is likely to be greater among older women, who may have more difficulty remembering events. Examination of data relating to child mortality does not indicate that there are any serious biases in reporting (Appendix Tables C.5 and C.6).

7.2 CHILDHOOD MORTALITY LEVELS AND TRENDS

Neonatal, postneonatal, infant, child, and under-five mortality rates by five-year periods preceding the survey are shown in Table 7.1. Levels shown reflect up to 15 years before the survey. Analysing the most recent five-year period (0-4 years preceding the survey or mid-1994 to mid-1999), under-five mortality is estimated at 147 per 1,000 live births, and infant mortality is 99 per 1000 live births.

These figures indicate that one in seven children born in Tanzania dies before reaching the fifth birthday. The pattern shows that 28 percent of deaths under five occur during the neonatal period, while 40 percent occur during the postneonatal period and 36 percent of deaths occur at ages 1-4 years.

There are two ways to measure trends in mortality, each giving a different indication of the direction of change. Data from the 1999 TRCHS birth histories were used to construct mortality rates for successive time periods prior to the survey. As shown in Table 7.1, this method implies that under-five mortality has declined substantially from 178 deaths per 1,000 births in the period 5-9 years before the survey (approximately 1990-94) to 147 for the period 0-4 years before the survey. Because this method relies on mothers' memories of events that may have taken place some years ago, the data are potentially subject to various distortions due to misreporting of events and/or their timing.

The second method of measuring trends in mortality is to compare data from two successive surveys. A comparison of data from the 1999 TRCHS and the 1996 TDHS indicates that childhood mortality has increased, from 137 per 1,000 births to 147 for the under-five mortality rate. Infant mortality has increased by from 88 to 99 per 1,000 births (BOS and MI, 1997: 98).

A recent study took a closer look at all the data on mortality levels from the 1999 TRCHS as well as from the 1991-92 and 1996 TDHS surveys (MEASURE DHS+ and MEASURE Evaluation, unpublished presentation). The trend analysis focused on the comparison of four-year rates in urban and rural Mainland Tanzania and on the possible role of the AIDS epidemic. It was concluded that there is a need to be very cautious in interpreting mortality trends because sampling errors associated with measures of childhood mortality are large. The problem of sampling errors is largest in the urban areas, where sample sizes are smaller. In urban Mainland Tanzania, child mortality levels appear to have increased after 1996, especially in the neonatal period. However, it cannot

Table 7.1 Infant and child mortality

Infant and child mortality rates by five-year periods preceding the survey, Tanzania 1999

Years preceding survey	Neonatal mortality (NN)	Postneonatal mortality (PNN)	Infant mortality (₁ Q ₀)	Child mortality (₄ Q ₁)	Under-five mortality (₅ Q ₀)
0-4	40.4	58.7	99.1	52.7	146.6
5-9	50.6	67.0	117.6	68.5	178.0
10-14	31.4	78.9	110.2	67.8	170.5

be excluded that the urban estimate for 1996 underestimated child mortality and exaggerated the decline during the early 1990s. It still appears that urban mortality has increased somewhat—compared with the estimates for 1987-91 from the TDHS 1991—and part of this increase is likely due to HIV/AIDS. Overall, Tanzanian mortality levels and trends are largely determined by what happens in the rural areas, where the majority of the population lives. There is some evidence of a modest increase or levelling off in the rural Mainland after 1996. In Zanzibar, child mortality levels are lower than in Mainland Tanzania. There is no evidence of any further decline during the nineties.

7.3 CHILDHOOD MORTALITY DIFFERENTIALS

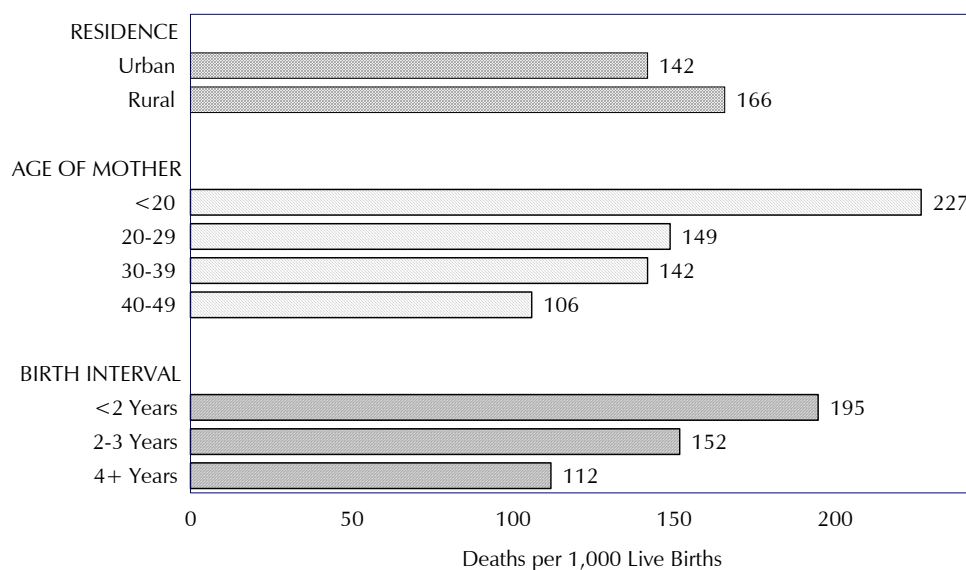
Table 7.2 presents mortality differentials by selected background characteristics, such as place of residence and level of education of mothers. A ten-year period (1990–99) is used to calculate the mortality estimates in order to have a sufficient number of cases in each category, except for size at birth, for which a five-year period is used.

Background characteristic	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality (${}_1q_0$)	Child mortality (${}_4q_1$)	Under-five mortality (${}_5q_0$)
Residence					
Urban	52.0	35.3	87.3	59.6	141.6
Rural	43.4	69.5	113.0	59.7	165.9
Mainland/Zanzibar					
Mainland	45.4	63.0	108.5	60.5	162.4
Urban	53.2	35.6	88.8	61.4	144.7
Rural	43.5	69.9	113.4	60.2	166.8
Zanzibar	35.2	47.9	83.0	34.1	114.3
Education					
No education	52.1	65.6	117.7	54.1	165.4
Primary incomplete	47.0	67.1	114.0	64.0	170.7
Primary complete+	40.5	59.4	99.9	61.4	155.2
Total	45.2	62.6	107.8	59.7	161.1

As expected, urban mortality rates are generally lower than in rural areas, as can be seen in Table 7.2 and Figure 7.1, where the urban under-five mortality rate is 142 per 1,000 versus 166 for rural areas. The difference is largest at the postneonatal period, while surprisingly, neonatal mortality is higher in urban areas. Comparing the Tanzanian Mainland and Zanzibar, as in the 1991-92 and 1996 surveys, mortality rates in Zanzibar continue to be lower than in the Mainland. From the 1999 TRCHS, infant mortality in Zanzibar is 24 percent lower than it is in the Mainland, while the under-five mortality rate is lower by 30 percent.

Table 7.2 also shows that mother's education has an inverse relationship with infant and under-five mortality. This conforms to the universal observation that children of educated mothers

Figure 7.1 Under-five Mortality by Selected Background Characteristics



Note: Rates are for the 10-year period preceding the survey.

TRCHS 1999

have lower mortality than those whose mothers are uneducated. Table 7.2 reveals that mortality rates for children born to mothers with no education are higher than those whose mothers have completed primary.

Studies have shown that demographic factors of both mother and child can have an impact on infant and child mortality. These factors include sex of the child, age of the mother at child's birth, birth order, length of previous birth interval, and the size of the child at birth. Table 7.3 presents mortality rates for the ten years preceding the survey by selected demographic characteristics.

The results show that male children experience higher mortality than female children, with under-five mortality rates of 172 and 150 deaths per 1,000 live births, for males and females, respectively. Children born to mothers younger than 20 years of age had higher mortality than children born to older mothers. Paradoxically, children born to older women (40-49 years) had the lowest under-five mortality (see Figure 7.1); however, for postneonatal mortality and infant mortality, the pattern is a U-shaped curve.

As expected, first births and higher order births experience higher infant mortality. For example, the infant mortality rate for first births (130 per 1,000) and births of order seven and higher (108) are substantially higher than the rate of 90 for birth order 4-6.

Information provided in Table 7.3 and Figure 7.1 shows that short birth intervals pose a high risk for child survival both during and after infancy. Children born less than two years after a preceding sibling are more likely to die before reaching age five than those born four or more years after a preceding sibling (195 versus 112 per 1,000). A similar pattern is observed for neonatal mortality, postneonatal mortality, and infant mortality. The findings suggest the need to reduce

mortality risks for Tanzanian children by promoting use of family planning and traditional practices, such as breastfeeding, to space children farther apart.

The size of a child at birth provides an important indicator of its survival during infancy. In the 1999 TRCHS, mothers were asked whether their young children were very small, small, average, large, or very large at birth. The mother's perception has been shown to correlate closely with the child's actual weight at birth, which is an important indicator for child growth monitoring. Newborns perceived by their mothers to be small or very small are much more likely to die in the first year of life (170 per 1,000 live births) than those perceived as average or larger in size (89 per 1,000 live births). A similar pattern of mortality is evident during the neonatal and postneonatal periods.

Table 7.3 Infant and child mortality by biodemographic characteristics

Infant and child mortality rates for the 10-year period preceding the survey, by selected biodemographic characteristics, Tanzania 1999

Biodemographic characteristic	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality (${}_1Q_0$)	Child mortality (${}_4Q_1$)	Under-five mortality (${}_5Q_0$)
Sex of child					
Male	55.5	62.5	118.0	61.1	171.8
Female	34.4	62.8	97.2	58.3	149.8
Age of mother at birth					
< 20	76.1	88.2	164.4	74.5	226.6
20-29	35.0	53.6	88.6	66.7	149.3
30-39	45.6	61.1	106.7	39.7	142.1
40-49	(32.7)	(70.6)	(103.3)	(3.1)	(106.0)
Birth order					
1	64.0	66.4	130.4	63.3	185.5
2-3	42.1	65.6	107.7	71.2	171.2
4-6	27.2	62.6	89.8	59.0	143.5
7+	57.5	50.5	108.0	28.8	133.7
Previous birth interval					
< 2 years	51.7	89.7	141.4	62.9	195.4
2-3 years	38.9	54.3	93.2	64.3	151.5
4 or more years	28.5	51.1	79.6	34.9	111.7
Size at birth¹					
Small or very small	90.1	79.5	169.6	NA	NA
Average or larger	33.6	55.3	88.8	NA	NA

Note: Figures in parentheses are rates based on 250-499 births.

¹ Refers to births in the three years before the survey

NA = Not applicable

7.4 HIGH-RISK FERTILITY BEHAVIOUR

Certain patterns of childbearing are associated with elevated levels of infant and child mortality. Typically, infants and children have a greater probability of dying early if they are born to mothers who are especially young or old, if they are born after a short birth interval, or if they are of high birth order. Data to examine these relationships are presented in Table 7.4, which shows the

distribution of births in the five years preceding the survey and of currently married women according to these categories of increased risk. In this analysis, a mother is classified as “too young” if she is less than 18 years of age and “too old” if she is over 34 years of age. A “short birth interval” is defined as a birth occurring less than 24 months after a previous birth, and a child is of “high birth order” if the mother had previously given birth to three or more children (i.e., if the child is of birth order 4 or higher). First births, although often at increased risk, are not placed in a high-risk category since they are not considered an avoidable risk.

Table 7.4 is further divided into two categories, with births falling into single high-risk categories (such as those born to mothers below the age of 18 or over the age of 34, those born within 24 months of a previous birth, and those of birth order higher than three) and those falling into multiple high-risk categories (e.g., those born within 24 months of a previous birth to mothers who are below the age of 18, or children of birth order greater than 3 who are born to mothers who are over 34 years, etc.).

The results indicate that well over half (57 percent) of children born in the five years before the survey have an elevated risk of dying; 39 percent of births are in a single high-risk category, while 18 percent are in a multiple high-risk category. The results also show that the most common high-risk category is high birth order. Looking at the single-risk categories, 26 percent of children are at increased risk because they are fourth births or higher, while 7 percent are born to mothers younger than 18 years and 6 percent are born less than two years after a prior birth. Among multiple high-risk categories, 11 percent of children are of birth order 4 or higher and were born to mothers age 35 and older. About 26 percent of recent births do not fall into any high-risk category and 16 percent fall into the unavoidable risk category.

The second column of Table 7.4 indicates the relative risk of dying for children born in the five years before the survey by comparing the proportion dead in each high-risk category with the proportion dead among children not in any high-risk category. Young age of mother at birth of child is a significant risk factor (relative risk ratio of 1.76), with 7 percent of births falling into this category. Older age of mother at birth of child is also associated with high mortality risks (relative risk ratio of 2.34). At even greater risk are births to young mothers that occur after a short birth interval (relative risk ratio of 2.85). Fortunately, however, the proportion of recent births falling in these two categories is very small, so that even though the fertility behaviour results in much higher risk of dying for the child, few children are subject to that higher risk.

Column 3 of Table 7.4 shows the distribution of currently married, non-sterilised women by risk category into which a currently conceived birth would fall. Three in four currently married women (73 percent) are at risk of conceiving a child who will have an elevated risk of dying. Forty-one percent of women are at risk due to multiple high-risk factors, while 32 percent are at risk due to a single high-risk factor. The most likely risks are due to high birth order alone (17 percent) or in combination with older age of mother at birth of child (24 percent of women).

Table 7.4 High-risk fertility behaviour

Percent distribution of children born in the five years preceding the survey by category of elevated risk of dying and risk ratio, and percent distribution of currently married women at risk of conceiving a child with an elevated risk of dying, by category of increased risk, Tanzania 1999

Risk category	Births in the 5 years preceding the survey		Percentage of currently married women ^a
	Percentage of births	Risk ratio	
Not in any high-risk category	26.2	1.00	20.7 ^b
Unavoidable risk category			
First births to women 18-34	17.2	1.27	6.4
Single high-risk category			
Mother's age < 18	6.5	1.76	1.5
Mother's age > 34	0.2	2.34	3.5
Birth interval < 24 months	6.3	1.32	9.4
Birth order > 3	25.8	0.84	17.2
Subtotal	38.9	1.08	31.6
Multiple high-risk category			
Age < 18 & birth interval < 24 months ^c	0.5	2.85	0.4
Age > 34 & birth interval < 24 months	0.0	0.00	0.1
Age > 34 & birth order > 3	11.3	1.19	24.0
Age > 34 & birth interval < 24 months & birth order > 3	1.3	1.51	5.4
Birth interval < 24 months & birth order > 3	4.6	1.00	11.4
Subtotal	17.7	1.21	41.3
In any high-risk category	56.6	1.12	72.9
Total	100.0	-	100.0
Number of births	3,282	-	2,653

Note: Risk ratio is the ratio of the proportion dead of births in a specific high-risk category to the proportion dead of births *not in any high-risk category*.

^a Women were assigned to risk categories according to the status they would have at the birth of a child, if the child were conceived at the time of the survey: age less than 17 years and 3 months, age older than 34 years and 2 months, latest birth less than 15 months ago, and latest birth of order 3 or higher.

^b Includes sterilised women

^c Includes the combined categories Age < 18 and birth order > 3