

CHAPTER 6

INFANT AND CHILD MORTALITY

6.1 Introduction

This section presents the estimates of levels and trends of child mortality in South Africa from 1983-1998. It will focus on socioeconomic factors related to the family and demographic factors related to the mother and child, because they are both important components of child survival. The data are disaggregated by province and by demographic and socioeconomic characteristics in order to identify geographic differences and groups with special needs.

The rates of child mortality presented in this chapter are defined as follows:

- Neonatal mortality (NN): the probability of dying within the first month of life
- Postneonatal mortality (PNN): the difference between infant and neonatal mortality
- Infant mortality (${}_1q_0$): the probability of dying in the first year of life
- Child mortality (${}_4q_1$): the probability of dying between exact age one and five
- Under-five mortality (${}_5q_0$): the probability of dying between birth and exact age five

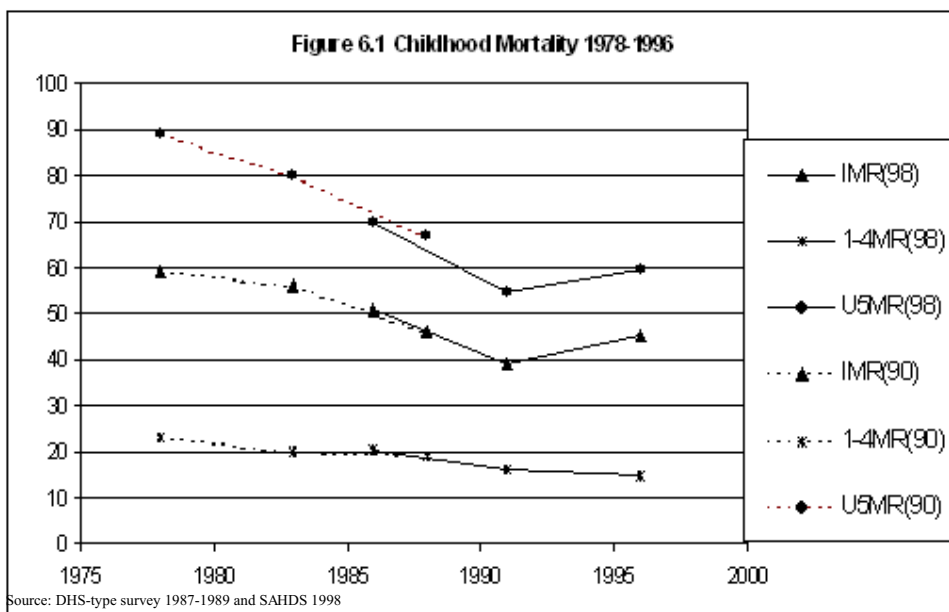
The mortality rates are calculated from information obtained in the pregnancy history section of the Women's Questionnaire. In the absence of a complete vital registration system, this information is regarded as giving the most robust estimates of child mortality. However, it has been noted that problems with this type of retrospective history may include omissions of births and deaths. This is especially common for infants who die shortly after birth. Other problems may include misreporting of date of birth and age at death which can distort both the level and trends in child mortality. A more detailed analysis is needed to determine the effects of reporting errors on infant and childhood mortality rates.

6.2 Levels and Trends in Infant and Child Mortality

Table 6.1 shows neonatal, post-neonatal, infant, child and under-five mortality rates for 3 five-year periods before the survey. The most recent estimates centre around 1996 and show that slightly more than three-quarters of all deaths under five occur in the first year of life and one-third occur in the first month of life.

Years preceding survey	Approximate calendar period	Post-				
		Neonatal mortality (NN)	neonatal mortality (PNN)	Infant mortality (${}_1q_0$)	Child mortality (${}_4q_1$)	Under-five mortality (${}_5q_0$)
0-4	1993 - mid-1998	19.8	25.6	45.4	14.7	59.4
5-9	1988 - 1992	18.6	20.6	39.2	16.2	54.8
10-14	1983 - 1987	22.6	28.1	50.7	20.4	70.1

Figure 6.1 below shows trends in infant, child and under-five mortality between 1978 and 1996. It uses five-year retrospective estimates from surveys conducted by the HSRC (centred on 1990) and the 1998 SADHS. There is remarkable consistency between the two sets of estimates showing improvements in the level of child mortality until 1991.



6.3 Socioeconomic Differentials in Childhood Mortality

Differentials in the various mortality rates by selected socioeconomic characteristics are presented in Table 6.2. The table focuses on basic geographic and socioeconomic characteristics including residence, province, mother's education, population group, and medical maternal care. In order to reduce sampling error, a ten-year period (1986-1996) was used to calculate mortality estimates except for medical maternal care for which a five-year period is used.

Mortality is consistently higher in non-urban than urban areas. This is also true of African rural residents compared to their urban counterparts. There is confirmation of considerable variation in childhood mortality by province as has been reported in many studies (Rossouw and Jordaan, 1997:28). Level of education attained by the mother also shows the expected relationship of more schooling correlating with lower mortality rates for children. Women with a secondary education have substantially lower under-five mortality than women with less than secondary education.

There are also striking differences in mortality rates by population group, with infant and under-five mortality rates for Africans that are two and one half times that of coloured infants and four times higher than for white infants. Unfortunately, the sample of Indian births was too small to allow a reliable estimate of mortality rates.

Childhood mortality rates also vary depending on whether the mother received any antenatal or delivery care. The data clearly illustrate that mothers who receive neither antenatal or delivery care or only one type of care suffer higher neonatal and infant mortality than mothers who receive both antenatal and delivery care.

Table 6.2 Infant and child mortality by socioeconomic characteristics

Neonatal, postneonatal, infant, child, and under-five mortality for the ten-year period preceding the survey by selected socioeconomic characteristics, South Africa 1998

Background characteristic	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality (${}_1q_0$)	Child mortality (${}_4q_1$)	Under-five mortality (${}_4q_0$)
Residence					
Urban	16.4	16.2	32.6	11.0	43.2
Non-urban	22.0	30.1	52.2	20.1	71.2
Province					
Western Cape	4.0	4.4	8.4	4.8	13.2
Eastern Cape	24.7	36.5	61.2	20.5	80.5
Northern Cape	20.5	21.3	41.8	14.3	55.5
Free State	9.9	26.9	36.8	13.7	50.0
KwaZulu-Natal	23.2	28.9	52.1	23.6	74.5
North West	20.0	16.8	36.8	8.8	45.3
Gauteng	17.8	18.5	36.3	9.3	45.3
Mpumalanga	23.6	23.6	47.3	17.3	63.7
Northern	18.3	18.9	37.2	15.7	52.3
Education					
No education	19.7	39.1	58.8	26.5	83.8
Sub A - Std 3	25.1	28.6	53.7	26.4	78.7
Std 4 - Std 5	19.3	22.3	41.5	14.5	55.4
Std 6 - Std 9	16.5	22.9	39.3	13.8	52.6
Std 10	18.2	12.0	30.2	3.2	33.3
Higher	21.9	7.3	29.3	0.0	29.3
Population group					
African	20.6	26.5	47.0	17.4	63.6
Afr. urban	18.3	20.4	38.7	12.7	50.9
Afr. non-urban	22.3	31.3	53.6	21.2	73.7
Coloured	9.6	9.2	18.8	9.6	28.2
White	(11.4)	(0.0)	(11.4)	(3.9)	(15.3)
Asian	*	*	*	*	*
Medical maternity care¹					
No ANC or no DS	*	*	*	NA	NA
Neither ANC nor DS	27.9	15.0	42.9	NA	NA
Both ANC and DS	14.6	21.5	36.1	NA	NA
Total	19.2	23.0	42.2	15.4	56.9

¹ Refers to births in the five years before the survey

Note: Figures in parentheses are based on 250-500 cases, while an asterisk denotes a figure based fewer than 250 cases that has been suppressed.

ANC = Antenatal care

DS = Delivery services from medical personnel

NA = Not applicable

It is important to note that the levels of under-five mortality derived from the 1996 census were higher than those observed in SADHS (Udjo, 1998). This is likely to be the result of differences in the methodology – the census used indirect methods while SADHS used a detailed pregnancy history. The methodology used in SADHS is usually considered to be a more reliable approach but possibly resulted in an underestimate of the true rate. However, when comparing the provincial estimates of under-five mortality from the SADHS with those from the census, it was found that there was a good correlation between them except in the cases of the Western Cape, Free State and North West which clearly appear to be too low in SADHS. This suggested that an adjustment for the underestimates for these three provinces would be appropriate. Adjusted estimates of under-five mortality were made for these three provinces on the basis of the relationship between census and SADHS estimates for the other 6 provinces. Adjusted estimates of infant mortality were then made for the three provinces on the basis of the adjusted under-five estimates and the relationship between infant and under-five mortality observed in SADHS in the other six provinces. These adjusted national and provincial rates are shown in Table 6.3. Allowing for the underestimates in these three provinces the adjustment suggests that the national childhood mortality rates should be adjusted by a factor of 7.5 percent. Reasons for the underestimates in these three provinces need to be explored.

Table 6.3 Adjusted infant and under-five mortality

Adjusted provincial and national estimates of infant and under-five mortality rates for the ten-year period preceding the survey (1988-97), by province, South Africa

Province	Adjusted infant mortality rate (${}_1q_0$)	Adjusted under-five mortality rate (${}_4q_0$)
Western Cape ¹	30.0	39.0
Eastern Cape	61.2	80.5
Northern Cape	41.8	55.5
Free State ¹	53.0	72.0
KwaZulu-Natal	52.1	74.5
North West ¹	42.0	56.0
Gauteng	36.3	45.3
Mpumalanga	47.3	63.7
Northern	37.2	52.3
Total	45.0	61.0

¹ Rates for these provinces have been adjusted on the basis of the relationship between SADHS and the 1996 census data observed in the remaining provinces.

6.4 Demographic Differentials in Childhood Mortality

It is well established that bio-demographic factors of both the mother and child influence childhood mortality. Table 6.4 examines the relationship between childhood mortality and various bio-demographic variables for the ten-year period preceding the survey. The typical pattern of higher mortality in male children than female children at every age also holds true for South Africa. The relationship between age of mother at birth and child mortality shows the expected U-shape with women younger than twenty years old having slightly higher infant and under-five mortality rates than women between 20 and 40 years of age. However, children borne by women over the age of forty experience

sharply increased mortality rates. An exception to the U-shape is seen in the neonatal mortality which decreases with the age of the mother.

Mortality by birth order also shows a U-shaped pattern that is consistent with international findings. Generally, first-born children fare worse than children of birth orders 2-3, after which mortality increases as birth order increases. The exception to this pattern occurs for child mortality. This anomaly is most probably due to the relatively small number of deaths in this age group. The interval from one birth to the next can also have a dramatic effect on the child's survival chances. The data show that when this period is less than two years, under-five mortality (101 per 1000) is double what it is for a previous birth interval of 2-3 years (52 per 1000) or 4 years or more (47 per 1000). These findings are also consistent with other research and highlight the importance of birth spacing as a means of reducing child mortality.

Table 6.4 Infant and child mortality by demographic characteristics

Neonatal, postneonatal, infant, child, and under-five mortality rates for the ten-year period preceding the survey by selected bio-demographic characteristics, South Africa 1998

Background characteristic	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality (${}_1q_0$)	Child mortality (${}_4q_1$)	Under-five mortality (${}_4q_0$)
Sex of child					
Male	23.7	25.4	49.0	17.7	65.9
Female	14.6	20.7	35.3	13.0	47.9
Mother's age at birth					
Less than 20	20.3	22.3	42.5	19.2	60.9
20-29	19.3	20.9	40.2	14.9	54.5
30-39	18.4	24.1	42.5	13.3	55.2
40-49	(18.2)	(56.3)	(74.5)	(30.2)	(102.5)
Birth order					
1	19.2	21.4	40.6	15.0	55.0
2-3	15.3	17.7	32.9	14.1	46.6
4-6	23.3	26.8	50.1	19.6	68.7
7+	31.2	59.6	90.8	7.4	97.5
Previous birth interval					
< 2 years	35.0	42.0	76.9	25.9	100.8
2-3 years	18.1	20.4	38.5	13.9	51.8
4 years or more	13.7	20.2	33.9	13.1	46.5
Total	19.2	23.0	42.2	15.4	56.9

Note: Figures in parentheses are based on 250-500 births.

6.5 Environmental factors and Childhood mortality

Environmental health refers to characteristics of environmental conditions, which affect the quality of life. Environmental health is concerned with those forms of life, substance forces and conditions in the surroundings of man that may exert an influence on human health and well-being. Man not only interacts with his environment but is shown to be a vital factor of his own environment (Purdam, 1980). Environmental factors are key variables in explaining differences in the levels of health.

This section focuses on the environmental factors, which influence health and more particularly, child health. Table 6.5 presents infant and child mortality for a ten-year period preceding the survey.

Environmental factors investigated are source of drinking water, sanitation, housing materials and source of energy.

Child mortality (4q1) rates, more than doubled where the source of drinking water was other than piped water. Where poor sanitation exists child mortality rates are higher e.g. where flush toilets are in use, the child mortality rates are 7.7 per 1000 compared to 34.9 per 1000 where other sanitation practices are in use.

Better flooring material (covered cement) and better toilet facilities (flush toilets) are associated with lower infant and child mortality. An association is also found where houses are block/brick built, and plastered and where electricity is the main source of energy, with lower child mortality. Child mortality increases more than three times where other materials for housing and other sources of energy are being used.

The findings of SADHS generally show that where poor environmental factors exist infant and child mortality rates are significantly higher.

Table 6.5 Infant and child mortality by environmental factors

Neonatal, postneonatal, infant, child, and under-five mortality rates for the ten-year period preceding the survey by selected environmental factors, South Africa 1998

Environmental factor	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality (₁ q ₀)	Child mortality (₄ q ₁)	Under-five mortality (₄ q ₀)
Drinking water					
Piped	17.3	18.0	35.3	11.6	46.5
Other	25.0	39.0	64.0	27.7	89.9
Sanitation					
Flush	16.3	13.1	29.4	7.7	36.9
Latrine	20.2	25.2	45.4	15.0	59.7
Other	23.5	41.0	64.4	34.9	97.1
Floor type					
Sand/bare	23.2	39.3	62.5	28.0	88.8
Cement	20.2	25.6	45.9	16.8	61.9
Covered cement	15.9	11.9	27.8	7.2	34.8
Other	15.9	15.3	31.2	25.3	55.7
Wall type					
Mud/mud cement	21.7	41.3	63.0	24.5	85.9
Plastic/iron/prefab	18.2	26.6	44.8	21.9	65.8
Bare block/unfinished	17.6	19.8	37.4	8.2	45.3
Plastered	19.4	17.4	36.7	7.4	43.9
Other	22.5	12.2	34.7	24.8	58.6
Cooking fuel					
Electricity	16.2	11.3	27.4	4.4	31.7
Gas/paraffin	13.9	24.0	37.9	14.9	52.2
Wood/coal/dung/other	26.0	36.6	62.7	22.3	83.5
Total	19.2	23.0	42.2	15.4	56.9

6.6 High-Risk Fertility Behaviour

Numerous studies have demonstrated a strong relationship between a mother's pattern of fertility and her children's survival chances. The results presented in the previous section support this. 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 birth and "too old" if they are age 35 years or more at the time of birth. A "short" birth interval is defined as one of less than 24 months, and a "high-order" birth is one occurring after three or more previous births (i.e., birth order 4 or higher). Births are also cross-classified by combinations of these characteristics. Thus, a birth may have from zero to three potentially high-risk characteristics. While first births are often considered high risk, they are not an *avoidable* risk in the same sense as the other factors and are thus treated separately in this analysis.

The first column of Table 6.6 shows the percentage of births occurring in the five years before the survey that fall into various risk categories. Forty-two percent of births are in at least one high-risk category, with about 15 percent having multiple high-risk characteristics. Risk ratios are presented in the second column; the risk ratio is the ratio of the proportion of children in a particular risk category who have died to the proportion in the specified reference category who have died. Births in the reference category are those who are not in any high-risk category. The results confirm that babies born to younger and older women and those born after a short interval suffer higher mortality than those not in any high-risk category. Babies of high birth order apparently are not subject to higher mortality risks unless they are also born after a short birth interval, in which case their risk of death is roughly 4 times higher than births in no high-risk category. Fortunately, only a small percentage of births in South Africa (3 percent) fall into this multiple risk category.

The third column in Table 6.6 shows the distribution of currently married women by the risk category into which a currently conceived birth would fall. A comparison of this percentage with the distribution of actual births in the last five years indicates that, without fertility control, the percentage of births falling into high-risk categories because the mother is too old (>34) would rise significantly. Further, the percentage of births with multiple high-risk characteristics would double from 15 to 31 percent.

Table 6.6 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 percent distribution of currently married women at risk of conceiving a child with an elevated risk of dying, by category of increased risk, South Africa 1998

Risk category	Births in 5 years preceding the survey		Percentage of currently married women ^a
	Percentage of births	Risk ratio	
Not in any high-risk category	32.1	1.00	34.8
First births	26.1	1.06	5.2
Single high-risk category			
Mother's age <18	6.8	1.89	0.3
Mother's age >34	3.3	1.54	14.6
Birth interval <24 months	4.9	1.51	5.1
Birth order >3	12.3	0.98	9.0
Subtotal	27.2	1.37	29.0
Multiple high-risk category^b			
Age <18 & birth interval <24 months	0.1	*	0.0
Age >34 & birth interval <24 months	0.1	*	0.4
Age >34 & birth order >3	10.3	1.29	23.6
Birth interval <24 months & birth order >3	1.4	1.64	3.0
Subtotal	2.7	4.08	4.0
In any high-risk category	14.6	1.86	31.0
Total	41.8	1.54	60.0
Number of births	100.0	-	100.0
	4,992	-	5,077

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 the combined categories *Age <18 and birth order >3*.

An asterisks indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.