

Lesson 8: Mortality



Trends

Differentials

Determinants

Introduction

Mortality differential refers to the unequal survival chances among individuals and population groups. Death is often preceded by illness (morbidity). As a result, the state of health of individuals and societies is the prime determinant of mortality differences. However, variations in the types and severity of illnesses around the world indicate that the state of health is itself dependent on the level of socio-economic development.

Education figures prominently in our discussions of fertility differentials in Ethiopia. It also tops the list of factors determining the health of individuals, as well as mothers' ability to prevent illness and care for their young. The level of mortality is at the same time the reflection and determinant of socio economic progress. Moreover, infant and child mortality rates are among the vital indicators widely used to assess the socio-economic wellbeing of a country's population. "A reduction in child mortality significantly increases life expectancy and thus human capital, which is needed for development". [1] With a life expectancy of only 46 years Ethiopia, unfortunately, has one of the highest child and adult mortality rates in the world.

MORTALITY TRENDS

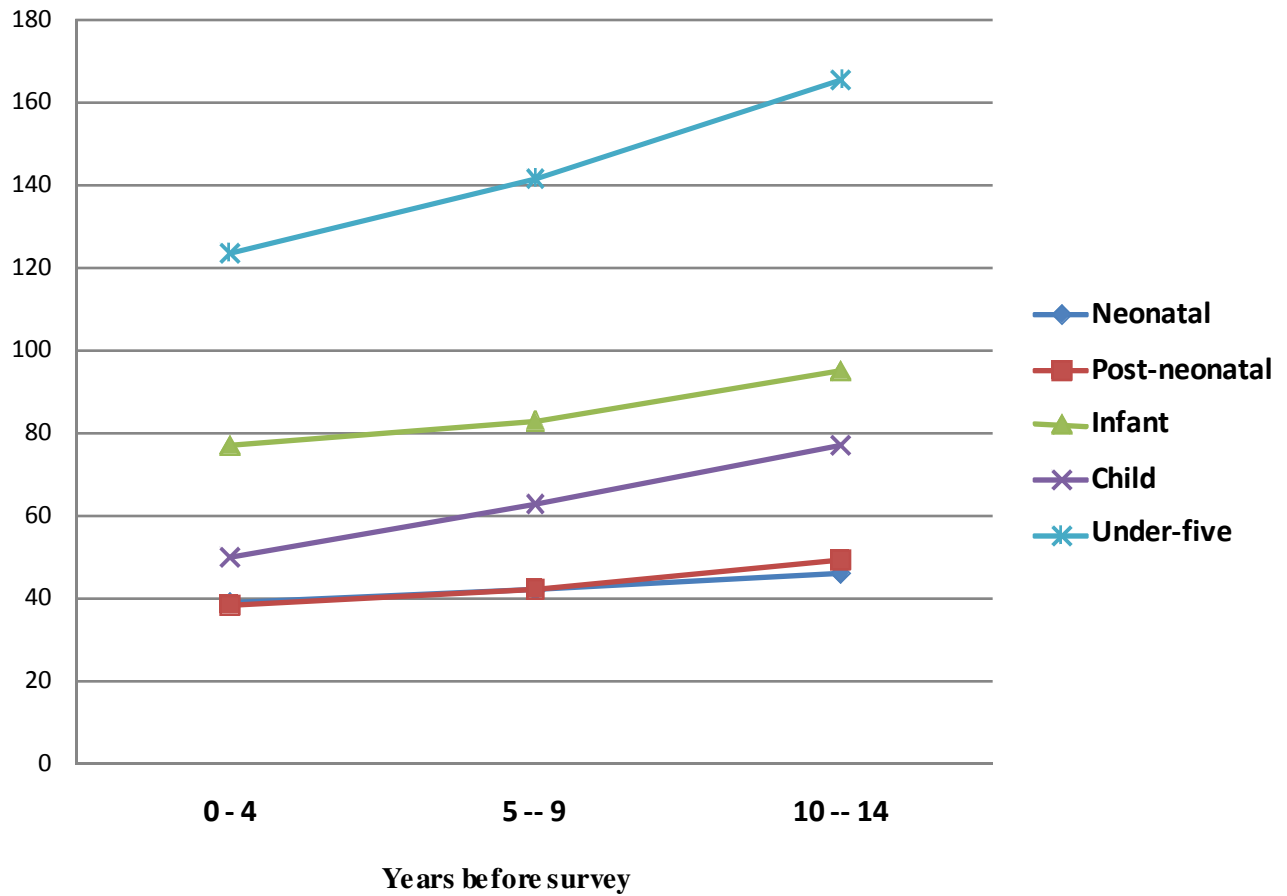
Infant Mortality

Definition of terms [2]:

- Neonatal mortality (NN): the probability of dying within the first month of life
- Post-neonatal mortality (PNN): the probability of dying between the 5th and 52nd week after birth (the 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 ages one and five
- Under-five mortality (${}_5q_0$): the probability of dying between birth and the fifth birthday

The 2005 Demographic and Health Survey [2] presents childhood mortality trends in a very positive light in which infant mortality dropped from 93 per thousand births in 2000 to 77 per thousand in 2005 (see Fig 8.1 also). Under-five mortality rate (U5MR) reportedly declined from 166 in 2000 to 123 per thousand live births (DHS 2005). These figures represent an impressive mortality decline of 21 and 26 percent respectively in a span of five years.

Fig. 8.1 Trends in Childhood Mortality (per thousand) 0 – 15 years before the 2005 Demographic and Health Survey (DHS)



Source: [2]

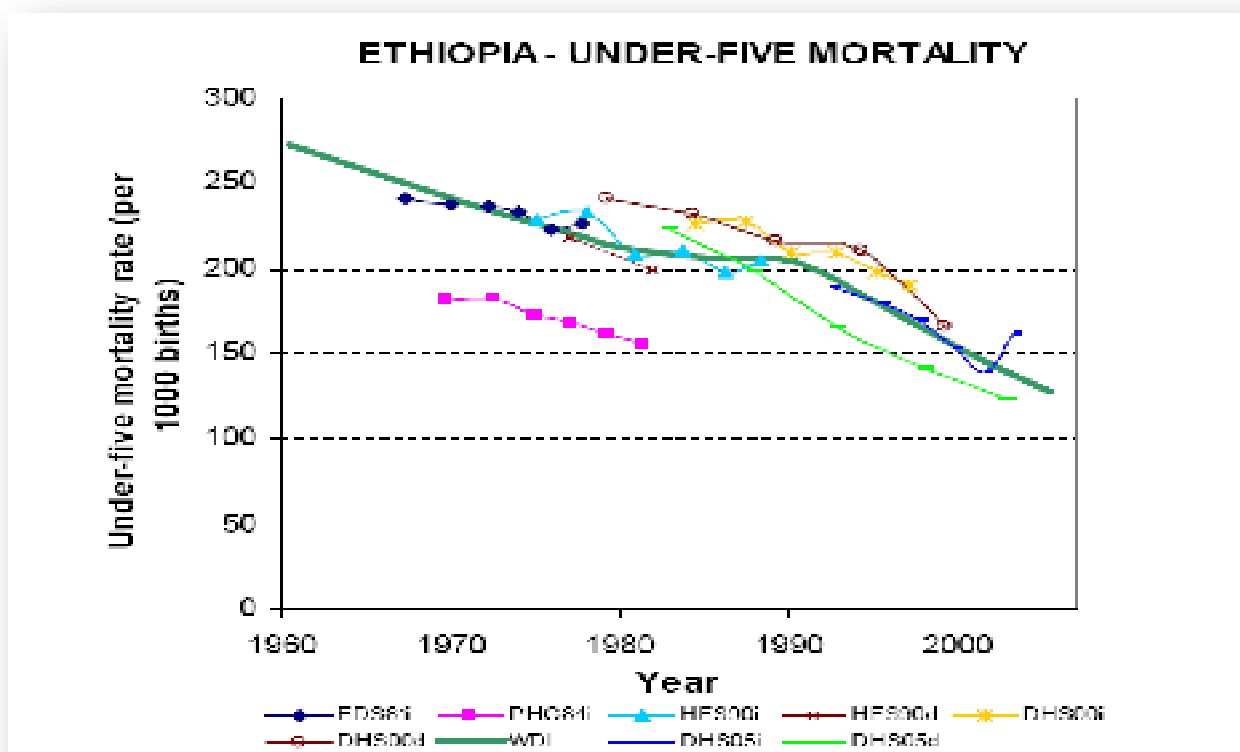
A recent news article quoting a UN official gave the following assessment: “Ethiopia, the second populous nation in Africa, has managed to reduce under-five mortality rates by 40 per cent during the last 15 years...” [3]. The World Bank’s recent report also gave a concordant mortality trend carefully put together by piecing rates from a variety of sources to give a complete picture of childhood mortality trends since the 1960s (Fig. 8.2). The sources are listed in Table 8.1.

Table 8.1. Data Sources for the Constuction of Childhood Mortality Trend-lines

Data source and type	Acronym
1981 Ethiopia Demographic Survey (indirect)	EDS81i
1984 Ethiopia Population and Housing Census (indirect)	PHC84i
1990 Ethiopia National Family & Fertility Survey (direct)	HFS90d
1990 Ethiopia National Family & Fertility Survey (indirect)	HFS90i
2000 Demographic and Health Survey (direct)	DHS00d
2000 Demographic and Health Survey (indirect)	DHS00i
2005 Demographic and Health Survey (direct)	DHS05d
2005 Demographic and Health Survey (indirect)	DHS05i

Source: [3]

Fig. 8.2 Under-five Mortality Trends 1960 to Present

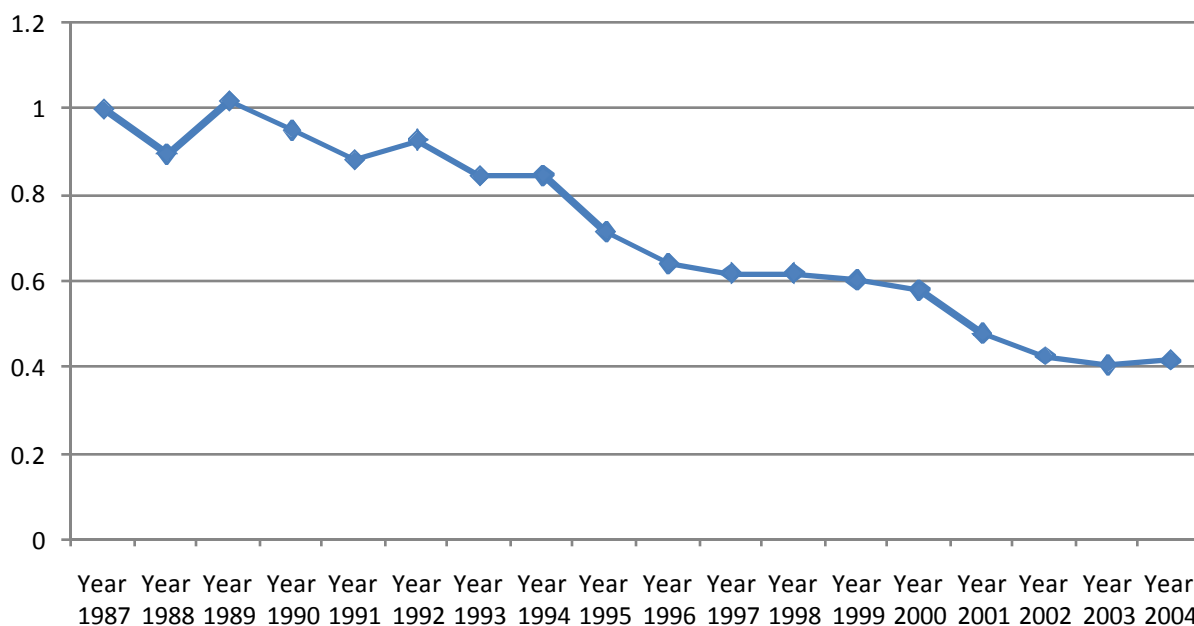


Source: [4]

Mortality Trends: Child and Adolescent Mortality

Among the factors putting infants at risk of illness and death in Ethiopia are, short birth intervals, high birth order, low birth weight, the age and educational attainment of the mother, tetanus and other infections, congenital factors, and being part of certain religious group. [4]. The reported low life expectancy at birth for Ethiopia which is in the mid-forties, and the ongoing HIV/AIDS epidemic, is an indication that adult mortality is also high and, perhaps, rising. On the plus side, as indicated above, recent studies suggest a steady decline in child and young adult mortality (Figs. 8.2 and 8.3).

Fig. 8.3 Adjusted mortality rate ratios, age 0 - 20



Source: [6]

The data for the calculated the ratios in Fig. 8.3 came from the 2005 Demographic and Health Survey (DHS) and show a constant improvement in mortality over the entire seventeen-year period. The year 1987 is the base/ reference year with a rate ratio of 1. Rate ratios above 1 in subsequent years would imply an increase in mortality, but no such observation was made. Figure 8.3 suggests a mortality decline of 60 percent in the age group 0 -20 in 17 years. The authors [4] made similar calculations based on a different data source – the Butajira Rural Health Program Demographic Surveillance Site (BRHP DSS):

The Butajira Rural Health Program (BRHP) is a DSS [Demographic Surveillance System] that has been in place since 1987 and has accumulated over 700,000 person-years of surveillance data. It is located in the Southern Nations, Nationalities and Peoples Region (SNNPR), some 130 km to the south of Addis Ababa. This district was purposefully chosen as being potentially representative for a DSS in 1986, on the basis of being at least 100 km from any major city, but not in a peripheral border region; combining a mixture of the highland and lowland environments typical of Ethiopia; and containing a mixture of ethnic and religious groups. [6]

The results from Butajia show an erratic trend and don't appear to be as plausible as those from the DHS data. It is true, however, that Demographics Survey Sites (DSS) such as that in Butagira do provide a longitudinal/cohort data, and serve as cheaper alternatives to complete vital registration.

Infant and under-five mortality (a subset of the population covered in Fig. 8.3) has also been declining. A World Bank estimate puts the reduction at 21 percent in the five to nine years preceding its 2004 report "...with a more pronounced reduction in the last decade." [5].

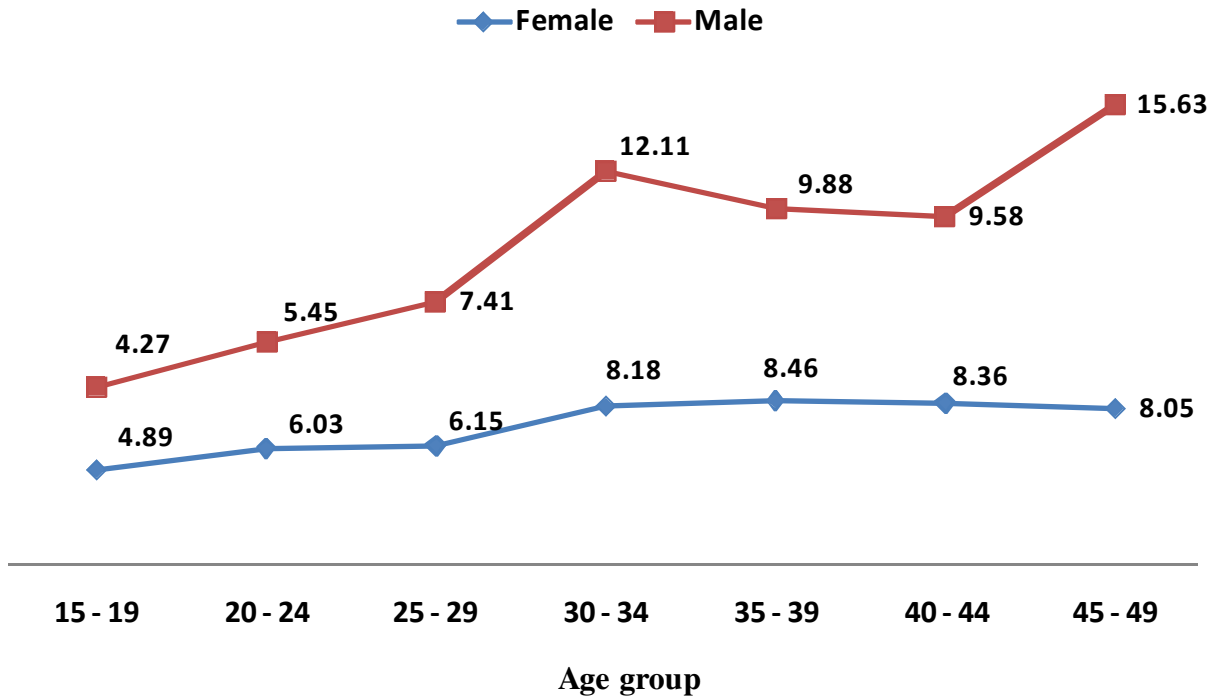
Mortality Trends: Adult Mortality

The year 2000 Demographic and Health Survey gave direct estimates of adult (age 15 and above) mortality by asking siblings about the survival status of their brothers/ sisters. A total of 92,000 siblings were reported, most of them sisters. Using the response from surviving siblings, "age-specific death rates [were] computed by dividing the number of deaths in each age group by the total person-months of exposure in that age group during a specified reference period." [5]. A crude death rate of 8 per thousand and 6.7 per thousand were calculated for males and females respectively. The age specific rates are shown in Figure 8.4. The female rates appear less erratic than that of males but fail to show the expected rise with increasing age. More investigation is called for to account for the sudden rise in the male death rate in the 30 – 34 and 45 – 49 age groups. One might suspect excess HIV/AIDS deaths as a culprit, especially in the 30 -34 age group, but the lack of a similar surge in the female rate leads to a suspicion of data errors, or other causes.

A recent HIV/AIDS study in the capital Addis Ababa used Life Table techniques and burial records to arrive at HIV/AIDS estimates. [7]

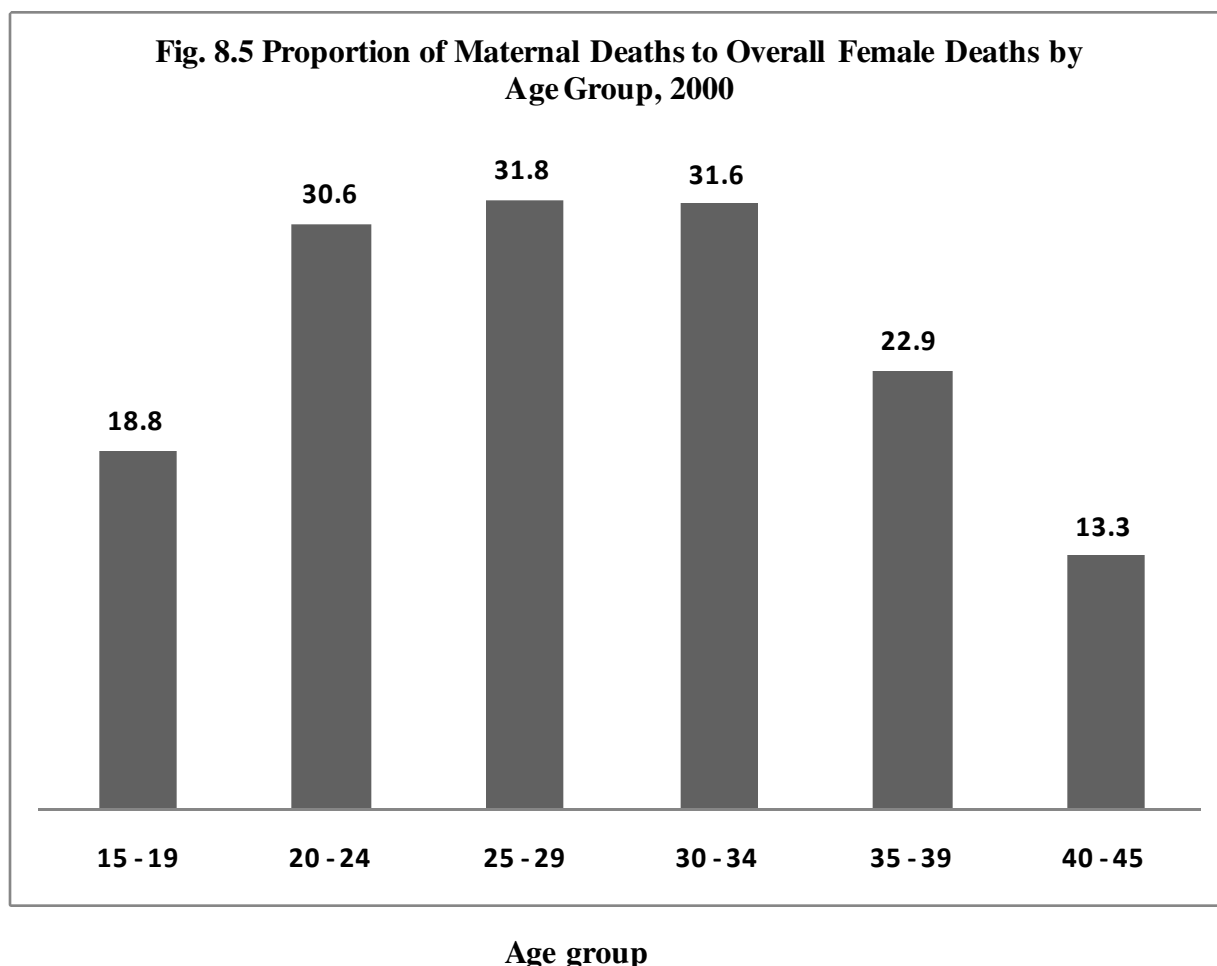
Between 54.7 and 62.4% of adult deaths in Addis Ababa (age 20-64) are attributed to AIDS. The absolute numbers of AIDS deaths for the year 2001 is estimated between 7,000 and 9,000. Estimates of the absolute number of deaths are sensitive to under-reporting of burials and therefore on the conservative side. In terms of the share of AIDS attributable mortality, women are worse affected than men. The absolute number of AIDS deaths is higher for men than for women. [7]

Fig. 8.4 Adult Age specific Death Rate (per thousand), Year 2000



Source: [8]

While women everywhere enjoy a survivorship advantage over men at every age, Ethiopian women suffer the added burden of unsupervised high-risk pregnancies due to lack of prenatal care, as well as back-alley abortion and its attendant complications. These lead to excess female mortality in the reproductive age groups in Ethiopia and have put the country at the bottom of the world maternal mortality rankings. There are no estimates of mortality risks from abortion, but the DHS survey results provide estimates of overall maternal mortality. The maternal mortality ratio is 871 (per 100,000 births) [8] and the age-specific burden is shown in Fig. 8.4.



Source: [8]

Maternal mortality accounted for over 30 percent of female deaths in the age groups 20 – 24, 25 – 29, and 30 – 34. Lack of data from prior years precludes determination of whether or not the year 2000 adult and maternal mortality rates represent an improvement over prior years and decades.

CHILDHOOD MORTALITY DIFFERENTIALS

Differential by Baby's Gender

Baby boys and male children die at a higher rate than girls. Even though this is a universal fact exceptions abound owing to differential treatments in societies where boys are strongly preferred over girls. In such cases girls die at a higher rate than boys. Ethiopia, where childhood mortality

is 4 percent higher among girls than boys is one such exception; an exception blamed on “... differences in child rearing practices in Ethiopia, presumably in feeding practices and utilization of health care services, that favor boys over girls”. [8]

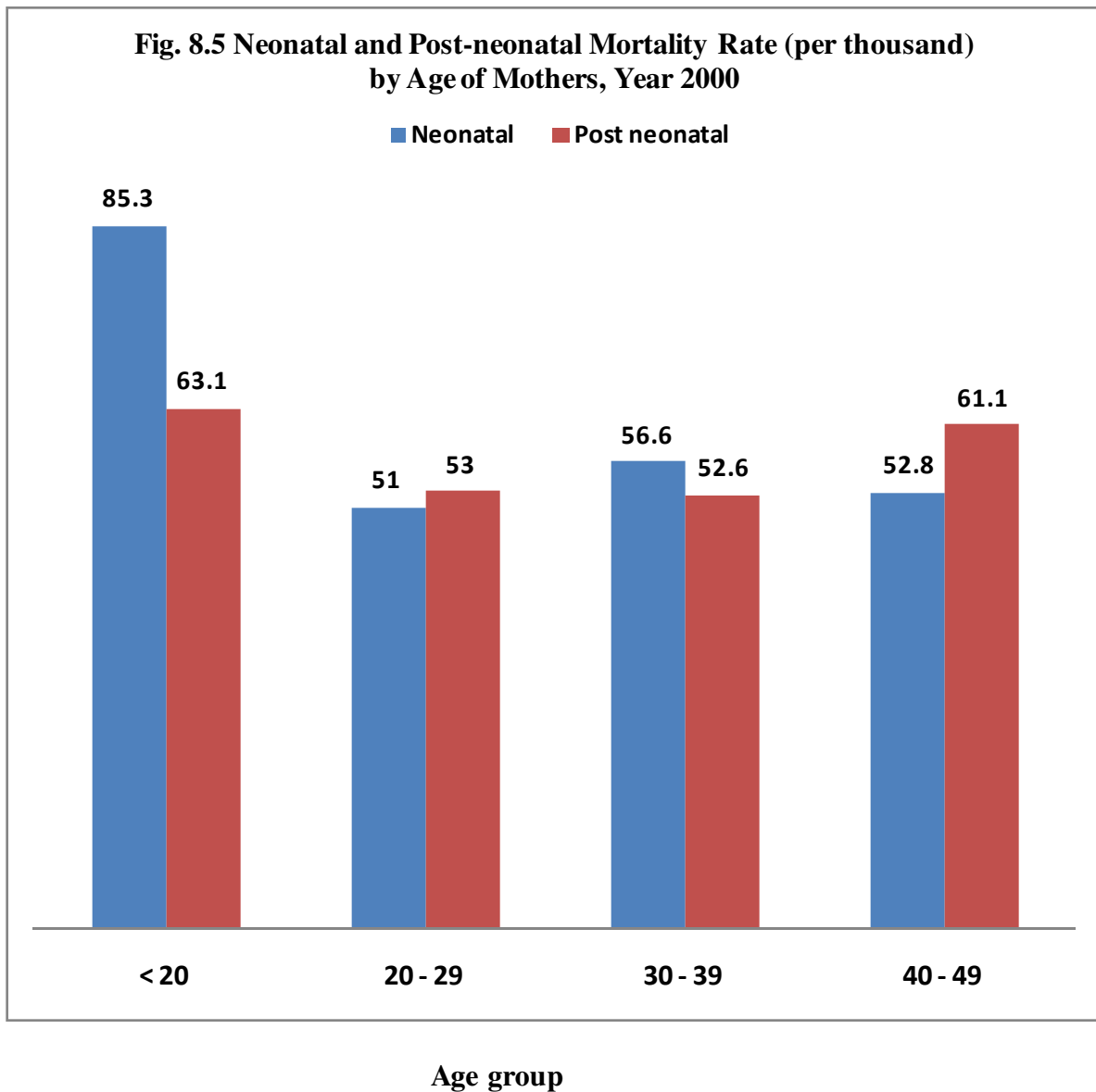
Differential by Maternal Age

Infant mortality has a classic U-shaped relationship with maternal age in which infant and under-five mortality is “...relatively higher among children born to mothers under age 20 and over age 40 than among mothers in the middle age groups”. Infant mortality includes neonatal mortality (mortality in the first month of life), and post-neonatal mortality (from week 5 to week 52). In the developed world, more infants die in the first month of life than in the remaining 11 months mainly due to congenital malformations. However, for all maternal age groups, this is not true, in Ethiopia (Fig. 8.5).

The table below presents the infant mortality rates (IMR) by age of mothers. It maintains the pattern of higher death rates at the lowest and higher maternal age groups noted in Fig. 8.5. The promised U-shaped mortality pattern is evident in Table 8.2 with high infant mortality at the highest and lowest maternal ages. The numbers will not give a genuine U-shape, however, due data aggregation by 10-year age groups rather than the customary 5-year age classification.

**Table 8.2 Infant Mortality
(per thousand)
By Age of Mothers, Year 2000**

< 20	148.5
20 - 29	104
30 - 39	109
40 - 49	113.9

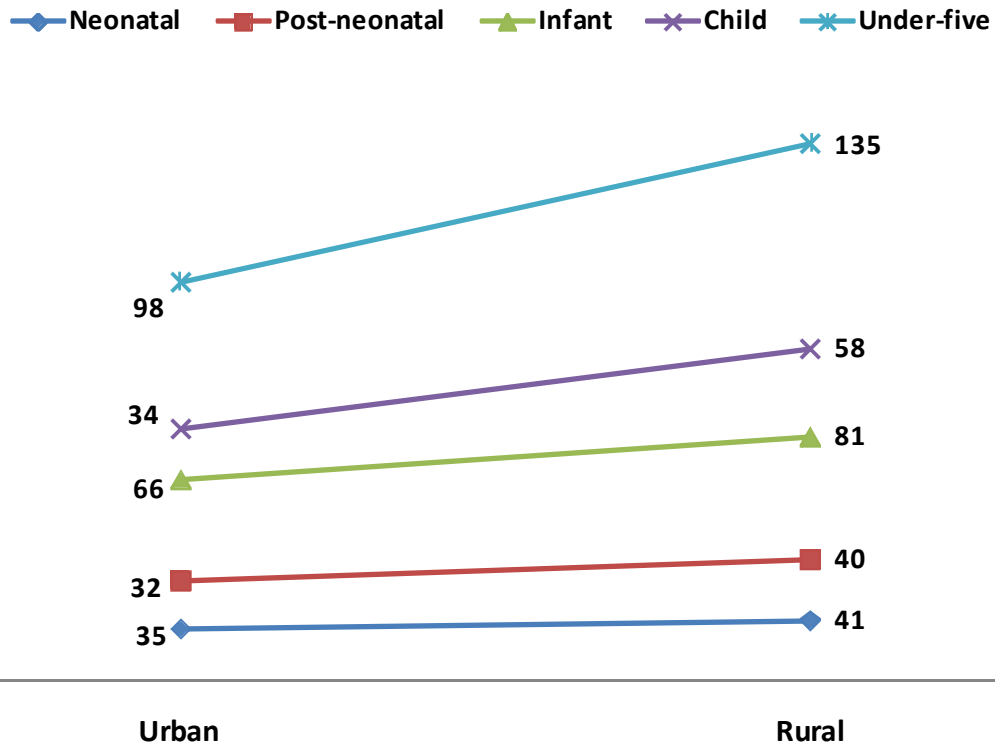


Source: [8]

Urban-rural Differential in childhood mortality

In most of Africa easy access to care insures better health and lower mortality in urban and rural areas. Ethiopia is no exception. “Mortality in urban areas is consistently lower than in rural areas. For example, infant mortality in urban areas is 66 deaths per 1,000 live births compared with 81 deaths per 1,000 live births in rural areas. The urban-rural difference is even more pronounced in the case of child mortality”. [2]

Fig. 8.5 Urban-rural Difference in Childhood Mortality Rates (per thousand), 2005



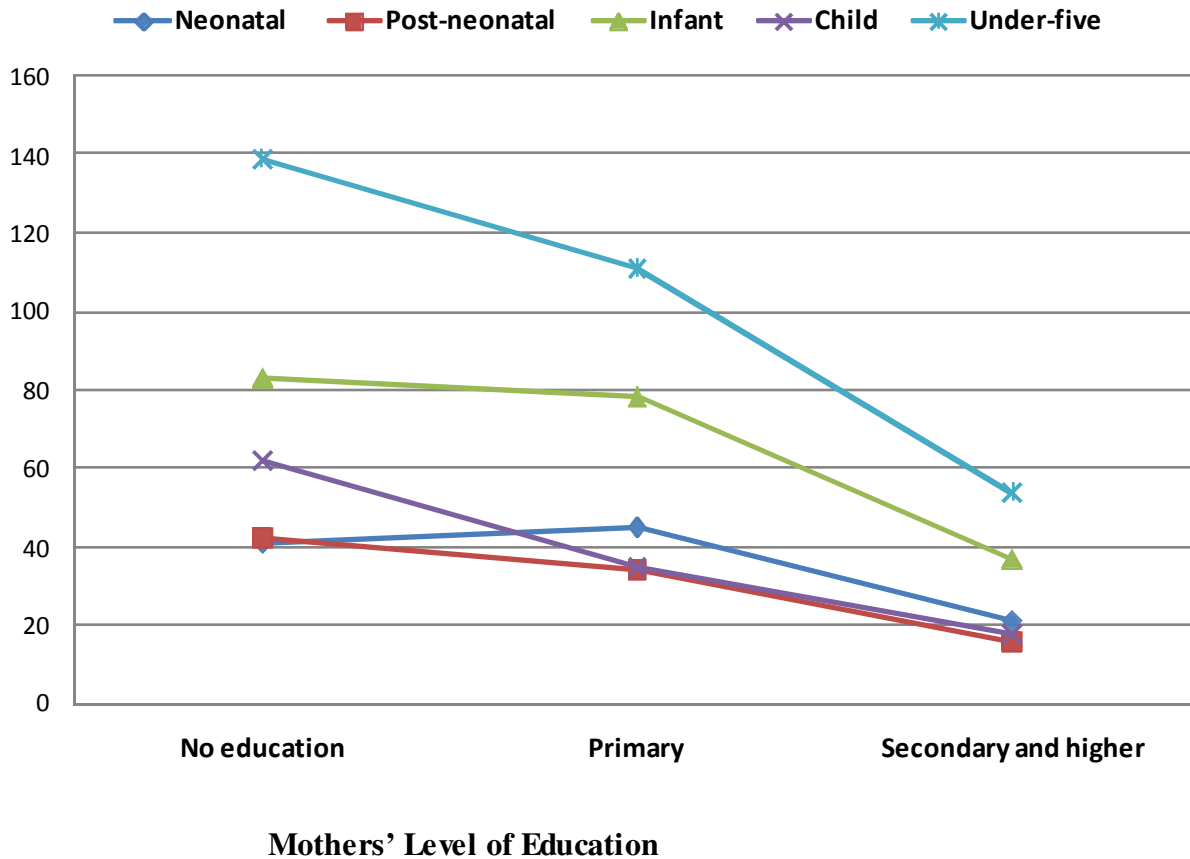
Source: [2]

The biggest difference is in child mortality - 41% (70%), followed by under-five mortality - 40% (38%) post-neonatal mortality (25%) and infant mortality - 15% (23%). Neonatal mortality too registered a double digit difference of 17%.

Childhood Mortality Differentials by Education of Mothers

The beneficial effects of a mother’s education, and its critical role in the survival of their children from infancy to adulthood, are well known. Infant and childhood mortality are inversely related to the education of mothers. In Ethiopia “under-five mortality among children born to mothers with no education (139 per 1,000 live births) is more than twice that of children born to mothers with secondary and higher level of education (54 per 1,000 live births)” [2]. Figure 8.6 reveals that the child survival advantage for women with a primary education and higher applies to all of the five groups (neonatal, post-neonatal, infant, child, and under-five) shown in Fig. 8.6. A suggested slight mortality disadvantage for neonates with mothers in the primary education group as compared to mothers with no education should be an artifact of data error. Figure 8.6 also reveals the sharper mortality decline with educational advances from primary to secondary level and above, compared to gains scored when mothers advance from illiteracy to primary education.

Fig. 8.6 Childhood Mortality Rates (per thousand) by Education of Mothers, 2005



Source: [2]

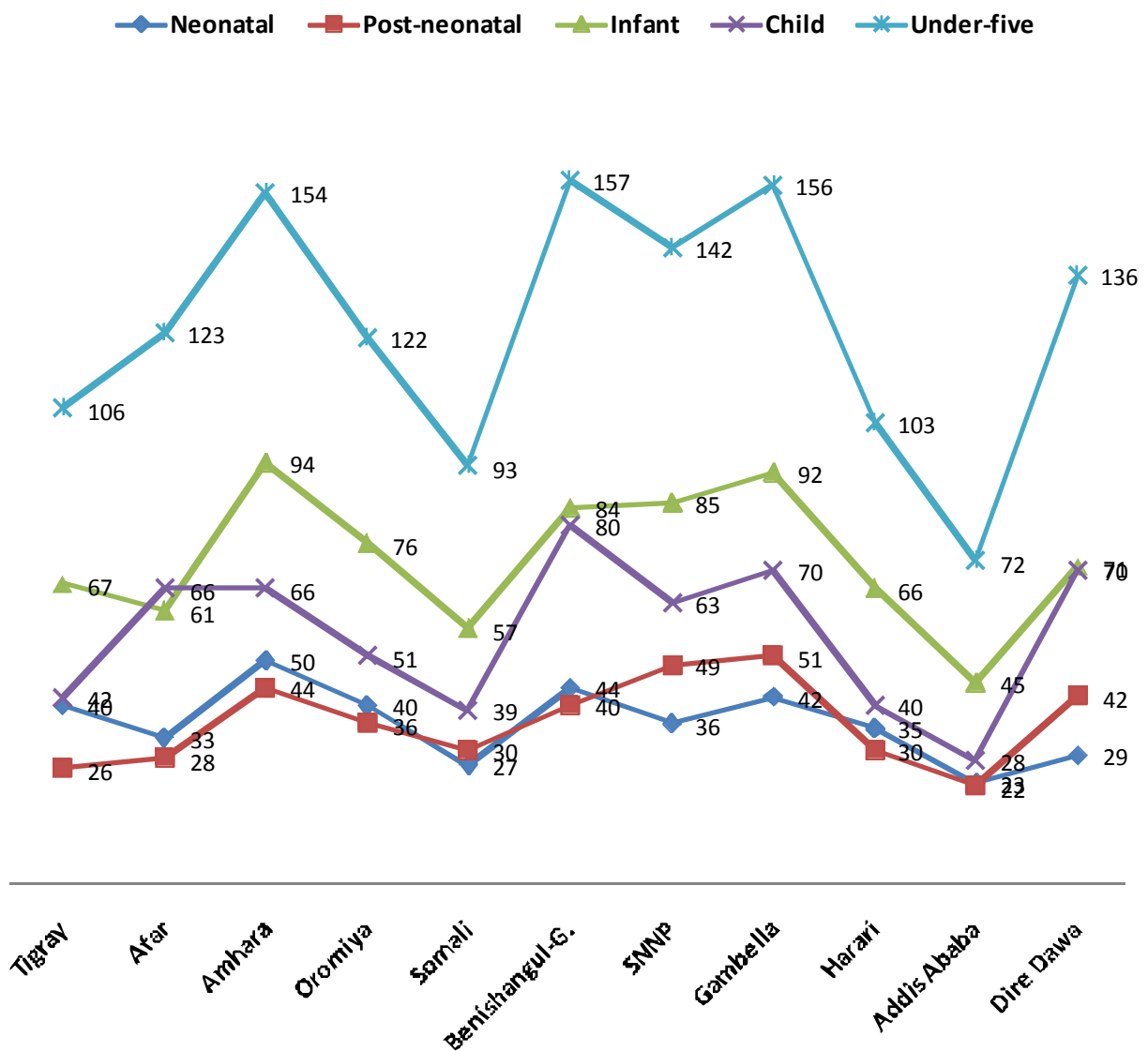
Regional Differentials in Childhood Mortality

Very few observations in nature show uniformity of distribution across space. Unevenness is the distinct characteristics of the distribution of phenomena in space. Mortality is no exception. In Ethiopia “wide regional differentials in infant and under-five mortality are observed. For example, under-five mortality ranges from a low of 72 per 1,000 live births in Addis Ababa to a high of 157 per 1,000 live births in Benishangul-Gumuz. Under-five mortality is also relatively higher in Amhara and Gambela”.

The rates for Somali (Fig 8.7) are impressive and on par with urban locations like Addis Ababa, and even better than the other two urban centers – Harari and Dire Dawa – despite its primarily rural character. If the data can stand the scrutiny of time and statistical testing, Somali would

stand out as a model of a predominantly rural but highly child-friendly region with traditions that insure better child survival. Those traditions need to be studied and lessons learned. Or, could it be the hot dry environment? Could it be that the hostile climate is proving to be too inhospitable even to infectious microorganisms that afflict children in all other parts of the country? On the flip side, the high rates in Amhara are worrying especially in view of the fact that it is home to a large population (almost 20 million in 2007). It has the highest neonatal and infant mortality of any region, and almost ties the worst under five mortality observations of the Benishangul Gumuz and Gambella regions.

Fig. 8.7 Childhood Mortality Rate (per thousand) by Region, 2005

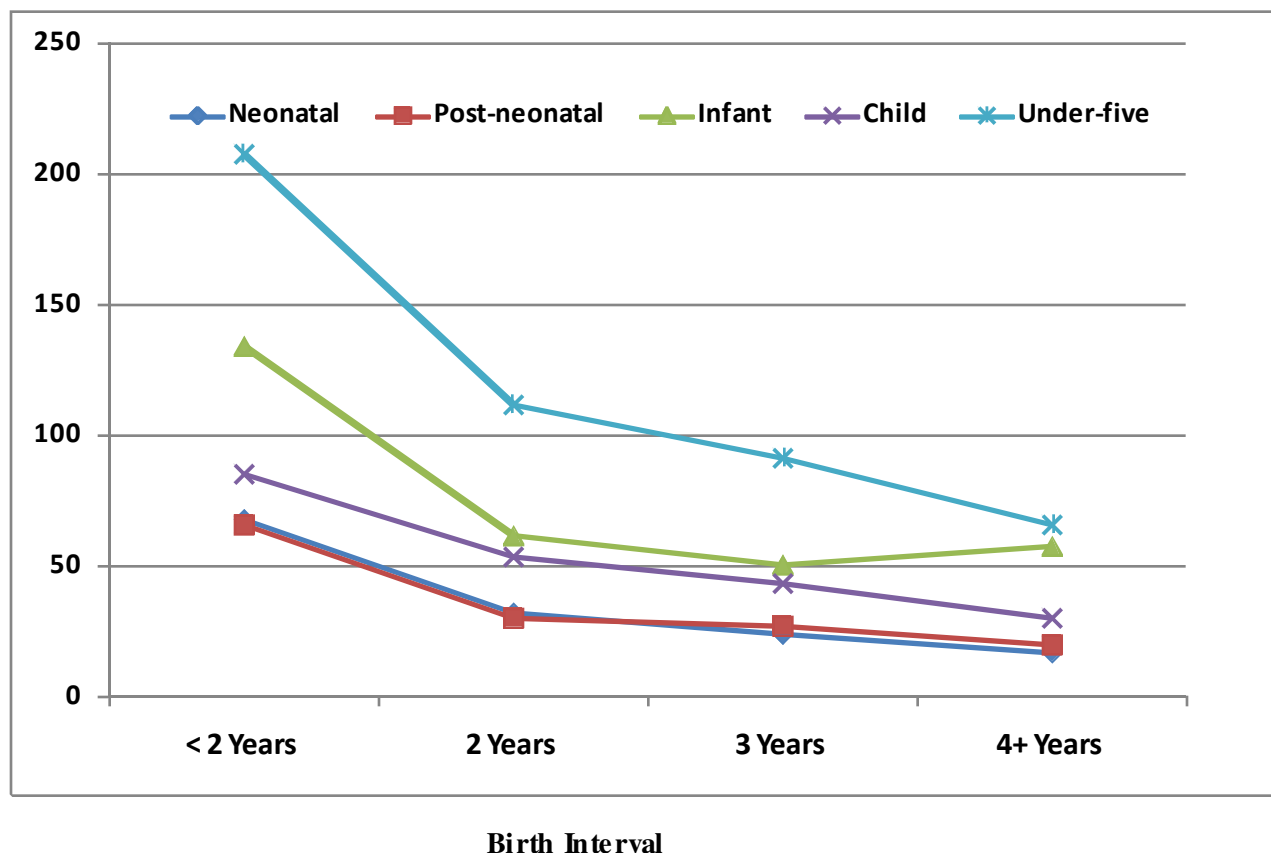


Source: [2]

Differentials by length of Birth Interval between Index Child and Prior Birth

Figure 8.8 sends a powerful hopeful message to policy makers willing to effect mortality change in society, especially among children, through policy measure that successfully target morbidity and mortality among the young. Officials working to bring about swift and substantial declines in the number of children dying on an annual basis should seek to educate the public regarding the benefits, both to the mother and the child, of long both intervals, and make enabling resources available to mothers to achieve the goal. The figure shows, for instance that the probability of an infant just born dying before is/she is one month old is four time as high (.0068) if he/she is born less than 2 years after the previous child, compared to a baby born at least 4 years after his/her immediate sibling was borne (0.0017). For that same child the probability of dying before the 5th birth day (0.0208) is also almost four times (0.0066) as high as a sibling born after an interval of at least four intervening years.

Fig. 8.8 Childhood Mortality Rate by Length of Birth Interval between Index Child and Prior Birth (in thousands), 2005



Source: [2]

References:

1. Millennium Development Goals Report: Challenges and Prospects for Ethiopia. Ministry of Finance and Economic Development (MOFED) of the Federal Democratic Republic of Ethiopia and the United Nations Country Team, March 2004. Addis Ababa.
2. Ethiopia Demographic and Health Survey 2005 Central Statistical Agency, Addis Ababa, Ethiopia, RC Macro, Calverton, Maryland, USA, September 2006
3. <http://allafrica.com/stories/200801221379.html>
4. Ethiopia. A Country Status Report on Health and Poverty. June 2004. The World Bank, Africa Region Human Development & Ministry of Health Ethiopia
5. <http://siteresources.worldbank.org/INT/HNPMDGS/Resources/563114-1112109151438/892594-1113404879158/Ethiopia.pdf>

6. Peter Byass et. al. DSS and DHS: longitudinal and cross-sectional viewpoints on child and adolescent mortality in Ethiopia, *Population Health Metrics* 2007, 5:12
7. Georges Reniers et. al. Life table estimates of adult HIV/AIDS mortality in Addis Ababa. *Ethiopian Journal of Health Development*. Vol. 20 No 1. 2006
8. Ethiopia Demographic and Health Survey 2000 Central Statistical Agency, Addis Ababa, Ethiopia , RC Macro, Calverton, Maryland, USA, September 2001