

# DHS

# Comparative Reports

# 4

## Childhood Mortality in the Developing World





MEASURE *DHS+* assists countries worldwide in the collection and use of data to monitor and evaluate population, health, and nutrition programs. Funded by the U.S. Agency for International Development (USAID), MEASURE *DHS+* is implemented by ORC Macro in Calverton, Maryland.

The main objectives of the MEASURE *DHS+* project are:

- 1) to provide decisionmakers in survey countries with information useful for informed policy choices,
- 2) to expand the international population and health database,
- 3) to advance survey methodology, and
- 4) to develop in participating countries the skills and resources necessary to conduct high-quality demographic and health surveys.

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# DHS Comparative Reports No. 4

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## **Childhood Mortality in the Developing World**

**A Review of Evidence from the Demographic  
and Health Surveys**

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## Preface

One of the most significant contributions of the MEASURE *DHS+* program is the creation of an internationally comparable body of data on the demographic and health characteristics of populations in developing countries. The *DHS Comparative Reports* series examines these data across countries in a comparative framework. The *DHS Analytical Studies* series focuses on specific topics. The principal objectives of both series are to provide information for policy formulation at the international level and to examine individual country results in an international context. Whereas *Comparative Reports* are primarily descriptive, *Analytical Studies* take a more analytical approach.

The *Comparative Reports* series covers a variable number of countries, depending on the availability of data sets. Where possible, data from previous DHS surveys are used to evaluate trends over time. Each report provides detailed tables and graphs organized by region. Survey-related issues such as questionnaire comparability, survey procedures, data quality, and methodological approaches are addressed as needed.

The topics covered in *Comparative Reports* are selected by MEASURE *DHS+* staff in conjunction with the MEASURE *DHS+* Scientific Advisory Committee and USAID. Some reports are updates and expansions of reports published previously.

It is anticipated that the availability of comparable information for a large number of developing countries will enhance the understanding of important issues in the fields of international population and health by analysts and policymakers.

Martin Vaessen  
Project Director

## Executive Summary

This report is a review of childhood mortality in 56 developing countries. The mortality estimates are based on data from 102 Demographic and Health Surveys carried out between 1990 and 2002. Differentials are compared for key variable that are known to influence childhood mortality. Biodemographic variables include: mother's age at birth, length of the preceding birth interval, birth order, sex of the child, and multiplicity. Socioeconomic variables include: residence (urban or rural) and mother's education. Perinatal mortality estimates are presented where data are available and trends in childhood mortality are examined in countries that have had multiple surveys.

In all regions except sub-Saharan Africa the vast majority of deaths among children under five years occur in the first year of life. In sub-Saharan Africa, large numbers of children also die between the age of one and four—the age range with potentially the most preventable childhood deaths.

The limited number of countries with data available on perinatal mortality emphasizes the difficulty of collecting data on stillbirths. A quality check of the data suggests that improvements need to be made in collecting pregnancy histories. The few countries that have trend data on perinatal mortality show mixed results: six countries show improvements while six countries show increasing levels of perinatal mortality.

Estimates of childhood mortality for the five years preceding the survey are presented for the most recent surveys. The results show that under-five mortality ranges from 25 deaths per 1,000 live births in Turkey to 274 per 1,000 in Niger. Only three of the 29 countries surveyed in sub-Saharan Africa have under-five mortality rates below 100 per 1,000.

Variations in childhood mortality are examined by looking at differentials in mortality by biodemographic and socioeconomic characteristics for the ten years preceding the survey. The results indicate that children of women who have births in quick succession, at young ages, or at high birth orders, have poorer child survival outcomes. Male births and multiple births are also at increased risk of dying because of increased biological risks. In almost all countries, children of women with less education or who live in rural areas have higher levels of mortality than children of other women.

Trend data on childhood mortality (based on the five years preceding the survey) suggest that under-five mortality has been declining in most of the countries in Asia and Latin America. At the same time, past improvements in child survival in much of sub-Saharan Africa are being reversed. There are statistically significant increases in under-five mortality in four countries for which trend data are available.

# 1 Introduction

Mortality of children under the age of five remains unacceptably high in many developing countries. A special edition of the Bulletin of the World Health Organization (WHO, 2000) stressed this point and noted that 10.5 million children still die each year. In Lopez's (2000) introductory comments to the WHO Bulletin, he emphasizes that child mortality needs to remain the focus of public policy to protect the gains in child survival from new threats such as HIV/AIDS. This report compares child mortality data from 56 countries and indicates where child survival gains are slipping and where they have yet to be made.

Although initially there was controversy over whether childhood mortality levels were reversing direction (i.e., increasing), this phenomenon has been proven in a number of countries, primarily in sub-Saharan Africa. Some researchers thought that the increase was only a blip in the data and did not necessarily indicate a trend change (Ahmad et al., 2000). However, others found evidence of increasing childhood mortality due primarily to the increasing prevalence of AIDS in the population (Hill et al., 2001; Claeson et al., 2000; and Adetunji, 2000).

Numerous causes have been cited for the reversal or stagnation of child survival. Adetunji (2000) concludes that not all of the stagnation in child mortality levels can be directly attributed to the prevalence of HIV/AIDS. The resurgence of malaria and lower levels of vaccination coverage and health care utilization have also contributed to the reversal of child survival trends (Rutstein, 2000). Deteriorating health systems have resulted in fewer children being vaccinated against childhood diseases, and thus increases or stagnation in mortality levels have occurred. Recent data from two states in India (Rajasthan and Arunachal Pradesh) show stagnation of child mortality coinciding with lower vaccination coverage between 1992 and 1998 (Claeson et al., 2000; IIPS 1995; and IIPS and ORC Macro, 2000).

Changes in socioeconomic conditions such as women's level of education and investment in the health sector have affected child survival. Biodemographic and socioeconomic changes are explored in this report.

The Demographic and Health Surveys (DHS) program publishes comparative reports as reference documents. Previous DHS comparative studies of child mortality were published in 1994 (Sullivan et al., 1994) and 1996 (Bicego and Ahmad, 1996). This report covers data from DHS surveys conducted between 1990 and 2000. Recent estimates of childhood mortality are presented by country for population subgroups. Mortality levels are compared; mortality age patterns are analyzed; and trends (including sampling errors) are described for countries where multiple surveys have been conducted. Information on perinatal mortality is presented for 20 countries that have stillbirth data available.

Childhood mortality consists of deaths occurring among children from birth until exact age five. It can be broken down by age classification: perinatal mortality, neonatal mortality, postneonatal mortality, infant mortality, child mortality (not to be confused with overall childhood mortality), and under-five mortality. The age classifications used in this analysis are as follows:

**Perinatal mortality (PN):** the sum of fetal deaths after seven months of gestation (stillbirths) and deaths in the first week of life divided by the number of pregnancies of seven or more months duration

**Neonatal mortality (NN):** the probability of dying between birth and exact age one month

**Postneonatal mortality (PNN):** the difference between infant and neonatal mortality rates



**Infant mortality ( ${}_1q_0$ ):** the probability of dying between birth and exact age one year  
**Child mortality ( ${}_4q_1$ ):** the probability of dying between exact ages one and five years  
**Under-five mortality ( ${}_5q_1$ ):** the probability of dying between birth and exact age five years

In this report, national-level estimates of childhood mortality are calculated for the five years preceding the survey. For subnational estimates, the rates are calculated for the ten years preceding the survey. Ten-year rates are used for subgroups to ensure a reasonable sample size. Data from a total of 102 surveys in 56 countries were used in this analysis.

## 2 Data Quality

The quality of DHS survey data on child mortality has been reviewed in other publications (Curtis, 1995; Sullivan et al., 1990). The following is a brief discussion of the changes that have occurred in the data collection and tabulation process since those papers were written and the biases that affect childhood mortality. The unique data quality issues regarding perinatal mortality are discussed in section 4.

Direct estimates of childhood mortality are calculated from complete maternal birth histories collected from women age 15 to 49. The birth history includes the date of every live birth (multiple births are recorded individually), survival status, current age for living children, and age at death for children who died.

### Changes in survey procedures in the DHS survey program during the 1990s

The DHS program has addressed survey biases by improving data collection methods (Sullivan et al., 1990). While the content of the birth history section of the standard DHS questionnaire has remained the same, advances have been made in interviewer training, including adding quality control measures to check data quality.

To avoid heaping on one year of age, interviewers are trained to probe for the child's age at death if the woman says that the death occurred at age 12 months. Despite training emphasizing the importance of this information, there are still cases where the interviewer does not get a more precise estimate than one year. In countries where female literacy is low, some women may not know or understand years or dates. In these situations, interviewers work with the respondent to find an event that will provide an approximate date for the demographic event. In some cases, the data still need to be imputed because there are inconsistencies between responses. In these cases, as much data as possible are used to impute an estimated date using a hotdeck procedure. The number of dates of birth or death that need to be imputed varies by country and by survey, but there has been a decline over time as women become more educated (and more likely to recall dates) and as the training of interviewers has improved.

Once data entry has started (usually two weeks after interviewing has begun), tables can be produced alerting supervisors of heaping problems associated with individual interviewers or teams. These tables are produced throughout the fieldwork and allow the supervisor to retrain the interviewer and ensure probing in future interviews.

Data quality can vary by survey depending on the implementing agency and survey staff. In previous comparative reports, data for the same survey were used to show trends over time. This method relies on women reporting about events that occurred more than five years in the past, and may be prone to error. In this report, we examine trends by comparing multiple surveys from the same country to avoid bias due to misdating.

Mortality rates are calculated using a life-table approach to estimate the probability of dying between two exact ages. The probability of dying is based on the number of deaths among children in a specific age range and the exposure of those children to the risk of dying in a particular calendar period. (The calculation is described in Appendix A.)

## **Biases**

Maternal birth histories present a number of potential biases that could affect mortality estimates. It is assumed that the biases affect all countries approximately the same way, thus making cross-national comparisons possible. If there are differences in the effects of the biases by country, caution needs to be taken when making comparisons. The following is a description of potential biases and their effects:

*Omission* of a child death occurs when the mother does not report a child who lived for only a short time after birth. This happens because either the event was painful to remember so the mother does not mention the child or she does not understand that any child who lived for a short time after birth needs to be recorded. Omission results in an underestimate of child mortality. Without accurate hospital records or birth certificates, it is difficult to estimate the degree to which event omission underestimates child mortality. Trends between surveys might provide some insight; however, it is difficult to gauge how omission varies between surveys.

*Misdating errors* occur when the respondent does not remember the date of birth or age at death of a child. These errors are least likely to occur when the time frame is recent (e.g., the five years preceding the survey). Mortality estimates based on events that occurred more than ten years ago are less reliable.

*Selection bias* occurs when data from a group of people with distinct mortality levels are overlooked. For example, if the survey collects only data on children whose mothers are alive, the mortality rates could be biased. Children whose mothers have died are likely to have higher mortality levels because of disease being transmitted from mother to child or because the child received inadequate care when the mother was sick or after she died.

The AIDS epidemic exacerbates the selection bias. Data on children who have lost their mother to AIDS are omitted, and it is these children who are most likely to die following the death of their mother. Assuming that these children have higher mortality levels, this bias would result in underestimates of child mortality and inaccuracies in comparisons of child mortality levels at different points in the epidemic or between countries at different stages of the epidemic. However, recent studies suggest that under-five mortality estimates for the five years prior to a survey (five-year rates) will be underestimated by no more than 3 to 5 percent in countries with high HIV prevalence, but 10-year rates might be biased by up to 7 percent (Mahy, 2003). In this paper, the 10-year rates are only used at the subnational level. If the bias is assumed to be consistent across subgroups, comparisons can still be made within a country.

*Heaping* of age at death is common in survey data. Heaping occurs when a respondent chooses a convenient (rounded) number as the age at death such as one, two, or five years instead of an exact age such as 11 months or 19 months. Heaping can be prevented somewhat through training and supervision of interviewers. However, even after probing, some mothers may be unable to provide a precise age at death for their children. Thus, a substantial amount of heaping remains, especially among respondents with little or no education.

Another possible bias in survey data is *transference*, which is assigning an age to a child that excludes the child from the age group for which additional data are collected. In DHS surveys, additional questions are asked about living children under age five (or under age three in a few countries). Transference results when interviewers transfer the ages of children from five to six years (or three to four years) to avoid having to ask the additional questions. Transference affects child mortality by reducing the denominator of children who survived the first five years of life, thus increasing estimates of child mortality.

### 3 Age Patterns of Childhood Mortality

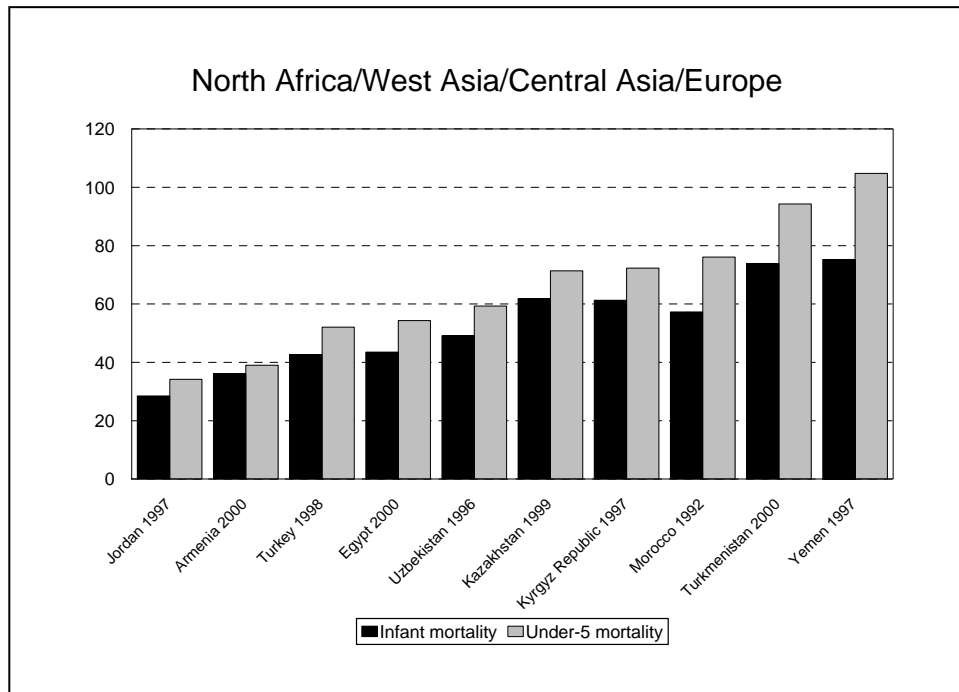
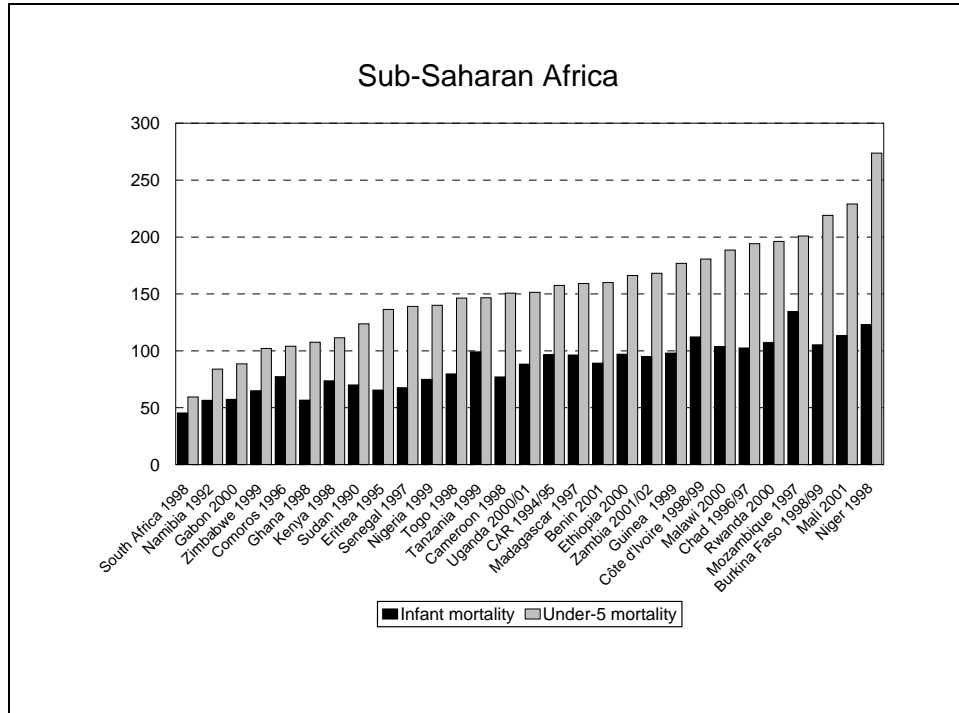
The age distribution of childhood deaths is influenced by the causes of death in a community. For example, in communities where deaths due to congenital anomalies, birth complications, or infections at birth (such as tetanus) are common, infant mortality constitutes a greater part of under-five mortality. In communities where immunization coverage and malnutrition are problems, child mortality constitutes the majority of under-five mortality. The ratio of infant mortality to under-five mortality can thus provide insight into the causes of childhood death in a country. We would expect that as countries develop, improvements in under-five survival will occur first among children age 1 to 4 because of improved immunization coverage against preventable childhood diseases. Improvements in the survival of children less than one year of age comes later, with the capacity to treat ailments affecting children during the earliest months of life. Neonatal deaths are usually less easily addressed by contextual (environmental) improvements. Determining the age patterns of mortality helps to focus interventions on the appropriate age groups and causes.

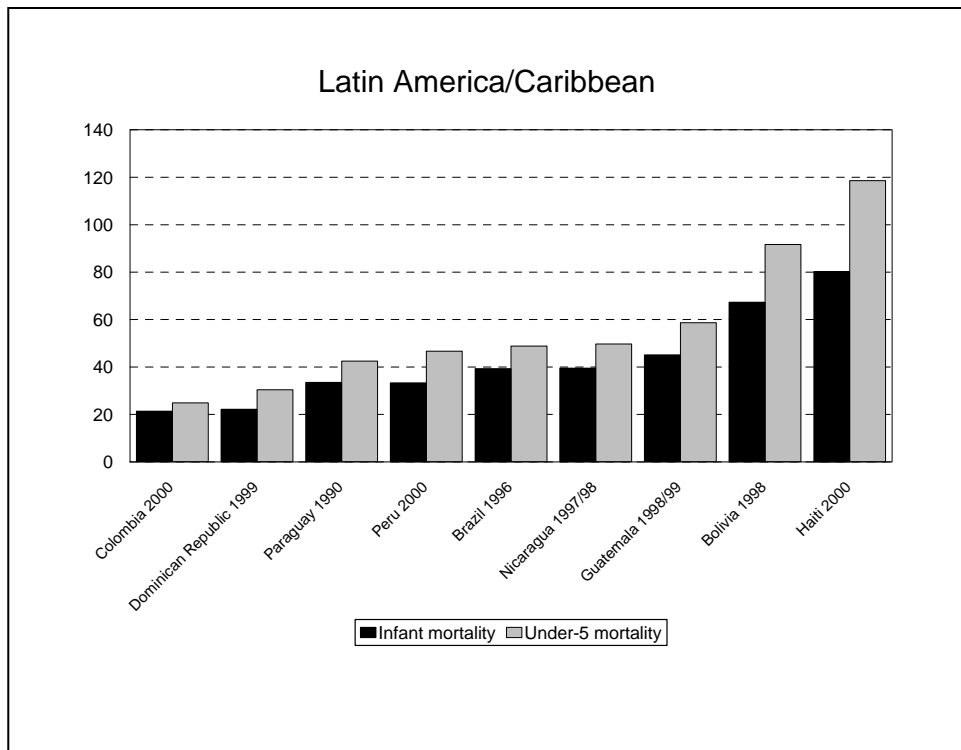
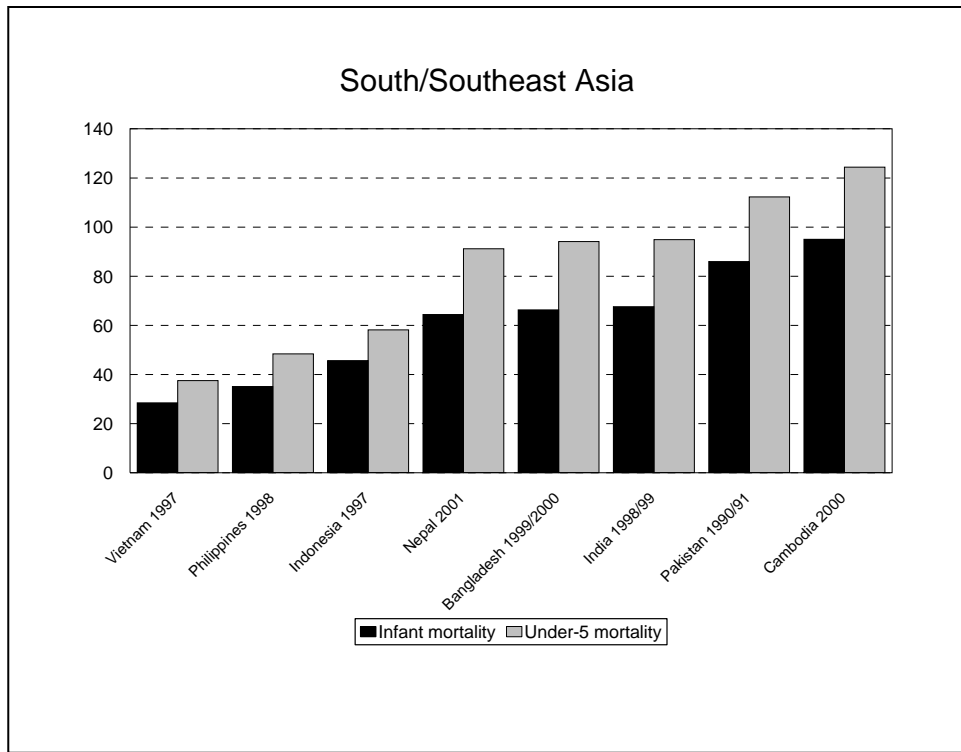
The portion of under-five mortality that consists of infant mortality is shown in Figure 1. In general, as under-five mortality increases, the proportion made up of infant mortality decreases. For example, in Jordan, where under-five mortality is low—34 deaths per 1,000 births—83 percent of deaths occur during infancy (see Appendix B for values). In Niger, under-five mortality is 274 deaths per 1,000 live births, and the infant mortality/under-five mortality ratio ( ${}_1q_0/{}_5q_0$ ) is 0.45. Less than half of under-five deaths are infant deaths, suggesting that many childhood deaths may have been caused by infectious diseases. In Jordan, childhood deaths are more likely due to problems during delivery. This is suggested by the large portion of under-five deaths that occur in the first year of life. As overall health conditions improve, more deaths are clustered in the first months of life.

It should be noted that if a large amount of heaping of age at death occurs at age one, the results of analysis will be biased. Deaths recorded as occurring at 12 months are considered child mortality, while deaths occurring at 11 months and 30 days are infant deaths. Therefore, the ratio of  ${}_1q_0$  to  ${}_5q_0$  will be higher when age at death heaping occurs at age one (more deaths recorded as child deaths, decreasing the numerator of the ratio).

Figure 1 shows the differences in infant and under-five mortality by region. In the majority of regions, the difference between infant and under-five mortality increases as under-five mortality increases (see the ratios in Appendix B).

**Figure 1 Infant and Under-five Mortality Rates, Demographic and Health Surveys, 1990-2002**





## 4 Perinatal Mortality Levels

Perinatal mortality refers to the death of a fetus after seven months of pregnancy (stillbirths) or the death of a newborn in the first week after birth (Table 1). The perinatal mortality rate is thus defined as the number of stillbirths and early neonatal deaths per 1,000 births and stillbirths. (If stillbirths were not included in this calculation the result would be a perinatal ratio.) Information on perinatal mortality is difficult to estimate in many developing countries because in data-deficient settings it is often difficult to



Table 1 Perinatal mortality rates (per 1,000), Demographic and Health Surveys, 1990-2000

Country	Number of stillbirths	Number of early neonatal deaths <sup>1</sup>	Perinatal mortality rate <sup>2</sup>	Pregnancies of 7 or more months duration
<b>SUB-SAHARAN AFRICA</b>				
Ghana 1998	76	78	47.1	3,271
Kenya 1998	53	116	30.0	5,610
Malawi 2000	163	341	40.8	12,364
Uganda 2000	126	179	39.2	7,798
Zimbabwe 1994	59	67	31.3	4,036
Zimbabwe 1999	53	75	35.5	3,612
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>				
Jordan 1990	98	127	26.9	8,359
Jordan 1997	53	84	21.3	6,417
Morocco 1992	110	96	38.8	5,307
Turkey 1993	66	79	38.0	3,802
Turkey 1998	55	76	37.2	3,514
<b>CENTRAL ASIA</b>				
Kazakhstan 1999	21	38	40.3	1,467
<b>SOUTH/SOUTHEAST ASIA</b>				
Bangladesh 1993	208	233	59.9	7,349
Bangladesh 1996	203	172	58.3	6,433
Bangladesh 1999	198	202	56.0	7,137
Indonesia 1991	123	270	26.9	14,616
Indonesia 1994	189	346	31.2	17,172
Indonesia 1997	162	249	25.1	16,378
Philippines 1993	79	117	21.8	8,937
Philippines 1998	93	106	25.9	7,659
<b>LATIN AMERICA/CARIBBEAN</b>				
Bolivia 1994	72	137	33.6	6,219
Brazil 1991	47	56	29.8	3,461
Brazil 1996	44	67	22.9	4,826
Colombia 1990	50	31	21.6	3,781
Colombia 1995	48	75	24.3	5,098
Colombia 2000	53	53	22.9	4,615
Dom. Republic 1991	63	68	33.5	3,911
Dom. Republic 1996	86	86	38.5	4,464
Egypt 1995	170	216	33.2	11,624
Egypt 2000	166	182	30.2	11,526
Guatemala 1995	102	185	31.0	9,252
Guatemala 1999	75	80	33.5	4,620
Peru 1992	81	143	26.0	8,621
Peru 1996	149	251	25.4	15,788
Peru 2000	114	155	21.8	12,337
Paraguay 1990	70	57	31.5	4,045

<sup>1</sup> Deaths occurring within 0-6 days after birth

<sup>2</sup> Perinatal mortality rate is the sum of stillbirths and early neonatal deaths divided by the number of pregnancies of seven or more months duration.

determine when a fetus or infant died. Perinatal mortality rates are presented only for the countries where data on stillbirths were collected.

In DHS surveys, perinatal data are collected in two ways, and the differences between them are likely to affect estimates of perinatal mortality. The first method summarizes data on women's pregnancy status for each of 60 months preceding the survey. The interviewer asks the respondent for a birth history, in chronological order, for all births in the 60 months preceding the survey. The interviewer enters the length of the pregnancy and the birth event in a calendar format. In addition, women are asked about any pregnancies that did not result in a live birth in the last 60 months and these are entered on the same calendar. Thus, the calendar provides information about all pregnancies whether they resulted in a live birth or a stillbirth.

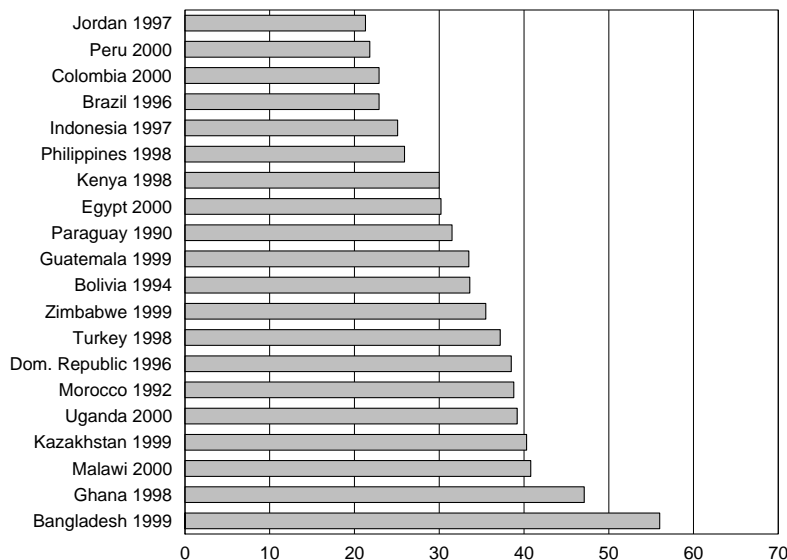
The second method for obtaining data on perinatal mortality—which was used in a number of central Asian countries—collects pregnancy histories for the woman’s entire reproductive period (as opposed to only the past 60 months). Information about the pregnancies is collected in reverse chronological order so the most recent pregnancy is reported first. The pregnancies are not entered in a calendar format, but information on the length of the pregnancy is collected.

Both approaches allow for the calculation of a perinatal mortality rate. However, the first method is more likely to exclude recent births, as the respondent has already mentioned previous births and pregnancies and might avoid mentioning more recent births to avoid having to respond to the list of questions. In the second method, which asks for pregnancies in reverse chronological order, the respondent has just begun the recall process and is more likely to report recent pregnancies fully and accurately. The shift in chronological order would not affect stillbirths to the same degree as live births because the first method asks only about stillbirths in the past five years. Thus, responses might not be censored because of respondent fatigue.

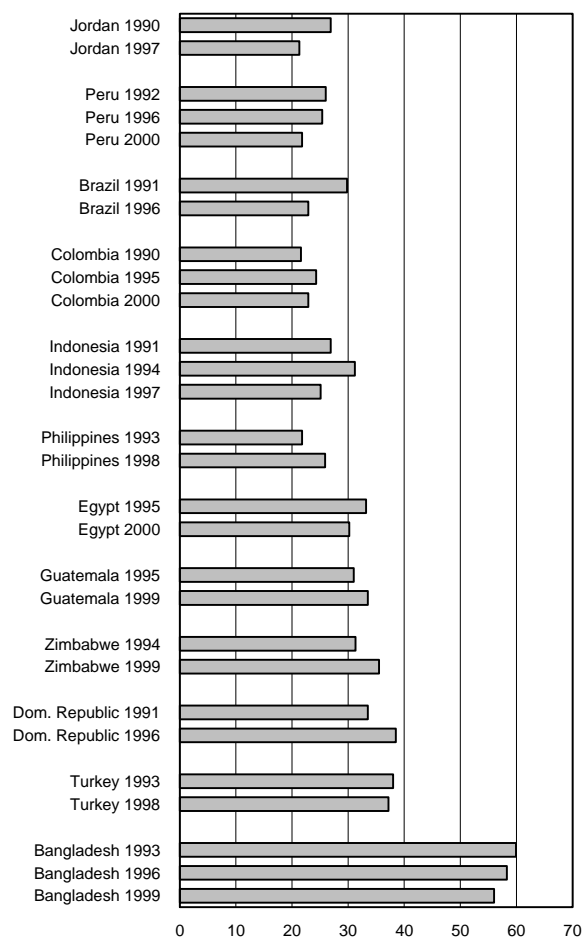
One measure of the quality of the perinatal mortality data is to look at trends in the ratio of stillbirths to early neonatal deaths. We would expect a consistent ratio between the two, representing the biological relationship. However, there is no consistency in this ratio. The ratio of stillbirths to perinatal deaths is less than 0.5 for Indonesia, Kenya, and Malawi, while it is more than 1.5 for Colombia (ratio not shown). These variations suggest that data quality for stillbirths may be poor and more research needs to be done on the collection of this data.

Despite possible data quality issues, perinatal rates are presented in this study to encourage dialog on the collection of data on perinatal mortality. Figure 2 shows the most recent estimates of perinatal mortality for surveys with calendar or pregnancy history data. The latest estimate for Jordan is the lowest at 21 perinatal deaths per 1,000 pregnancies of 7 or more months. The highest estimate is for Bangladesh with a perinatal mortality rate of 56. Figure 3 shows trends in perinatal mortality where available. Improvements can be seen in Bangladesh, Turkey, Egypt, Brazil, Peru, and Jordan, while the Dominican Republic, Zimbabwe, Guatemala, the Philippines, Indonesia, and Colombia suggest deteriorating levels of perinatal mortality.

**Figure 2 Recent estimates of perinatal mortality, Demographic and Health Surveys, 1990-2000**



**Figure 3 Trends in perinatal mortality, Demographic and Health Surveys, 1990-2000**



## 5 Childhood Mortality Levels

This section examines levels of mortality by selected background variables. Rates are shown for neonatal through under-five mortality so that variations in the age patterns can be seen for each variable. Estimates at the national level are for the five years preceding the survey. However, in the presentation of mortality rates by selected variables, rates have been calculated for the ten years preceding the survey in order to ensure an appropriate sample size.

The biodemographic and socioeconomic differentials are presented here through relative risk ratios. These ratios can be misleading if the level of mortality is not taken into consideration. For example, a ratio of 4 is relatively insignificant if the difference is between a mortality level of 2 and 8 as opposed to a difference in mortality levels from 50 to 200. For that reason the under-five mortality rate (U5MR) for the reference group is provided in each table. The average (or median) of these risks is provided at the bottom of the table for summary purposes. These averages are not weighted.

### 5.1 Recent Estimates of Childhood Mortality

Table 2 presents childhood mortality rates for each country by region. Countries in West Africa tend to have the highest rates of child mortality. Very few countries in Asia or Latin America have under-

Table 2 Estimates of childhood mortality arranged by level of under-five mortality in each region, five-year rates, Demographic and Health Surveys 1990-2002

Country	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_4q_1$ )	Under-5 mortality ( ${}_5q_0$ )
<b>SUB-SAHARAN AFRICA</b>					
South Africa 1998	20	26	45	15	59
Namibia 1992	32	25	57	29	84
Gabon 2000	30	27	57	33	89
Zimbabwe 1999	29	36	65	40	102
Comoros 1996	38	39	77	29	104
Ghana 1998	30	27	57	54	108
Kenya 1998	28	45	74	41	112
Sudan 1990	44	26	70	58	124
Eritrea 1995	25	41	66	76	136
Senegal 1997	37	30	68	77	139
Nigeria 1999	37	38	75	70	140
Togo 1998	41	39	80	72	146
Tanzania 1999	40	59	99	53	147
Cameroon 1998	37	40	77	80	151
Uganda 2000/01	33	55	88	69	152
CAR 1994/95	42	55	97	67	158
Madagascar 1997	40	56	96	70	159
Benin 2001	38	51	89	78	160
Ethiopia 2000	49	48	97	77	166
Zambia 2001/02	37	58	95	81	168
Guinea 1999	48	50	98	88	177
Côte d'Ivoire 1998/99	62	50	112	77	181
Malawi 2000	42	62	104	95	189
Chad 1996/97	44	59	103	102	194
Rwanda 2000	44	64	107	100	196
Mozambique 1997	54	81	135	77	201
Burkina Faso 1998/99	41	65	105	127	219
Mali 2001	57	56	113	131	229
Niger 1998	44	79	123	172	274
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>					
Jordan 1997	19	10	29	6	34
Armenia 2000	20	17	36	3	39
Turkey 1998	26	17	43	10	52
Egypt 2000	24	20	44	11	54
Morocco 1992	31	26	57	20	76
Yemen 1997	34	42	75	32	105
<b>CENTRAL ASIA</b>					
Uzbekistan 1996	23	26	49	11	59
Kazakhstan 1999	34	28	62	10	71
Kyrgyz Republic 1997	32	30	61	12	72
Turkmenistan 2000	34	40	74	22	94
<b>SOUTH/SOUTHEAST ASIA</b>					
Vietnam 1997	18	10	29	9	38
Philippines 1998	18	17	35	14	48
Indonesia 1997	22	24	46	13	58
Nepal 2001	39	26	64	29	91
Bangladesh 1999/2000	42	24	66	30	94
India 1998/99	43	24	68	29	95
Pakistan 1990/91	49	37	86	29	112
Cambodia 2000	37	58	95	33	124
<b>LATIN AMERICA/CARIBBEAN</b>					
Colombia 2000	15	7	21	4	25
Dominican Republic 1999	14	8	22	8	30
Paraguay 1990	19	14	34	9	43
Peru 2000	18	15	33	14	47
Brazil 1996	19	20	39	10	49
Nicaragua 1997/98	17	22	40	11	50
Guatemala 1998/99	23	22	45	14	59
Bolivia 1998	34	34	67	26	92
Haiti 2000	32	48	80	42	119

five mortality rates over 100 deaths per 1,000 births, while almost all under-five mortality rates in sub-Saharan Africa are above 100. The range of under-five mortality varies from 25 per 1,000 live births in Colombia to 274 per 1,000 live births in Niger.

Numerous factors are associated with high levels of childhood mortality. In the following analysis, we explore seven influential variables and show the differences in mortality levels between countries. The variables are categorized into two groups: biodemographic characteristics and socioeconomic characteristics. These variables are known to affect childhood mortality. The goal here is not to reemphasize the previously made points, but to show how these factors affect childhood mortality differently in different settings or countries.

## **5.2 Biodemographic Differentials in Childhood Mortality**

Biodemographic characteristics affect the health of the child before and after delivery and, in some cases, can affect caretaker behavior toward the child. Differences in mortality levels by biodemographic characteristics of the child (and mother) have been demonstrated in many studies (Bicego and Ahmad, 1996; Rutstein, 1984; Sullivan et al., 1994). The data presented here provide additional evidence of the differences in childhood mortality in various settings.

### **Mother's age at birth**

For most countries the relationship between mother's age at birth and level of mortality risk exhibits a U-shaped curve. When women give birth at a young age, they are at increased risk of complications, and the child is at increased risk of low birth weight and prematurity. There are also potentially adverse social and economic consequences for these women. When women give birth at an older age, they are more likely to have pregnancy complications, and the baby is more likely to have congenital anomalies, which increases the risk of dying in early childhood. In addition, risk to older women is often increased because of higher parity.

Most countries in this analysis show the expected U-shaped relationship between mother's age and childhood mortality (see Appendix C.1 for values). All of the countries show a higher risk of under-five mortality for young mothers. However, some countries such as Haiti do not show evidence of higher risk for births to older women. In general, mother's age appears to have the greatest impact in the first month of life. On average, infants born to mothers under the age of 20 are 45 percent more likely to die in the first month of life than infants born to mothers age 20 to 29; and infants born to women age 40 to 49 are 30 percent more likely to die in the first month of life. The relative risks of dying for children born to younger mothers and children born to older mothers are shown in Tables 3 and 4.



Table 3 Relative risk of dying before age five among children born to younger women (<20 years versus 20-29 years), ten-year rates, Demographic and Health Surveys 1990-2002

Country	Under-5 mortality rate for children of mothers age 20-29	Relative risk of dying before age five				
		Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( <sub>1</sub> q <sub>0</sub> )	Child mortality ( <sub>4</sub> q <sub>1</sub> )	Under-5 mortality ( <sub>5</sub> q <sub>0</sub> )
<b>SUB-SAHARAN AFRICA</b>						
Benin 2001	151	1.56	1.17	1.33	1.12	1.23
Burkina Faso 1998/99	222	1.70	1.12	1.34	1.10	1.19
Cameroon 1998	133	1.45	1.51	1.48	1.27	1.35
CAR 1994/95	153	1.54	1.40	1.46	0.87	1.21
Chad 1996/97	194	1.41	1.09	1.22	1.06	1.13
Comoros 1996	104	2.03	0.86	1.44	1.22	1.37
Côte d'Ivoire 1998/99	153	1.50	1.35	1.42	1.37	1.38
Eritrea 1995	156	1.15	1.26	1.21	0.91	1.04
Ethiopia 2000	179	1.67	1.19	1.43	1.09	1.26
Gabon 2000	83	1.28	1.13	1.21	1.27	1.22
Ghana 1998	105	1.93	0.88	1.35	1.15	1.25
Guinea 1999	183	1.45	1.21	1.33	1.15	1.22
Kenya 1998	89	1.71	1.62	1.66	1.50	1.58
Madagascar 1997	159	1.51	1.12	1.27	1.10	1.19
Malawi 2000	193	1.79	1.21	1.42	1.27	1.32
Mali 2001	219	1.87	1.34	1.62	1.27	1.40
Mozambique 1997	218	1.09	1.21	1.16	0.91	1.07
Namibia 1992	91	1.13	0.95	1.05	1.24	1.11
Niger 1998	299	1.71	1.24	1.41	1.06	1.17
Nigeria 1999	122	1.06	1.21	1.13	1.51	1.30
Rwanda 2000	207	1.11	1.30	1.22	1.05	1.13
Senegal 1997	130	1.64	1.28	1.47	1.18	1.30
South Africa 1998	55	1.05	1.07	1.06	1.29	1.12
Sudan 1990	133	1.32	0.97	1.15	1.28	1.20
Tanzania 1999	149	2.17	1.65	1.86	1.12	1.52
Togo 1998	137	1.36	1.19	1.27	1.28	1.26
Uganda 2000/01	147	1.42	1.23	1.30	1.18	1.23
Zambia 2001/02	166	1.50	1.10	1.23	1.00	1.12
Zimbabwe 1999	90	1.39	0.95	1.14	0.97	1.08
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>						
Armenia 2000	41	1.43	1.22	1.34	0.48	1.25
Egypt 2000	58	1.51	1.75	1.62	1.17	1.52
Jordan 1997	30	1.63	2.48	1.94	1.17	1.82
Morocco 1992	80	2.01	1.58	1.82	0.90	1.56
Turkey 1998	58	0.99	1.38	1.14	1.32	1.17
Yemen 1997	114	1.78	1.32	1.53	1.18	1.42
<b>CENTRAL ASIA</b>						
Kazakhstan 1999	61	(2.14)	1.03	1.56	0.47	1.38
Kyrgyz Republic 1997	76	(1.55)	1.40	1.48	0.96	1.40
Turkmenistan 2000	88	(1.73)	0.88	1.24	1.26	1.24
Uzbekistan 1996	55	(1.60)	0.69	1.07	1.08	1.07
<b>SOUTH/SOUTHEAST ASIA</b>						
Bangladesh 1999/2000	102	1.75	1.08	1.47	0.85	1.27
Cambodia 2000	116	1.25	1.08	1.14	0.92	1.09
India 1998/99	90	1.55	1.31	1.46	1.08	1.34
Indonesia 1997	64	1.42	1.27	1.34	1.27	1.31
Nepal 2001	98	1.77	1.36	1.60	0.87	1.36
Pakistan 1990/91	117	1.38	1.28	1.34	0.94	1.24
Philippines 1998	51	1.62	0.88	1.24	1.06	1.18
Vietnam 1997	44	1.82	0.54	1.36	0.49	1.16
<b>LATIN AMERICA/CARIBBEAN</b>						
Bolivia 1998	91	1.14	1.74	1.44	1.20	1.37
Brazil 1996	51	1.17	1.42	1.30	1.23	1.28
Colombia 2000	24	1.25	2.03	1.49	0.68	1.37
Dominican Republic 1999	38	3.69	1.64	2.54	0.93	2.10
Guatemala 1998/99	54	1.49	2.06	1.73	1.50	1.66
Haiti 2000	135	1.40	1.70	1.58	1.26	1.43
Nicaragua 1997/98	48	1.24	1.60	1.44	1.05	1.35
Paraguay 1990	39	1.96	1.65	1.81	1.37	1.69
Peru 2000	56	1.26	1.37	1.32	0.95	1.20
Median (unweighted)		1.45	1.25	1.36	1.12	1.26

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

Table 4 Relative risk of dying before age five among children born to older women (40-49 years versus 20-29 years), ten-year rates, Demographic and Health Surveys 1990-2002

Country	Under-5 mortality rate for children of mothers age 20-29	Relative risk of dying before age five				
		Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_4q_1$ )	Under-5 mortality ( ${}_5q_0$ )
<b>SUB-SAHARAN AFRICA</b>						
Benin 2001	151	1.17	1.29	1.24	0.99	1.12
Burkina Faso 1998/99	222	1.30	0.85	1.02	0.95	0.99
Cameroon 1998	133	1.30	1.35	1.33	0.75	1.04
CAR 1994/95	153	2.17	0.95	1.47	1.10	1.30
Chad 1996/97	194	1.17	1.52	1.38	1.10	1.23
Comoros 1996	104	2.43	1.55	1.99	0.88	1.68
Côte d'Ivoire 1998/99	153	(1.06)	0.89	0.97	2.01	1.32
Eritrea 1995	156	0.41	0.73	0.57	1.10	0.87
Ethiopia 2000	179	1.04	1.15	1.10	0.96	1.04
Gabon 2000	83	3.21	0.60	1.88	0.97	1.55
Ghana 1998	105	0.73	0.64	0.68	1.06	0.87
Guinea 1999	183	1.48	1.03	1.24	0.79	1.01
Kenya 1998	89	1.83	1.88	1.86	2.13	1.91
Madagascar 1997	159	1.91	1.24	1.50	0.88	1.22
Malawi 2000	193	1.79	0.92	1.23	0.83	1.04
Mali 2001	219	1.30	0.99	1.15	0.92	1.03
Mozambique 1997	218	1.23	0.70	0.91	0.73	0.85
Namibia 1992	91	1.36	0.69	1.05	1.58	1.21
Niger 1998	299	1.16	0.87	0.97	0.75	0.84
Nigeria 1999	122	2.25	2.50	2.37	1.56	1.92
Rwanda 2000	207	1.46	1.14	1.27	0.58	0.95
Senegal 1997	130	1.68	0.85	1.29	0.93	1.09
South Africa 1998	55	0.94	2.69	1.85	2.03	1.88
Sudan 1990	133	1.05	1.05	1.05	1.07	1.06
Tanzania 1999	149	0.93	1.32	1.17	0.05	0.71
Togo 1998	137	1.42	0.84	1.13	1.11	1.11
Uganda 2000/01	147	1.31	0.95	1.08	1.05	1.06
Zambia 2001/02	166	1.33	1.19	1.24	1.08	1.15
Zimbabwe 1999	90	1.29	1.71	1.53	1.29	1.43
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>						
Armenia 2000	41	*	*	*	*	*
Egypt 2000	58	1.22	1.67	1.43	1.09	1.35
Jordan 1997	30	2.11	0.86	1.65	1.81	1.67
Morocco 1992	80	0.90	1.23	1.05	1.12	1.07
Turkey 1998	58	2.99	1.39	2.37	0.87	2.08
Yemen 1997	114	0.98	0.92	0.95	1.23	1.02
<b>CENTRAL ASIA</b>						
Kazakhstan 1999	61	(3.71)	2.11	2.88	0.00	2.41
Kyrgyz Republic 1997	76	(1.20)	2.79	1.97	0.00	1.72
Turkmenistan 2000	88	0.90	0.62	0.74	0.64	0.72
Uzbekistan 1996	55	(4.50)	0.00	1.89	0.56	1.56
<b>SOUTH/SOUTHEAST ASIA</b>						
Bangladesh 1999/2000	102	0.41	0.50	0.45	0.74	0.55
Cambodia 2000	116	1.12	1.47	1.33	1.43	1.34
India 1998/99	90	1.52	1.94	1.67	1.99	1.74
Indonesia 1997	64	0.92	0.83	0.87	0.32	0.73
Nepal 2001	98	2.00	0.58	1.42	0.71	1.20
Pakistan 1990/91	117	1.10	1.26	1.17	0.95	1.12
Philippines 1998	51	2.17	0.98	1.56	0.88	1.32
Vietnam 1997	44	1.20	0.00	0.77	1.54	0.96
<b>LATIN AMERICA/CARIBBEAN</b>						
Bolivia 1998	91	1.48	1.15	1.32	0.80	1.18
Brazil 1996	51	1.00	1.88	1.46	2.45	1.59
Colombia 2000	24	2.56	0.79	2.01	*	1.73
Dominican Republic 1999	38	*	*	*	*	*
Guatemala 1998/99	54	3.02	2.55	2.82	3.85	2.99
Haiti 2000	135	0.87	1.04	0.97	0.38	0.75
Nicaragua 1997/98	48	2.37	1.12	1.68	0.20	1.36
Paraguay 1990	39	2.60	0.93	1.80	3.39	2.19
Peru 2000	56	2.56	1.48	2.04	1.35	1.82
Median (unweighted)		1.30	1.05	1.30	0.97	1.19

Note: Figures in parentheses are based on fewer than 250-499 births. An asterisk signifies an estimate was

## **Birth intervals**

Births that occur in quick succession often have poor outcomes for reasons related to maternal health and environmental factors. Research has found that maternal nutrition and maternal depletion are key factors affecting mortality levels for births following a short birth interval. Also, competition for resources with similar-aged siblings can affect the well-being of a child. In this paper, we examine three birth intervals—less than 24 months, 24 to 47 months, and 48 months or more. These cutoffs were chosen to match other analyses of these data (see Bicego et al., 1996 and Sullivan et al., 1994). In addition, research has shown that after about 48 months the benefits of a longer birth interval diminish. The additional risk associated with shorter and longer birth intervals is shown in Tables 5 and 6.

The relative risks associated with of childhood mortality are remarkably consistent across countries. Regardless of the overall level of under-five mortality, there is a stable association between the risk of dying and the length of the birth interval. On average, under-five mortality for births within 24 months of a previous birth is 64 percent higher than births with a 24- to 47-month interval (see Table 5). Births after a 48-month interval have a reduced risk of 28 percent compared with births after a 24- to 47-month interval (see Table 6).

Table 5 Relative risk of dying before age five among children born after a short birth interval (<24 year versus 24-47 months), ten-year rates, Demographic and Health Surveys 1990-2002

Country	Under-5 mortality rate for children of mothers age 24-47	Relative risk of dying before age five				
		Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( <sub>1</sub> q <sub>0</sub> )	Child mortality ( <sub>4</sub> q <sub>1</sub> )	Under-5 mortality ( <sub>5</sub> q <sub>0</sub> )
<b>SUB-SAHARAN AFRICA</b>						
Benin 2001	151	2.37	1.63	1.90	1.13	1.50
Burkina Faso 1998/99	207	1.94	1.56	1.70	1.29	1.42
Cameroon 1998	127	1.88	1.65	1.75	1.58	1.63
CAR 1994/95	122	2.21	2.07	2.12	1.49	1.79
Chad 1996/97	190	1.61	1.42	1.50	1.27	1.35
Comoros 1996	96	1.84	1.85	1.85	0.89	1.48
Côte d'Ivoire 1998/99	162	1.59	1.59	1.59	1.54	1.54
Eritrea 1995	130	2.06	1.87	1.95	1.50	1.65
Ethiopia 2000	168	2.18	1.87	2.02	1.30	1.62
Gabon 2000	79	1.76	1.60	1.67	1.46	1.58
Ghana 1998	108	2.54	1.64	2.03	1.09	1.51
Guinea 1999	199	1.40	1.30	1.35	1.02	1.18
Kenya 1998	99	1.55	1.48	1.51	1.59	1.51
Madagascar 1997	137	2.59	1.76	2.04	1.41	1.70
Malawi 2000	171	2.18	1.73	1.90	1.58	1.68
Mali 2001	197	2.01	1.77	1.89	1.55	1.64
Mozambique 1997	199	1.64	1.73	1.70	1.45	1.55
Namibia 1992	83	2.32	1.32	1.84	1.36	1.65
Niger 1998	282	1.81	1.37	1.51	1.28	1.32
Nigeria 1999	126	2.00	1.55	1.75	1.11	1.39
Rwanda 2000	183	2.03	1.77	1.88	1.50	1.64
Senegal 1997	131	1.56	1.76	1.65	1.12	1.33
South Africa 1998	52	1.93	2.06	2.00	1.86	1.95
Sudan 1990	111	1.51	1.59	1.55	1.68	1.58
Tanzania 1999	152	1.33	1.65	1.52	0.98	1.29
Togo 1998	130	2.56	1.79	2.15	1.58	1.81
Uganda 2000/01	131	2.13	1.84	1.94	1.26	1.56
Zambia 2001/02	144	2.76	1.89	2.16	1.40	1.72
Zimbabwe 1999	80	3.03	2.20	2.54	1.31	1.95
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>						
Armenia 2000	57	1.01	1.25	1.11	0.71	1.07
Egypt 2000	54	2.50	2.20	2.35	2.91	2.42
Jordan 1997	24	2.09	1.49	1.84	1.59	1.80
Morocco 1992	67	2.53	1.96	2.23	1.46	1.97
Turkey 1998	46	2.96	2.47	2.68	1.90	2.44
Yemen 1997	79	2.32	2.23	2.27	1.86	2.10
<b>CENTRAL ASIA</b>						
Kazakhstan 1999	54	2.86	1.30	1.80	0.64	1.62
Kyrgyz Republic 1997	58	1.76	1.87	1.81	1.21	1.71
Turkmenistan 2000	79	1.47	1.48	1.47	1.78	1.52
Uzbekistan 1996	44	1.10	1.79	1.44	1.91	1.51
<b>SOUTH/SOUTHEAST ASIA</b>						
Bangladesh 1999/2000	100	1.94	1.71	1.84	1.35	1.63
Cambodia 2000	113	1.96	1.38	1.60	1.36	1.52
India 1998/99	88	2.02	1.67	1.88	1.57	1.75
Indonesia 1997	72	2.09	1.93	2.00	1.66	1.88
Nepal 2001	92	2.27	1.79	2.07	1.60	1.87
Pakistan 1990/91	88	2.06	2.18	2.11	1.71	1.97
Philippines 1998	49	1.48	1.78	1.63	1.31	1.48
Vietnam 1997	42	1.84	2.12	1.94	1.82	1.90
<b>LATIN AMERICA/CARIBBEAN</b>						
Bolivia 1998	90	1.79	1.90	1.85	1.84	1.82
Brazil 1996	51	1.51	2.32	1.94	1.64	1.88
Colombia 2000	28	1.52	1.55	1.53	1.65	1.54
Dominican Republic 1999	20	4.93	6.76	5.59	1.09	3.57
Guatemala 1998/99	52	1.60	2.09	1.82	2.18	1.89
Haiti 2000	119	1.95	1.54	1.69	1.65	1.64
Nicaragua 1997/98	37	2.28	2.73	2.53	2.59	2.51
Paraguay 1990	49	0.95	1.38	1.13	1.17	1.14
Peru 2000	60	1.94	1.82	1.89	1.61	1.78
Median (unweighted)		1.95	1.77	1.85	1.49	1.64

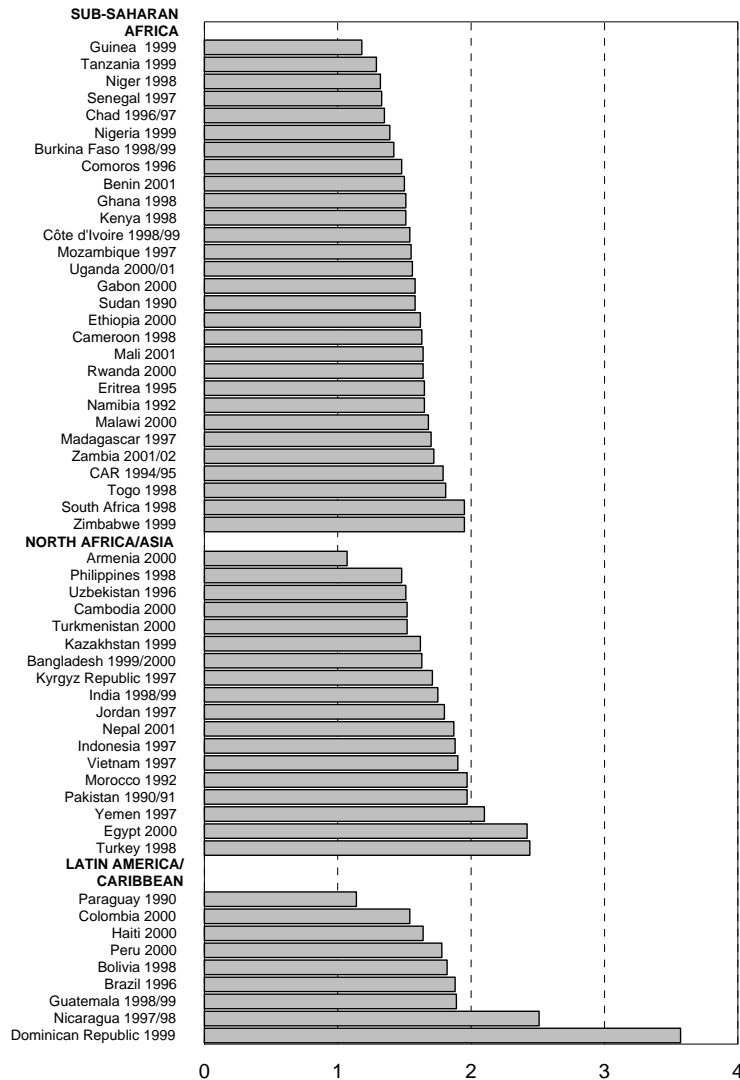
Table 6 Relative risk of dying before age five among children born after a long birth interval (48+ versus 24-47 months), ten year rates, Demographic and Health Surveys 1990-2002

Country	Under-5 mortality rate for children or mothers age 24-47	Relative risk of dying before age five				
		Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( <sub>1</sub> q <sub>0</sub> )	Child mortality ( <sub>4</sub> q <sub>1</sub> )	Under-5 mortality ( <sub>5</sub> q <sub>0</sub> )
<b>SUB-SAHARAN AFRICA</b>						
Benin 2001	151	1.25	0.52	0.78	0.88	0.83
Burkina Faso 1998/99	207	0.62	0.48	0.53	0.49	0.52
Cameroon 1998	127	0.71	0.53	0.62	0.58	0.61
CAR 1994/95	122	0.63	0.92	0.80	0.73	0.77
Chad 1996/97	190	0.67	0.59	0.63	0.46	0.55
Comoros 1996	96	1.40	0.67	1.03	0.35	0.78
Côte d'Ivoire 1998/99	162	0.58	0.38	0.48	0.78	0.61
Eritrea 1995	130	0.73	0.57	0.64	0.52	0.58
Ethiopia 2000	168	0.58	0.71	0.65	0.47	0.57
Gabon 2000	79	1.36	0.74	1.02	0.94	0.99
Ghana 1998	108	0.76	0.62	0.68	0.54	0.61
Guinea 1999	199	0.53	0.41	0.47	0.50	0.49
Kenya 1998	99	0.49	0.76	0.65	0.73	0.68
Madagascar 1997	137	0.90	0.49	0.63	0.70	0.68
Malawi 2000	171	0.77	0.96	0.89	0.63	0.77
Mali 2001	197	0.61	0.68	0.65	0.67	0.67
Mozambique 1997	199	0.39	0.73	0.60	0.62	0.62
Namibia 1992	83	0.95	0.86	0.91	0.81	0.87
Niger 1998	282	0.70	0.67	0.68	0.48	0.57
Nigeria 1999	126	0.95	0.78	0.85	0.63	0.74
Rwanda 2000	183	0.61	0.69	0.66	0.66	0.67
Senegal 1997	131	0.88	0.83	0.86	0.69	0.77
South Africa 1998	52	0.76	0.99	0.88	0.94	0.90
Sudan 1990	111	0.68	0.50	0.60	0.53	0.57
Tanzania 1999	152	0.73	0.94	0.85	0.54	0.74
Togo 1998	130	1.07	0.58	0.81	0.52	0.67
Uganda 2000/01	131	1.05	1.01	1.02	0.68	0.85
Zambia 2001/02	144	1.15	0.92	0.99	0.91	0.95
Zimbabwe 1999	80	1.20	1.24	1.22	0.67	0.97
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>						
Armenia 2000	57	0.94	0.81	0.89	0.54	0.85
Egypt 2000	54	0.88	0.72	0.80	0.71	0.78
Jordan 1997	24	1.30	1.40	1.34	1.46	1.36
Morocco 1992	67	0.86	0.51	0.68	0.66	0.68
Turkey 1998	46	1.76	0.38	0.97	0.23	0.78
Yemen 1997	79	0.66	0.64	0.65	0.74	0.68
<b>CENTRAL ASIA</b>						
Kazakhstan 1999	54	1.59	0.54	0.88	0.72	0.85
Kyrgyz Republic 1997	58	1.08	1.04	1.05	0.86	1.02
Turkmenistan 2000	79	1.24	0.43	0.77	0.56	0.73
Uzbekistan 1996	44	1.50	1.16	1.34	1.09	1.29
<b>SOUTH/SOUTHEAST ASIA</b>						
Bangladesh 1999/2000	100	0.65	0.74	0.69	0.47	0.61
Cambodia 2000	113	0.70	0.73	0.72	0.70	0.72
India 1998/99	88	0.68	0.64	0.66	0.43	0.59
Indonesia 1997	72	0.68	0.56	0.61	0.78	0.67
Nepal 2001	92	0.62	0.69	0.65	0.59	0.63
Pakistan 1990/91	88	0.38	0.67	0.50	0.54	0.52
Philippines 1998	49	1.61	1.05	1.33	0.51	0.98
Vietnam 1997	42	0.62	0.75	0.67	0.95	0.74
<b>LATIN AMERICA /CARIBBEAN</b>						
Bolivia 1998	90	0.57	0.42	0.49	0.59	0.52
Brazil 1996	51	1.25	0.69	0.95	0.54	0.88
Colombia 2000	28	1.22	0.29	0.83	0.68	0.81
Dominican Republic 1999	20	2.69	4.95	3.51	2.00	2.82
Guatemala 1998/99	52	0.44	1.35	0.84	0.49	0.76
Haiti 2000	119	0.71	0.66	0.68	0.36	0.57
Nicaragua 1997/98	37	1.20	0.93	1.06	1.21	1.08
Paraguay 1990	49	0.47	0.55	0.51	0.59	0.53
Peru 2000	60	0.78	0.57	0.68	0.47	0.62
Median (unweighted)		0.76	0.69	0.74	0.63	0.72



The reduced risk of a long birth interval exists throughout a child's first five years. Infants and children age 1 to 4 have an increased risk of dying after a short birth interval. Figure 4 presents the relative risks by country. Much of the variation in risk is due to the low levels of under-five mortality in some countries.

**Figure 4 Relative risk of dying before age five among children born after a birth interval of less than 24 months, Demographic and Health Surveys, 1990-2002**



### Birth order

First births and high-order births have poor outcomes compared with other births. However, not all of the association is due to birth order. Maternal age is also associated with differentials in mortality by birth order. Typically, younger women have had fewer births than older women. In addition, there is often a correlation between short birth intervals and high-order births because women who have had many children are more likely to have had short birth intervals on the way to high parity.

Most of the additional risk between first births and second- to third-order births occurs in the neonatal period (see Table 7). Between second- and third-order births and seventh- or higher-order births the additional risk exists throughout childhood (see Table 8). On average, babies born after six other

Table 7 Relative risk of dying before age five among children of low birth order (1st birth versus 2nd to 5th birth), ten-year rates, Demographic and Health Surveys 1990-2002

Country	Under-5 mortality rate for children of birth order 2-3	Relative risk of dying before age five				
		Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( <sub>1</sub> q <sub>0</sub> )	Child mortality ( <sub>4</sub> q <sub>1</sub> )	Under-5 mortality ( <sub>5</sub> q <sub>0</sub> )
<b>SUB-SAHARAN AFRICA</b>						
Benin 2001	147	1.35	0.93	1.10	0.99	1.05
Burkina Faso 1998/99	208	1.68	1.41	1.53	1.04	1.23
Cameroon 1998	140	1.46	0.91	1.17	0.98	1.07
CAR 1994/95	155	1.79	1.28	1.48	0.84	1.20
Chad 1996/97	200	1.23	0.96	1.08	0.89	0.98
Comoros 1996	104	1.51	0.91	1.24	0.75	1.09
Côte d'Ivoire 1998/99	160	1.25	1.60	1.42	0.84	1.17
Eritrea 1995	155	1.44	1.10	1.26	0.82	1.01
Ethiopia 2000	177	1.73	1.18	1.45	0.83	1.16
Gabon 2000	86	1.31	0.74	0.99	1.13	1.04
Ghana 1998	103	1.54	0.82	1.17	1.04	1.11
Guinea 1999	174	1.56	1.14	1.34	1.15	1.23
Kenya 1998	93	0.91	1.05	1.00	1.07	1.02
Madagascar 1997	155	1.23	1.14	1.18	0.84	1.02
Malawi 2000	202	1.44	1.18	1.28	1.10	1.18
Mali 2001	224	1.91	1.23	1.59	1.00	1.26
Mozambique 1997	207	1.44	1.11	1.24	0.87	1.11
Namibia 1992	92	0.93	0.80	0.87	1.04	0.92
Niger 1998	298	1.66	0.97	1.21	1.01	1.08
Nigeria 1999	111	1.51	0.90	1.19	1.04	1.11
Rwanda 2000	198	1.23	0.95	1.06	1.02	1.04
Senegal 1997	131	1.66	0.92	1.30	1.02	1.14
South Africa 1998	47	1.25	1.21	1.23	1.06	1.18
Sudan 1990	128	1.87	1.06	1.48	0.98	1.22
Tanzania 1999	171	1.52	1.01	1.21	0.89	1.08
Togo 1998	134	1.38	1.11	1.24	0.90	1.07
Uganda 2000/01	150	1.87	1.17	1.40	0.96	1.18
Zambia 2001/02	169	1.52	1.11	1.24	0.91	1.07
Zimbabwe 1999	86	1.37	1.13	1.23	0.74	1.04
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>						
Armenia 2000	52	0.92	0.46	0.70	0.31	0.66
Egypt 2000	55	1.11	0.93	1.02	0.75	0.97
Jordan 1997	30	1.03	1.18	1.08	1.17	1.10
Morocco 1992	83	1.35	1.01	1.19	0.69	1.05
Turkey 1998	54	1.04	0.59	0.85	0.94	0.87
Yemen 1997	120	1.48	0.99	1.22	0.76	1.10
<b>CENTRAL ASIA</b>						
Kazakhstan 1999	57	1.13	0.84	0.99	2.15	1.09
Kyrgyz Republic 1997	70	1.47	0.88	1.14	1.54	1.18
Turkmenistan 2000	92	1.00	0.86	0.92	0.72	0.88
Uzbekistan 1996	53	1.12	1.00	1.06	1.10	1.06
<b>SOUTH/SOUTHEAST ASIA</b>						
Bangladesh 1999/2000	99	1.93	1.08	1.59	0.61	1.26
Cambodia 2000	117	1.06	1.05	1.05	0.57	0.92
India 1998/99	91	1.26	1.00	1.17	0.65	1.01
Indonesia 1997	66	1.14	0.83	0.97	0.65	0.89
Nepal 2001	98	1.29	1.16	1.24	0.80	1.12
Pakistan 1990/91	113	1.35	0.98	1.18	0.40	0.98
Philippines 1998	46	1.25	0.72	1.00	0.73	0.92
Vietnam 1997	40	1.13	1.22	1.16	0.79	1.07
<b>LATIN AMERICA/CARIBBEAN</b>						
Bolivia 1998	88	0.88	0.92	0.90	0.89	0.90
Brazil 1996	51	0.93	0.75	0.83	0.76	0.82
Colombia 2000	29	0.87	0.64	0.78	0.65	0.76
Dominican Republic 1999	42	0.81	1.25	1.01	1.20	1.04
Guatemala 1998/99	54	1.91	0.88	1.32	0.78	1.18
Haiti 2000	135	1.25	0.96	1.07	1.01	1.04
Nicaragua 1997/98	49	1.17	1.03	1.09	0.90	1.05
Paraguay 1990	35	1.85	1.07	1.46	0.88	1.29
Peru 2000	54	0.83	0.88	0.85	0.82	0.84
Median (unweighted)		1.33	1.00	1.17	0.89	1.07

Table 8 Relative risk of dying before age five among children of high birth order (7th or higher birth versus 2nd - 5th birth), ten-year rates, Demographic and Health Surveys, 1990-2002

Country	Under-5 mortality rate for children of birth order 2-3	Relative risk of dying before age five				
		Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_4q_1$ )	Under-5 mortality ( ${}_5q_0$ )
<b>SUB-SAHARAN AFRICA</b>						
Benin 2001	147	1.69	1.32	1.47	1.20	1.33
Burkina Faso 1998/99	208	1.25	1.24	1.25	1.02	1.11
Cameroon 1998	140	1.44	0.98	1.19	1.05	1.11
CAR 1994/95	155	1.66	0.91	1.21	0.88	1.07
Chad 1996/97	200	1.29	1.18	1.23	1.19	1.20
Comoros 1996	104	1.23	1.31	1.27	1.13	1.22
Côte d'Ivoire 1998/99	160	1.23	1.31	1.27	1.34	1.28
Eritrea 1995	155	1.16	1.13	1.15	0.90	1.00
Ethiopia 2000	177	1.35	1.22	1.28	0.91	1.11
Gabon 2000	86	1.88	1.34	1.59	0.78	1.31
Ghana 1998	103	1.29	0.89	1.08	1.11	1.09
Guinea 1999	174	1.47	1.47	1.47	1.12	1.27
Kenya 1998	93	1.70	1.70	1.70	1.69	1.67
Madagascar 1997	155	1.43	1.48	1.46	0.95	1.21
Malawi 2000	202	1.25	0.88	1.02	0.95	0.99
Mali 2001	224	1.14	1.28	1.21	1.08	1.13
Mozambique 1997	207	0.89	1.13	1.04	1.48	1.18
Namibia 1992	92	1.30	0.67	0.99	1.51	1.15
Niger 1998	298	1.05	1.04	1.05	1.00	1.02
Nigeria 1999	111	2.13	2.04	2.08	1.45	1.72
Rwanda 2000	198	1.63	1.12	1.32	0.85	1.09
Senegal 1997	131	1.47	1.24	1.35	1.08	1.20
South Africa 1998	47	2.04	3.37	2.76	0.52	2.09
Sudan 1990	128	1.33	1.20	1.27	0.96	1.11
Tanzania 1999	171	1.37	0.77	1.00	0.40	0.78
Togo 1998	134	1.72	1.21	1.46	1.02	1.23
Uganda 2000/01	150	1.73	1.01	1.24	0.89	1.07
Zambia 2001/02	169	1.35	0.95	1.08	0.93	1.00
Zimbabwe 1999	86	1.17	1.56	1.39	1.12	1.28
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>						
Armenia 2000	52	8.96	3.02	6.09	*	5.49
Egypt 2000	55	1.98	2.33	2.14	2.75	2.23
Jordan 1997	30	1.48	1.26	1.40	1.44	1.40
Morocco 1992	83	1.33	1.37	1.35	0.77	1.18
Turkey 1998	54	0.68	1.90	1.19	3.03	1.46
Yemen 1997	120	0.91	1.13	1.02	1.13	1.05
<b>CENTRAL ASIA</b>						
Kazakhstan 1999	57	*	*	(2.72)	*	2.48
Kyrgyz Republic 1997	70	*	1.14	1.17	2.24	1.27
Turkmenistan 2000	92	1.29	0.81	1.02	0.56	0.92
Uzbekistan 1996	53	*	1.21	1.91	0.63	1.59
<b>SOUTH/SOUTHEAST ASIA</b>						
Bangladesh 1999/2000	99	0.98	1.25	1.09	1.41	1.19
Cambodia 2000	117	1.41	1.54	1.49	1.04	1.35
India 1998/99	91	1.73	1.77	1.75	1.84	1.74
Indonesia 1997	66	1.95	2.03	1.99	1.60	1.86
Nepal 2001	98	1.43	1.13	1.31	1.79	1.43
Pakistan 1990/91	113	1.41	1.13	1.28	1.01	1.20
Philippines 1998	46	1.62	1.71	1.66	2.78	1.98
Vietnam 1997	40	1.73	3.37	2.19	2.14	2.16
<b>LATIN AMERICA/CARIBBEAN</b>						
Bolivia 1998	88	1.78	1.48	1.62	1.55	1.59
Brazil 1996	51	1.88	2.00	1.94	3.68	2.16
Colombia 2000	29	(1.19)	0.63	0.98	0.50	0.91
Dominican Republic 1999	42	0.43	3.89	1.98	*	1.69
Guatemala 1998/99	54	2.19	1.34	1.70	1.36	1.61
Haiti 2000	135	1.63	1.07	1.27	0.98	1.16
Nicaragua 1997/98	49	2.39	1.61	1.94	1.97	1.93
Paraguay 1990	35	2.24	1.99	2.11	1.23	1.85
Peru 2000	54	1.79	1.64	1.71	1.94	1.76
Median (unweighted)		1.43	1.26	1.32	1.12	1.25

Note: Figures in parentheses are based on fewer than 250-499 births. An asterisk signifies an estimate was suppressed because it was based on fewer than 250 births.

births are 43 percent more likely to die during the neonatal period compared with births of second to third order, and are also 11 percent more likely to die between ages 1 and 4. First births are, on average, at a 33 percent increased risk of dying during the neonatal period than births of second through third order. However, this additional risk diminishes as children age. The risk for first births varies by country. In Mali, the chances of a first-born child dying during the first month of life are almost two times greater than those of the next two children, while in parts of Latin America, first-born children are more likely to survive than the next two. Birth order is highly correlated with age of the mother at birth, so the decreased risk for a first child in Latin America is probably due to older age at first birth among mothers.

## **Sex**

Much research has been done on the sex differentials in childhood mortality, especially in situations where the usual male disadvantage is not evident (Hill and Upchurch, 1995). Males have higher mortality rates during the first six months of life for genetic reasons (primarily because of higher vulnerability to infectious disease). Excess male mortality risk declines after six months. However, in situations where girl children are considered more of a financial burden to the family than boys, health care patterns tend to favor boys (Arnold, 1992). Where these situations exist, there is some evidence of a reduced risk of mortality for boys in the ages 1 to 4.

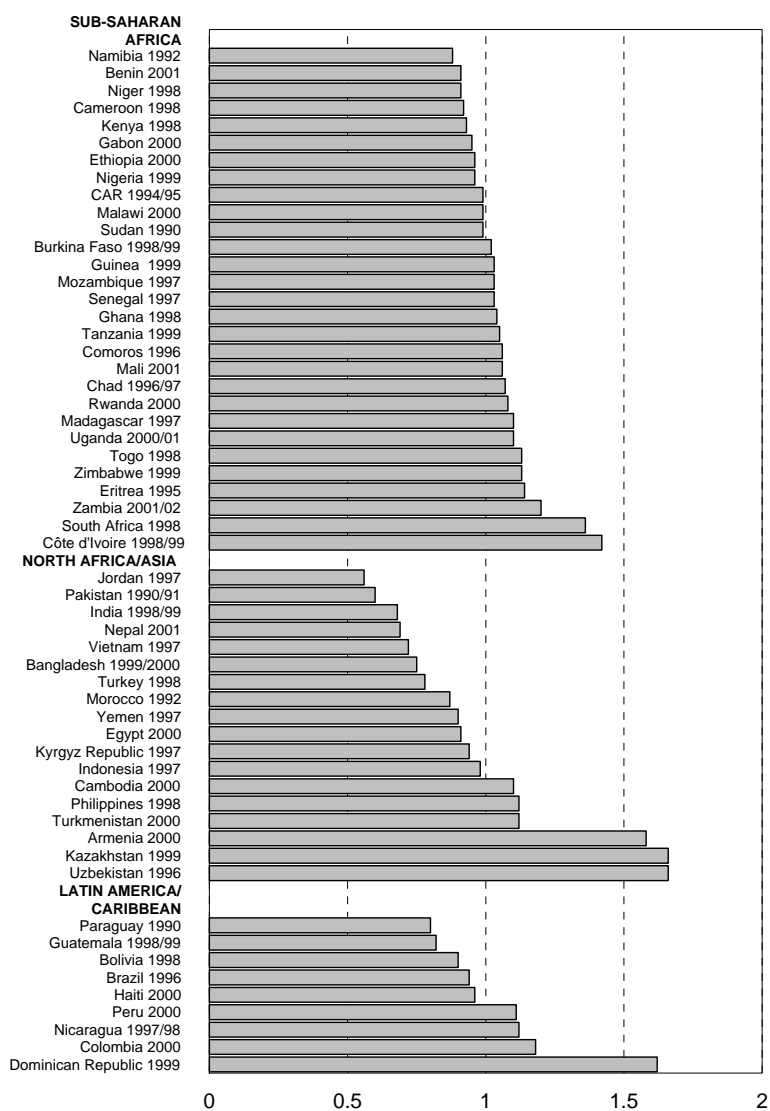
Table 9 indicates that, on average, boys are 28 percent more likely to die in the first month of life. During the remainder of the first year they are 6 percent more likely to die. However, for ages 1 to 4, there is no real difference in the average risk of mortality for girls and boys.

Sex differences in mortality exist between age 1 and 4 in some countries. For example, in Pakistan, the male child mortality rate is 60 percent that of females. Other countries that show a male advantage of more than 20 percent include Bangladesh, India, Nepal, Pakistan, Turkey, and Vietnam (see Figure 5). The large ratios from Turkey and Vietnam are likely due to small sample sizes.

Table 9 Relative risk of dying before age five by sex of child (males versus females), ten-year rates, Demographic and Health Surveys, 1990-2002

Country	Under-5 mortality rate for female children	Relative risk of dying before age five				
		Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( <sub>1</sub> q <sub>0</sub> )	Child mortality ( <sub>4</sub> q <sub>1</sub> )	Under-5 mortality ( <sub>5</sub> q <sub>0</sub> )
<b>SUB-SAHARAN AFRICA</b>						
Benin 2001	163	1.14	1.00	1.06	0.91	0.99
Burkina Faso 1998/99	216	1.47	0.98	1.15	1.02	1.07
Cameroon 1998	144	1.44	0.89	1.14	0.92	1.03
CAR 1994/95	152	1.33	1.04	1.16	0.99	1.09
Chad 1996/97	189	1.42	1.05	1.20	1.07	1.13
Comoros 1996	103	1.28	1.19	1.24	1.06	1.18
Côte d'Ivoire 1998/99	146	1.39	1.43	1.41	1.42	1.39
Eritrea 1995	141	1.59	0.92	1.19	1.14	1.16
Ethiopia 2000	178	1.38	1.10	1.24	0.96	1.11
Gabon 2000	80	1.56	1.45	1.51	0.95	1.28
Ghana 1998	106	1.30	0.94	1.11	1.04	1.08
Guinea 1999	188	1.35	0.94	1.12	1.03	1.07
Kenya 1998	103	1.22	1.06	1.12	0.93	1.05
Madagascar 1997	152	1.42	1.09	1.21	1.10	1.16
Malawi 2000	199	1.23	1.00	1.09	0.99	1.04
Mali 2001	226	1.42	0.95	1.18	1.06	1.11
Mozambique 1997	213	1.11	1.06	1.08	1.03	1.06
Namibia 1992	89	1.24	1.10	1.18	0.88	1.07
Niger 1998	306	1.40	0.93	1.08	0.91	0.98
Nigeria 1999	132	1.21	0.96	1.08	0.96	1.02
Rwanda 2000	198	1.35	0.95	1.10	1.08	1.09
Senegal 1997	134	1.24	1.02	1.13	1.03	1.08
South Africa 1998	48	1.62	1.23	1.39	1.36	1.38
Sudan 1990	129	1.42	0.96	1.19	0.99	1.09
Tanzania 1999	150	1.61	1.00	1.21	1.05	1.15
Togo 1998	132	1.40	1.10	1.25	1.13	1.18
Uganda 2000/01	150	1.14	1.06	1.09	1.10	1.09
Zambia 2001/02	160	1.06	1.01	1.03	1.20	1.10
Zimbabwe 1999	85	1.17	1.08	1.12	1.13	1.12
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>						
Armenia 2000	45	1.30	0.87	1.10	1.58	1.13
Egypt 2000	70	1.29	0.76	1.01	0.91	0.99
Jordan 1997	30	1.46	1.49	1.47	0.56	1.27
Morocco 1992	80	1.33	1.06	1.20	0.87	1.10
Turkey 1998	58	1.36	0.87	1.12	0.78	1.04
Yemen 1997	114	1.25	1.21	1.23	0.90	1.13
<b>CENTRAL ASIA</b>						
Kazakhstan 1999	53	1.36	1.27	1.31	1.66	1.35
Kyrgyz Republic 1997	70	1.24	1.16	1.19	0.94	1.16
Turkmenistan 2000	76	1.26	1.51	1.39	1.12	1.33
Uzbekistan 1996	46	1.25	1.50	1.37	1.66	1.42
<b>SOUTH/SOUTHEAST ASIA</b>						
Bangladesh 1999/2000	112	1.20	0.88	1.07	0.75	0.97
Cambodia 2000	110	1.29	1.22	1.25	1.10	1.21
India 1998/99	105	1.14	0.91	1.05	0.68	0.93
Indonesia 1997	64	1.20	1.43	1.32	0.98	1.21
Nepal 2001	112	1.20	0.85	1.05	0.69	0.93
Pakistan 1990/91	119	1.30	1.07	1.19	0.60	1.03
Philippines 1998	50	1.16	1.29	1.22	1.12	1.18
Vietnam 1997	40	1.73	1.31	1.56	0.72	1.28
<b>LATIN AMERICA/CARIBBEAN</b>						
Bolivia 1998	96	1.28	0.99	1.12	0.90	1.06
Brazil 1996	53	0.98	1.35	1.16	0.94	1.12
Colombia 2000	23	1.49	1.29	1.42	1.18	1.38
Dominican Republic 1999	43	0.99	1.26	1.11	1.62	1.20
Guatemala 1998/99	65	1.16	0.92	1.04	0.82	0.98
Haiti 2000	132	1.16	1.17	1.17	0.96	1.08
Nicaragua 1997/98	51	1.21	1.28	1.25	1.12	1.22
Paraguay 1990	45	1.20	1.20	1.20	0.80	1.09
Peru 2000	57	1.22	1.07	1.14	1.11	1.13
Median (unweighted)		1.28	1.06	1.17	1.01	1.11

**Figure 5 Relative risk of dying for boys age 1 to 4 (child mortality), Demographic and Health Surveys, 1990-2002**



The relative risks for Armenia, Uzbekistan, Kazakhstan, and the Dominican Republic suggest that boys age 1 to 4 are at increased risk of dying compared with girls the same age. These results again are likely due to the low levels of mortality in these countries and not to actual differences in mortality levels.

### Multiple births

Another biological factor that plays a role in the survival of infants and, in some cultures, plays a role in the care of the child is whether the child was part of a multiple birth. Children of multiple births are often not fully developed in the womb, resulting in low birth weight. In addition, complications at delivery and competition for resources after birth often result in greater risk of dying for multiple births. In some countries, bad luck and misfortune are associated with twins, and can lead to neglect and higher mortality for multiple births. Variations in mortality by multiplicity are shown in Table 10. (A few countries are not included in this table due to data limitations.)

Table 10 Relative risk of dying among children under five years, by multiple birth status (multiple birth/single birth), ten-year rates, Demographic and Health Surveys 1990-2000

Country	Under-5 mortality rate for children who were singleton births	Relative risk of dying before age five				
		Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( <sub>1q0</sub> )	Child mortality ( <sub>4q1</sub> )	Under-5 mortality ( <sub>5q0</sub> )
<b>SUB-SAHARAN AFRICA</b>						
Benin 1996	169	5.78	2.06	3.50	1.42	2.36
Burkina Faso 1999	217	4.21	1.77	2.71	2.24	2.23
Cameroon 1998	142	4.17	1.76	2.94	1.27	2.05
CAR 1994	151	6.77	2.33	4.19	1.42	2.96
Chad 1997	192	5.09	2.32	3.46	2.32	2.63
Comoros 1996	106	4.86	(0.79)	2.82	(1.92)	2.50
Côte d'Ivoire 1998	169	3.42	(1.89)	(2.63)	(1.80)	2.19
Eritrea 1995	143	6.12	4.79	5.40	1.97	3.27
Ethiopia 2000	179	7.13	2.61	4.84	2.33	3.36
Gabon 2000	86	5.97	1.56	3.67	0.30	2.44
Ghana 1998	102	6.51	3.09	4.80	1.46	3.06
Guinea 1999	186	3.70	2.34	2.98	1.68	2.21
Kenya 1998	100	6.64	2.00	3.63	2.23	3.01
Malawi 2000	192	6.05	1.66	3.27	1.31	2.19
Mali 1996	244	3.73	2.32	3.02	1.35	2.02
Morocco 1992	80	5.29	3.23	4.32	0.98	3.39
Mozambique 1997	211	3.03	2.55	2.73	1.16	2.09
Namibia 1992	87	3.98	3.69	3.85	0.52	2.64
Niger 1998	293	4.46	2.54	3.23	1.19	1.85
Nigeria 1999	127	4.64	2.26	3.39	1.15	2.19
Rwanda 2000	156	4.99	1.34	2.83	0.77	1.83
Senegal 1997	133	5.31	2.83	4.14	1.47	2.59
Tanzania 1999	157	3.76	1.69	2.53	0.96	1.93
Togo 1997	136	5.71	1.39	3.48	0.96	2.20
Uganda 2000	149	6.61	2.45	3.98	1.78	2.78
Zambia 1996	183	5.76	2.15	3.26	1.50	2.28
Zimbabwe 1999	86	6.81	2.11	4.01	1.51	3.02
<b>NORTH AFRICA/WESTASIA/ EUROPE</b>						
Armenia 2000	43	11.56	3.47	8.02	0.00	7.30
Egypt 2000	62	6.45	3.91	5.19	2.20	4.41
Turkey 1998	56	6.38	(3.00)	(4.90)	(2.20)	4.28
Yemen 1997	116	5.88	3.00	4.28	2.70	3.64
<b>CENTRAL ASIA</b>						
Kazakhstan 1999	57	11.94	*	*	*	(6.72)
Kyrgyzstan 1997	69	7.94	*	*	*	(5.09)
Turkmenistan 1999	84	7.23	(2.79)	4.72	0.56	3.82
Uzbekistan 1996	48	14.96	*	(9.59)	(3.09)	7.83
<b>SOUTH/SOUTHEAST ASIA</b>						
Bangladesh 2000	102	7.37	(4.26)	6.20	(3.97)	5.10
Cambodia 2000	117	7.02	1.94	3.97	0.88	3.14
India 1999	97	6.17	3.05	5.06	1.88	3.98
Indonesia 1997	69	5.31	2.08	3.60	1.74	3.04
Nepal 1996	132	7.87	(2.51)	5.79	(2.14)	4.19
Pakistan 1991	116	4.37	2.16	3.39	2.21	3.01
Philippines 1998	52	7.35	1.80	4.67	3.86	4.22
<b>LATIN AMERICA/CARIBBEAN</b>						
Bolivia 1998	96	4.24	3.01	3.61	2.07	3.10
Brazil 1996	54	4.53	2.43	3.37	1.20	3.01
Colombia 2000	27	5.99	(2.90)	4.93	*	4.25
Dom. Republic 1996	57	6.10	2.86	4.64	0.61	3.74
Guatemala 1999	63	4.83	(1.63)	(3.27)	(1.36)	1.00
Haiti 2000	131	6.27	2.07	3.66	2.55	3.03
Nicaragua 1997	53	7.40	3.15	5.00	1.90	4.29
Paraguay 1990	44	4.80	(3.12)	4.03	1.85	3.47
Peru 2000	57	6.17	5.03	5.62	2.14	4.48
Median (unweighted)		5.97	2.16	3.66	1.39	3.01

Note: The number of cases used to calculate neonatal mortality is less than 500 child years in all countries except Ethiopia, Malawi, Zambia, Benin, Mali, Niger, Nigeria, Togo, Egypt, India, and Indonesia. Figures in parentheses are based on 250-499 child years. An asterisk indicates that a figure is based on fewer than 250 child years and has been suppressed.

One example of the difference in mortality associated with multiple birth status is in Eritrea, where children of multiple births are five times more likely to die in the first year of life than children of singleton births. The highest differential, which is seen in Uzbekistan, is likely due to the small numbers of deaths in that country. The smallest differential is seen in Tanzania where infant mortality associated with multiple births is 153 percent higher than that for singletons. In Ethiopia, Chad, Niger, Bangladesh, and Nepal, more than half of the children born in multiple births died before their fifth birthday (see Appendix Table C.5).

### **5.3 Socioeconomic Differentials in Childhood Mortality**

While many other factors also influence childhood mortality, we have chosen to limit our discussion to two programmatically important socioeconomic characteristics to highlight differences between countries. The characteristics considered here are residence and mother's education.<sup>1</sup>

#### **Residence**

In DHS surveys, the location or place where the mother slept the night before the interview determines residence (urban or rural) and is based on the country's classification system; respondents are not asked to classify their location. Some childhood deaths may have occurred in locations other than the respondent's current residence, and these instances reduce the differentials between the two areas.

Residence indirectly affects mortality by determining a woman's access to health care facilities. It affects a woman's ability to find transportation to a health facility, her ability to have cash to pay for medicines, her opportunities for education, and her ability to allocate household resources for her children's health. These mediating factors affect child mortality independently; however, they are difficult to measure individually and are thus combined in this variable.

Mortality levels by urban-rural residence are presented in Table 11. The data suggest that children in rural areas have higher mortality than children in urban areas. On average, the greatest differences in childhood mortality between urban and rural areas are seen in the age group one to four (child mortality). This age group has, on average, a 61 percent greater risk of dying in rural areas than in urban areas, compared with a 27 and 39 percent increased risk for neonatal mortality and infant mortality, respectively. In a number of Latin American countries, child mortality in rural areas is almost twice as high as in urban areas. Figure 6 shows the relative risk of dying for rural children by country.

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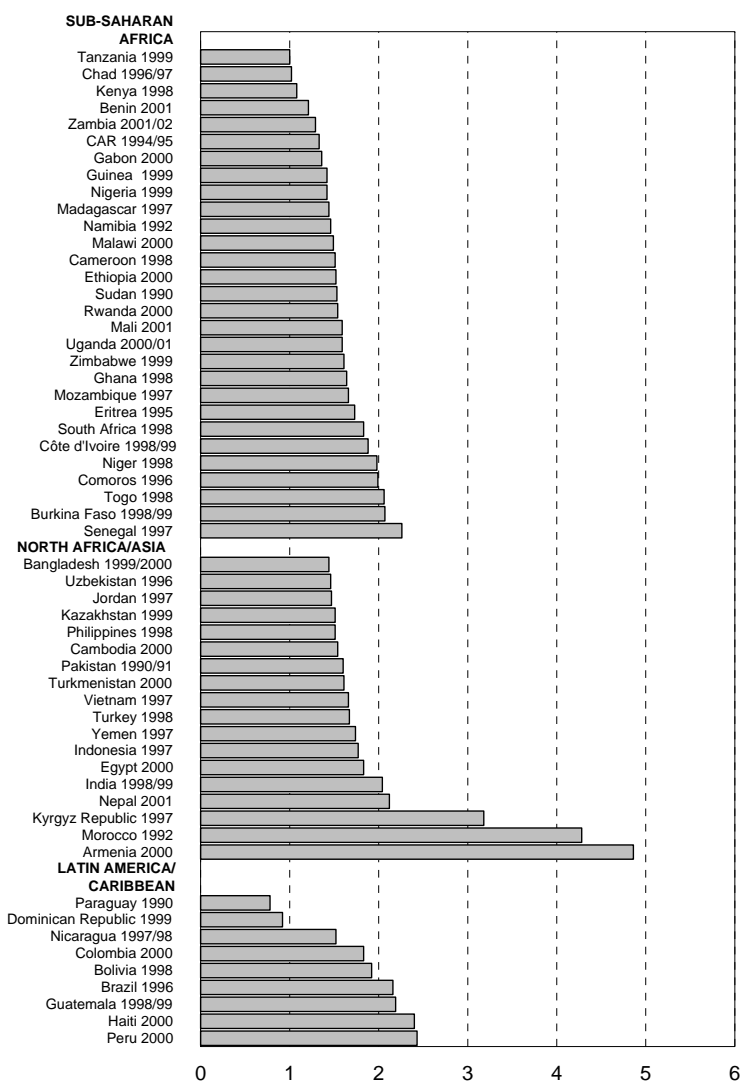
<sup>1</sup> Additional characteristics that might have associations include father's occupation, household wealth, and mother's literacy. The first two are difficult to compare between countries and the latter is discussed below under maternal education.



Table 11 Relative risk of dying among children under five years, by residence (rural versus urban), ten-year rates, Demographic and Health Surveys 1990-2002

Country	Under-5 mortality rate for children in urban areas	Relative risk of dying before age five				
		Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( <sub>1</sub> q <sub>0</sub> )	Child mortality ( <sub>4</sub> q <sub>1</sub> )	Under-5 mortality ( <sub>5</sub> q <sub>0</sub> )
<b>SUB-SAHARAN AFRICA</b>						
Benin 2001	134	1.39	1.47	1.43	1.21	1.31
Burkina Faso 1998/99	129	1.46	1.87	1.68	2.07	1.82
Cameroon 1998	111	1.40	1.45	1.42	1.51	1.45
CAR 1994/95	129	1.44	1.46	1.46	1.33	1.39
Chad 1996/97	190	1.31	1.03	1.14	1.02	1.07
Comoros 1996	81	1.22	1.71	1.41	1.99	1.52
Côte d'Ivoire 1998/99	125	1.29	1.68	1.46	1.88	1.57
Eritrea 1995	129	0.92	0.95	0.93	1.73	1.24
Ethiopia 2000	149	1.29	1.10	1.19	1.52	1.30
Gabon 2000	88	0.91	1.16	1.02	1.36	1.13
Ghana 1998	77	1.53	1.65	1.58	1.64	1.59
Guinea 1999	149	1.34	1.60	1.46	1.42	1.42
Kenya 1998	88	1.40	1.29	1.33	1.08	1.23
Madagascar 1997	127	1.10	1.57	1.35	1.44	1.37
Malawi 2000	148	1.61	1.31	1.41	1.49	1.42
Mali 2001	185	1.22	1.27	1.25	1.59	1.37
Mozambique 1997	150	1.05	2.21	1.58	1.66	1.58
Namibia 1992	86	1.07	0.84	0.96	1.46	1.10
Niger 1998	178	2.03	1.73	1.84	1.98	1.84
Nigeria 1999	108	0.96	1.74	1.26	1.42	1.32
Rwanda 2000	141	1.72	1.50	1.59	1.54	1.53
Senegal 1997	90	1.49	1.69	1.58	2.26	1.85
South Africa 1998	43	1.34	1.86	1.60	1.83	1.65
Sudan 1990	117	1.22	0.90	1.06	1.53	1.23
Tanzania 1999	142	0.83	1.97	1.29	1.00	1.17
Togo 1998	101	1.05	1.72	1.30	2.06	1.55
Uganda 2000/01	101	1.63	1.79	1.72	1.59	1.63
Zambia 2001/02	140	1.13	1.48	1.34	1.29	1.30
Zimbabwe 1999	69	1.29	1.46	1.38	1.61	1.44
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>						
Armenia 2000	37	1.28	1.82	1.47	4.86	1.59
Egypt 2000	53	1.15	1.89	1.43	1.83	1.50
Jordan 1997	31	1.14	2.10	1.46	1.47	1.46
Morocco 1992	59	1.21	1.50	1.34	4.28	1.67
Turkey 1998	51	1.14	1.80	1.39	1.67	1.43
Yemen 1997	96	1.08	1.41	1.24	1.74	1.34
<b>CENTRAL ASIA</b>						
Kazakhstan 1999	50	1.20	1.81	1.46	1.51	1.46
Kyrgyz Republic 1997	58	1.17	1.44	1.30	3.18	1.41
Turkmenistan 2000	73	1.04	1.67	1.33	1.61	1.37
Uzbekistan 1996	52	0.89	1.18	1.02	1.46	1.10
<b>SOUTH/SOUTHEAST ASIA</b>						
Bangladesh 1999/2000	97	1.25	0.88	1.09	1.44	1.17
Cambodia 2000	93	1.51	1.21	1.32	1.54	1.36
India 1998/99	65	1.54	1.78	1.62	2.04	1.70
Indonesia 1997	48	1.41	1.86	1.62	1.77	1.65
Nepal 2001	66	1.33	2.28	1.58	2.12	1.70
Pakistan 1990/91	94	1.44	1.29	1.37	1.60	1.41
Philippines 1998	46	1.17	1.47	1.30	1.51	1.36
Vietnam 1997	30	1.17	3.66	1.58	1.66	1.59
<b>LATIN AMERICA/CARIBBEAN</b>						
Bolivia 1998	72	2.12	1.69	1.88	1.92	1.87
Brazil 1996	49	1.23	1.85	1.54	2.16	1.62
Colombia 2000	24	1.27	1.92	1.46	1.83	1.50
Dominican Republic 1999	46	1.12	1.09	1.11	0.92	1.06
Guatemala 1998/99	58	0.72	1.50	1.00	2.19	1.19
Haiti 2000	112	1.39	0.87	1.04	2.40	1.34
Nicaragua 1997/98	49	1.31	1.25	1.28	1.52	1.32
Paraguay 1990	45	1.37	1.01	1.19	0.78	1.07
Peru 2000	39	2.06	2.18	2.12	2.43	2.19
Median (unweighted)		1.27	1.54	1.39	1.61	1.42

**Figure 6 Relative risk of dying for children age 1 to 4 (child mortality) in rural areas versus urban areas (10-year rates), Demographic and Health Surveys, 1990-2002**



### Mother's education

Research suggests that women with more education are likely to have a better understanding of hygiene and are more likely to seek medical attention for a sick child than their less educated counterparts. Studies have shown a strong correlation between mother's education and childhood mortality. Literacy was not used as a socioeconomic characteristic in this analysis because the benefits of schooling include exposure to diverse ideas by being outside of the household. Although literacy opens up one means of communication through reading, a woman's knowledge of hygiene and child care is likely to come from experiences she has had rather than from reading about these health topics.

Education is defined here as the highest year of schooling completed. Although countries define primary and secondary differently, that variation is overcome in this analysis because primary is defined as completing at least eight years of school and secondary as completing more than eight years.

Tables 12 and 13 show that in all the countries in this analysis under-five mortality is lower for children of mothers with more education. For example, children of women who have no formal schooling

Table 12 Relative risk of dying before age five by mother's education (no schooling versus secondary), ten-year rates, Demographic and Health Surveys 1990-2002

Country	Under-5 mortality rate for children whose mothers have secondary education	Relative risk of dying before age five				
		Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_4q_1$ )	Under-5 mortality ( ${}_5q_0$ )
<b>SUB-SAHARAN AFRICA</b>						
Benin 2001	81	1.50	2.29	1.89	2.82	2.16
Burkina Faso 1998/99	100	(1.02)	1.88	1.40	5.76	2.30
Cameroon 1998	90	2.43	1.76	2.08	2.51	2.21
CAR 1994/95	83	2.15	2.23	2.20	2.10	2.11
Chad 1996/97	133	1.73	1.37	1.50	1.66	1.54
Comoros 1996	75	(1.02)	1.87	1.30	4.59	1.62
Côte d'Ivoire 1998/99	79	(1.77)	2.29	2.00	4.17	2.43
Eritrea 1995	101	1.11	1.15	1.13	2.45	1.56
Ethiopia 2000	89	2.48	1.49	1.88	3.25	2.21
Gabon 2000	87	1.26	0.82	1.05	1.90	1.29
Ghana 1998	87	1.29	1.29	1.29	1.83	1.50
Guinea 1999	104	2.19	1.61	1.85	2.22	1.96
Kenya 1998	60	1.65	2.34	2.06	2.12	2.05
Madagascar 1997	105	1.42	2.39	1.96	1.89	1.88
Malawi 2000	118	1.50	2.04	1.78	1.97	1.82
Mali 2001	90	2.26	2.89	2.51	3.37	2.76
Mozambique 1997	123	(4.57)	1.60	2.15	1.61	1.87
Namibia 1992	76	1.11	0.91	1.02	2.08	1.28
Niger 1998	130	2.18	1.92	2.01	3.15	2.42
Nigeria 1999	88	1.08	1.82	1.38	2.55	1.79
Rwanda 2000	117	2.40	2.17	2.27	1.86	1.99
Senegal 1997	55	2.13	3.81	2.65	3.20	2.83
South Africa 1998	46	1.13	2.09	1.63	2.70	1.84
Sudan 1990	84	1.39	1.24	1.32	3.24	1.80
Tanzania 1999	63	1.58	2.73	2.07	9.02	2.64
Togo 1998	83	1.66	1.55	1.61	2.65	1.93
Uganda 2000/01	93	1.58	2.42	2.03	2.10	2.01
Zambia 2001/02	121	1.45	1.59	1.54	1.84	1.63
Zimbabwe 1999	79	2.18	1.11	1.50	1.56	1.51
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>						
Armenia 2000	48	*	*	*	*	*
Egypt 2000	40	1.46	2.64	1.90	4.96	2.21
Jordan 1997	29	2.06	2.26	2.13	2.21	2.13
Morocco 1992	22	2.60	4.54	3.24	15.88	4.08
Turkey 1998	32	1.53	5.60	2.38	4.85	2.65
Yemen 1997	71	1.05	1.84	1.38	9.25	1.79
<b>CENTRAL ASIA</b>						
Kazakhstan 1999	63	*	*	*	*	*
Kyrgyz Republic 1997	76	*	*	*	*	*
Turkmenistan 2000	88	*	(1.72)	(1.59)	(1.22)	1.51
Uzbekistan 1996	55	*	*	*	*	*
<b>SOUTH/SOUTHEAST ASIA</b>						
Bangladesh 1999/2000	68	1.35	2.67	1.68	3.13	1.93
Cambodia 2000	75	1.59	1.81	1.72	2.22	1.80
India 1998/99	51	1.81	2.72	2.06	4.67	2.46
Indonesia 1997	35	2.40	3.31	2.77	4.51	3.08
Nepal 2001	50	2.07	2.34	2.16	3.41	2.40
Pakistan 1990/91	65	1.68	1.63	1.66	5.91	1.98
Philippines 1998	39	1.98	4.10	2.77	5.59	3.48
Vietnam 1997	37	1.44	2.14	1.68	3.42	2.02
<b>LATIN AMERICA/CARIBBEAN</b>						
Bolivia 1998	54	2.77	2.68	2.72	3.48	2.84
Brazil 1996	37	1.82	4.34	2.91	5.61	3.22
Colombia 2000	23	(1.62)	3.47	2.16	0.50	1.94
Dominican Republic 1999	24	1.53	2.11	1.94	0.71	1.64
Guatemala 1998/99	42	1.17	1.65	1.36	20.17	1.86
Haiti 2000	74	1.83	1.51	1.63	3.41	2.03
Nicaragua 1997/98	34	1.41	2.85	2.00	6.47	2.39
Paraguay 1990	29	(2.09)	2.52	2.28	4.32	2.69
Peru 2000	35	2.45	2.99	2.68	4.40	3.02
Median (unweighted)		1.58	2.12	1.92	3.14	2.02

Note: Figures in parentheses are based on fewer than 250-499 births. An asterisk signifies an estimate was suppressed because it was based on fewer than 250 births.

Table 13 Relative risk of dying before age five by mother's education (primary versus secondary), ten-year rates, Demographic and Health Surveys 1990-2002

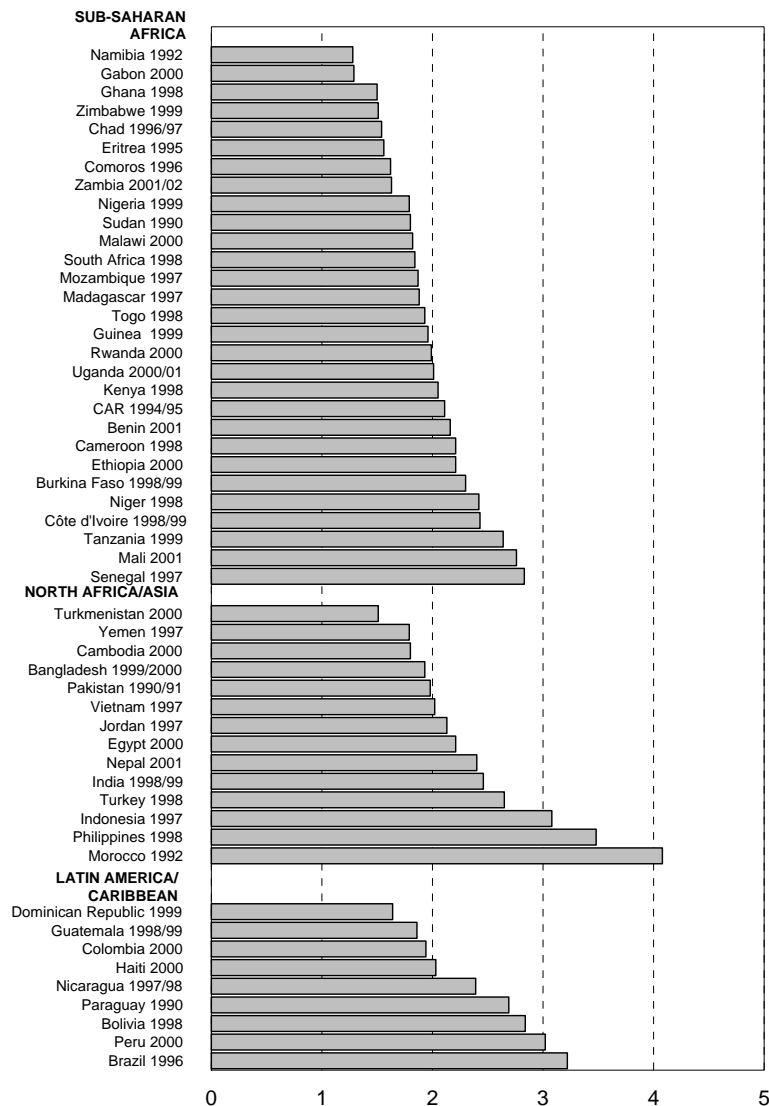
Country	Under-5 mortality rate for children whose mothers have secondary education	Relative risk of dying before age five				
		Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_4q_1$ )	Under-5 mortality ( ${}_5q_0$ )
<b>SUB-SAHARAN AFRICA</b>						
Benin 2001	81	1.78	1.50	1.65	1.99	1.74
Burkina Faso 1998/99	100	(0.96)	1.49	1.20	3.60	1.70
Cameroon 1998	90	1.45	1.52	1.48	1.37	1.42
CAR 1994/95	83	1.84	2.00	1.93	1.98	1.91
Chad 1996/97	133	1.41	1.32	1.36	1.55	1.42
Comoros 1996	75	(0.90)	1.72	1.17	2.66	1.31
Côte d'Ivoire 1998/99	79	(1.36)	1.75	1.53	3.42	1.93
Eritrea 1995	101	1.16	1.13	1.15	1.75	1.34
Ethiopia 2000	89	1.85	1.01	1.34	2.48	1.65
Gabon 2000	87	0.92	0.96	0.94	1.41	1.07
Ghana 1998	87	1.57	1.16	1.37	1.20	1.29
Guinea 1999	104	1.62	1.07	1.29	1.95	1.56
Kenya 1998	60	1.85	2.09	1.99	2.02	1.97
Madagascar 1997	105	1.59	1.62	1.61	1.76	1.64
Malawi 2000	118	1.51	1.96	1.75	1.77	1.72
Mali 2001	90	2.09	2.77	2.37	2.78	2.45
Mozambique 1997	123	(4.23)	1.48	1.98	1.52	1.75
Namibia 1992	76	1.26	1.02	1.15	1.74	1.29
Niger 1998	130	1.76	1.25	1.42	2.18	1.74
Nigeria 1999	88	1.10	1.52	1.27	1.60	1.38
Rwanda 2000	117	1.70	2.09	1.91	1.60	1.71
Senegal 1997	55	1.22	3.13	1.82	1.74	1.76
South Africa 1998	46	1.27	1.36	1.32	2.08	1.47
Sudan 1990	84	1.25	0.98	1.12	1.76	1.29
Tanzania 1999	63	1.29	2.63	1.86	*	2.62
Togo 1998	83	1.50	1.15	1.33	1.99	1.54
Uganda 2000/01	93	1.43	1.90	1.68	1.70	1.66
Zambia 2001/02	121	1.29	1.48	1.41	1.59	1.46
Zimbabwe 1999	79	1.45	0.94	1.12	1.35	1.19
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>						
Armenia 2000	48	*	*	*	*	*
Egypt 2000	40	1.36	2.11	1.64	3.56	1.83
Jordan 1997	29	1.03	1.68	1.25	2.45	1.41
Morocco 1992	22	2.30	3.06	2.55	4.63	2.69
Turkey 1998	32	1.22	3.31	1.66	2.69	1.77
Yemen 1997	71	1.00	1.17	1.07	5.40	1.30
<b>CENTRAL ASIA</b>						
Kazakhstan 1999	63	*	*	*	*	*
Kyrgyz Republic 1997	76	*	*	*	*	*
Turkmenistan 2000	88	*	*	*	*	0.34
Uzbekistan 1996	55	*	*	*	*	*
<b>SOUTH/SOUTHEAST ASIA</b>						
Bangladesh 1999/2000	68	1.17	1.93	1.36	2.03	1.48
Cambodia 2000	75	1.51	1.62	1.57	1.90	1.63
India 1998/99	51	1.46	1.91	1.59	2.32	1.70
Indonesia 1997	35	1.58	2.85	2.10	2.89	2.24
Nepal 2001	50	1.65	1.40	1.56	1.16	1.46
Pakistan 1990/91	65	1.49	1.56	1.52	3.27	1.65
Philippines 1998	39	1.14	2.35	1.59	2.63	1.87
Vietnam 1997	37	1.49	1.50	1.49	2.04	1.60
<b>LATIN AMERICA/CARIBBEAN</b>						
Bolivia 1998	54	2.00	2.19	2.10	2.44	2.15
Brazil 1996	37	1.36	2.42	1.82	1.84	1.81
Colombia 2000	23	1.35	1.67	1.44	1.57	1.46
Dominican Republic 1999	24	5.55	1.68	2.83	2.36	2.69
Guatemala 1998/99	42	0.91	1.49	1.13	11.83	1.42
Haiti 2000	74	1.92	1.64	1.74	2.47	1.90
Nicaragua 1997/98	34	1.03	2.08	1.46	3.56	1.65
Paraguay 1990	29	1.69	1.73	1.71	1.87	1.74
Peru 2000	35	1.68	2.33	1.95	3.03	2.18
Median (unweighted)		1.45	1.64	1.53	2.01	1.65

Note: Figures in parentheses are based on fewer than 250-499 births. An asterisk signifies an estimate was suppressed because it was based on fewer than 250 births.

have the highest level of under-five mortality while children of women with secondary education have the lowest level. In Burkina Faso and Mali, almost one-fourth of children of mothers with no education die before age five, while only about one-tenth of children of women with secondary education die before age five (see Appendix Table C.7). In the central Asian countries very few women have less than secondary education. For this reason, relative risk is not calculated for women with no education or women with primary education.

The largest education effect is seen at age 1 to 4 (child mortality). On average, children age 1 to 4 are two times more likely to be at risk of dying if their mother has primary education than if their mother has secondary education. The differences in survival among children 1 to 4 are often attributed to transmission of disease and lack of hygiene. This suggests that education might affect women’s understanding of health and hygiene and their utilization of health care facilities and vaccinations. Figure 7 shows the relative risk of dying by mother’s education for all children under the age of five.

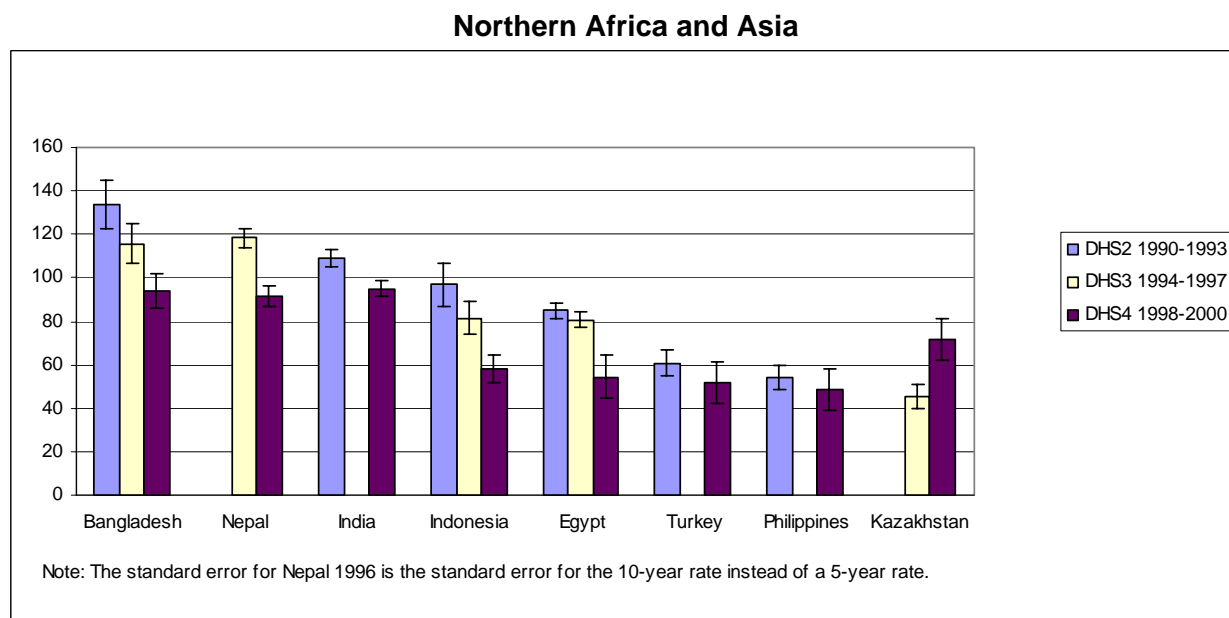
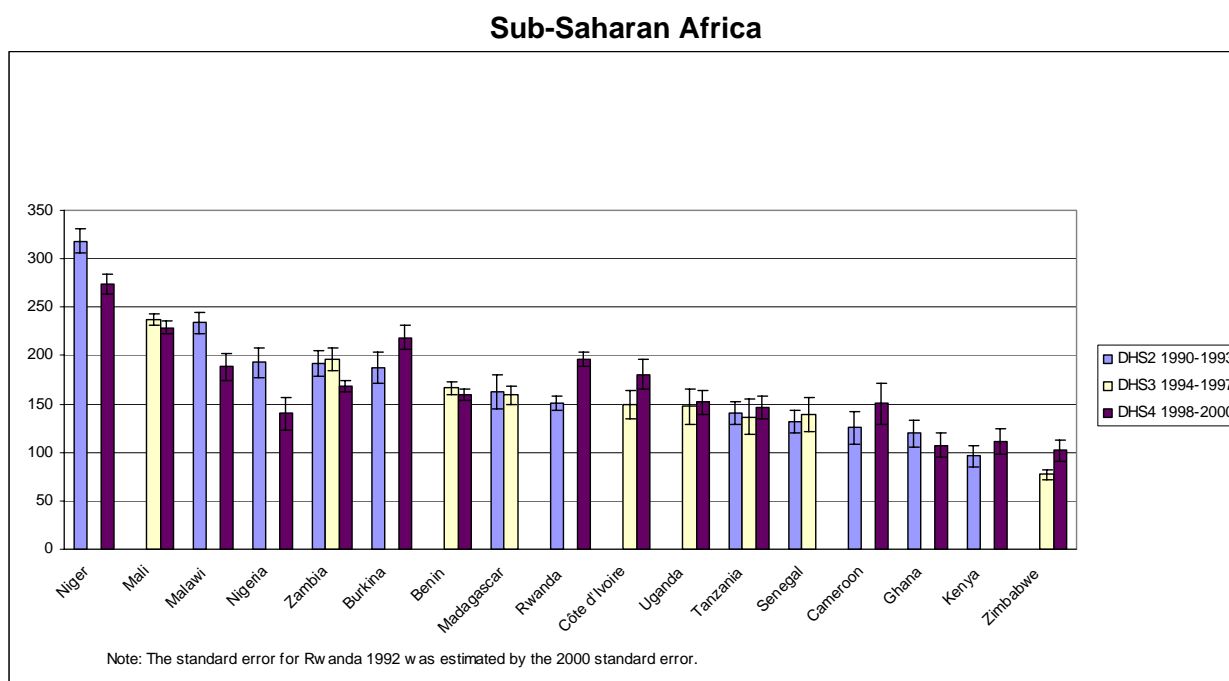
**Figure 7 Relative risk of dying for children under age five (under-five mortality) whose mothers have no education versus those with primary education, Demographic and Health Surveys, 1990-2002**



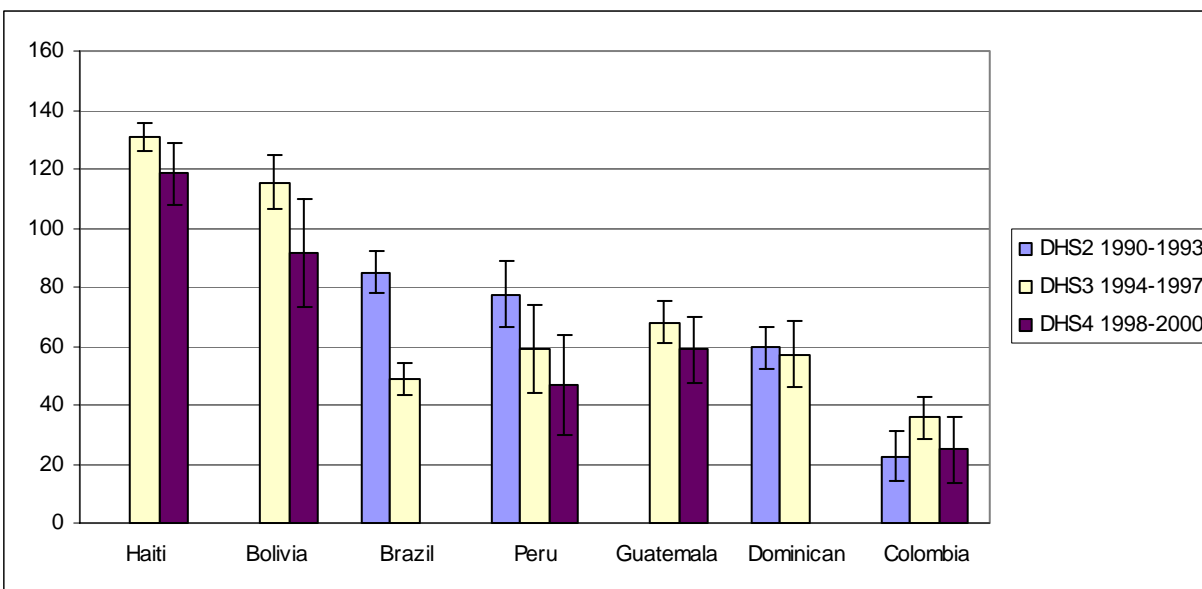
## 6 Trends in Under-five Mortality

Figure 8 shows the variation in under-five mortality in countries with more than one DHS survey carried out between 1990 and 2002. The rates are for the five-year period preceding the survey (unlike the rates in the previous section, which are ten-year rates). Mortality levels estimated for the surveys indicate the trends in each country. The 95 percent confidence intervals are shown to indicate where differences are statistically significant. In some countries, the sampling errors overlap, suggesting that variation in under-five mortality is not significantly different between the surveys.

**Figure 8 Trends in under-five mortality (five-year rates) for countries with more than one DHS survey, and sampling errors (95 percent confidence intervals)**



## Latin America and Caribbean



In all countries surveyed in Asia and Latin America, except for Kazakhstan, under-five mortality is declining. As mentioned earlier in the discussion of perinatal mortality (Section 4), there may be some differences in the level of reporting between the two Kazakhstan surveys. In much of sub-Saharan Africa, improvements in child survival over the past few years are being reversed. There are significant increases in under-five mortality in four of the sub-Saharan countries for which comparative data are available. An additional five countries appear to have non-significant increases. Rwanda and Zimbabwe are the most notable examples, with under-five mortality estimates increasing from 151 to 196 in Rwanda and 77 to 102 in Zimbabwe.

Statistically significant declines in under-five mortality have occurred in Malawi, Niger, Nigeria, Egypt, Bangladesh, India, Indonesia, Nepal, Brazil, and Peru. The largest declines were in the three African countries where there was the most room for improvement. Bangladesh and Indonesia also showed impressive gains in child survival with drops in under-five mortality of 40 deaths per 1,000 births.

Much of the observed increase in child mortality in some countries and the stagnation of the decline in child mortality in other countries is related to HIV/AIDS, especially in sub-Saharan Africa. There is a correlation between the prevalence of HIV/AIDS and child survival in the survey countries (Adetunji, 2000). HIV/AIDS affects child mortality through transmission of the virus from an infected mother to her child. In addition to the increasing number of children with the disease, there is an increasing number of orphans at risk of illness and death because of insufficient care. Finally, the increased load of HIV-related illnesses on health systems diverts limited resources from child survival programs. The breakdown of health care systems and increases in AIDS-related diseases such as tuberculosis and malaria have contributed to increases in mortality levels.

Table 14 Trends in childhood mortality, five-year rates, Demographic and Health Surveys 1990-2002

Country	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_4q_1$ )	Under-5 mortality ( ${}_5q_0$ )
<b>SUB-SAHARAN AFRICA</b>					
Benin 1996	38	56	94	80	167
Benin 2001	38	51	89	78	160
Burkina Faso 1992/93	43	51	94	103	187
Burkina Faso 1998/99	41	65	105	127	219
Cameroon 1991	33	32	64	65	125
Cameroon 1998	37	40	77	80	151
Côte d'Ivoire 1994	42	47	89	67	150
Côte d'Ivoire 1998/99	62	50	112	77	181
Ghana 1993	41	26	66	57	119
Ghana 1998	30	27	57	54	108
Kenya 1993	26	36	62	37	96
Kenya 1998	28	45	74	41	112
Madagascar 1992	39	54	93	77	163
Madagascar 1997	40	56	96	70	159
Malawi 1992	41	94	135	115	234
Malawi 2000	42	62	104	95	189
Mali 1995/96	60	62	123	131	238
Mali 2001	57	56	113	131	229
Niger 1992	41	82	123	223	318
Niger 1998	44	79	123	172	274
Nigeria 1990	42	45	87	116	193
Nigeria 1999	37	38	75	70	140
Rwanda 1992	39	46	85	72	151
Rwanda 2000	44	64	107	100	196
Senegal 1992/93	35	33	68	68	132
Senegal 1997	37	30	68	77	139
Tanzania 1992	38	54	92	54	141
Tanzania 1996	32	56	88	54	137
Tanzania 1999	40	59	99	53	147
Uganda 1995	27	54	81	72	147
Uganda 2000/01	33	55	88	69	152
Zambia 1992	43	65	107	94	191
Zambia 1996	35	74	109	98	197
Zambia 2001/02	37	58	95	81	168
Zimbabwe 1994	24	28	53	26	77
Zimbabwe 1999	29	36	65	40	102
<b>NORTH AFRICA/WEST ASIA/ EUROPE</b>					
Egypt 1992	33	29	62	25	85
Egypt 1995	30	32	63	19	81
Egypt 2000	24	20	44	11	54
Jordan 1990	21	12	34	5	39
Jordan 1997	19	10	29	6	34
Turkey 1993	29	23	53	9	61
Turkey 1998	26	17	43	10	52
Yemen 1991/92	41	44	85	40	121
Yemen 1997	34	42	75	32	105

Continued...



Table 14—Continued

Country	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_4q_1$ )	Under-5 mortality ( ${}_5q_0$ )
<b>CENTRAL ASIA</b>					
Kazakhstan 1995	20	20	40	6	46
Kazakhstan 1999	34	28	62	10	71
<b>SOUTH/SOUTHEAST ASIA</b>					
Bangladesh 1993/94	52	35	88	50	134
Bangladesh 1996/97	48	34	82	37	116
Bangladesh 1999/2000	42	24	66	30	94
India 1992/93	49	30	79	34	109
India 1998/99	43	24	68	29	95
Indonesia 1991	32	36	68	32	97
Indonesia 1994	30	27	57	26	81
Indonesia 1997	22	24	46	13	58
Nepal 1996	50	29	79	43	118
Nepal 2001	39	26	64	29	91
Philippines 1993	18	16	34	22	54
Philippines 1998	18	17	35	14	48
<b>LATIN AMERICA/CARIBBEAN</b>					
Bolivia 1994	37	39	75	44	116
Bolivia 1998	34	34	67	26	92
Brazil 1991 <sup>1</sup>	26	48	75	12	85
Brazil 1996	19	20	39	10	49
Colombia 1990	10	6	17	6	23
Colombia 1995	19	10	28	8	36
Colombia 2000	15	7	21	4	25
Dominican Republic 1991	24	19	43	17	59
Dominican Republic 1996	27	20	47	11	57
Dominican Republic 1999	14	8	22	8	30
Guatemala 1995	26	25	51	18	68
Guatemala 1998/99	23	22	45	14	59
Haiti 1994/95	31	43	74	61	131
Haiti 2000	32	48	80	42	119
Peru 1992	25	29	55	24	78
Peru 1996	24	19	43	17	59
Peru 2000	18	15	33	14	47

<sup>1</sup> Northeast region

## 7 Conclusions

This report presents estimates of child mortality based on data from the Demographic and Health Surveys program, 1990 through 2002. Childhood mortality levels vary greatly among the 56 countries included in the analysis. Sub-Saharan Africa continues to have the highest levels of childhood mortality and the most countries with increasing mortality.

Age patterns of childhood mortality indicate that as conditions improve more childhood deaths are concentrated in the first year of life. In most countries, children of women with less education and women who live in rural areas have higher levels of mortality than other women. There is continued evidence that children of women who have births in quick succession, at young ages, or at high birth orders have higher levels of mortality. Finally, male births and multiple births are at increased risk of dying because of biological factors and perhaps behavioral factors. Reaction to the biological factors may also influence caretakers' behavior, which in turn can affect children's survival chances. These factors are examined comparatively for individual countries and regions. Multiplicity of births has the most dramatic association with child survival.

Levels of childhood mortality continue to vary widely across countries and regions. The largest differentiation is in the age group 1 to 4, where levels vary from 4 to 168 deaths per 1,000 children who have reached the age of one. Child mortality is 42 times higher in Niger than in Colombia. These values represent the diversity of mortality rates in the countries in this analysis.

For the countries with trend data, prospects for childhood mortality are not as hopeful as they were in the past. Increasingly, countries are witnessing stagnation of progress in child survival and even reversal; the countries most affected are in sub-Saharan Africa. Efforts to improve child survival should be focused on the most vulnerable populations and those that have the greatest room for improvement in the age group 1 to 4.

Programmatic efforts aimed at educating women, improving access to health care in rural areas, lengthening birth intervals, avoiding adolescent births, and avoiding high-order births, can bring about reductions in childhood mortality.

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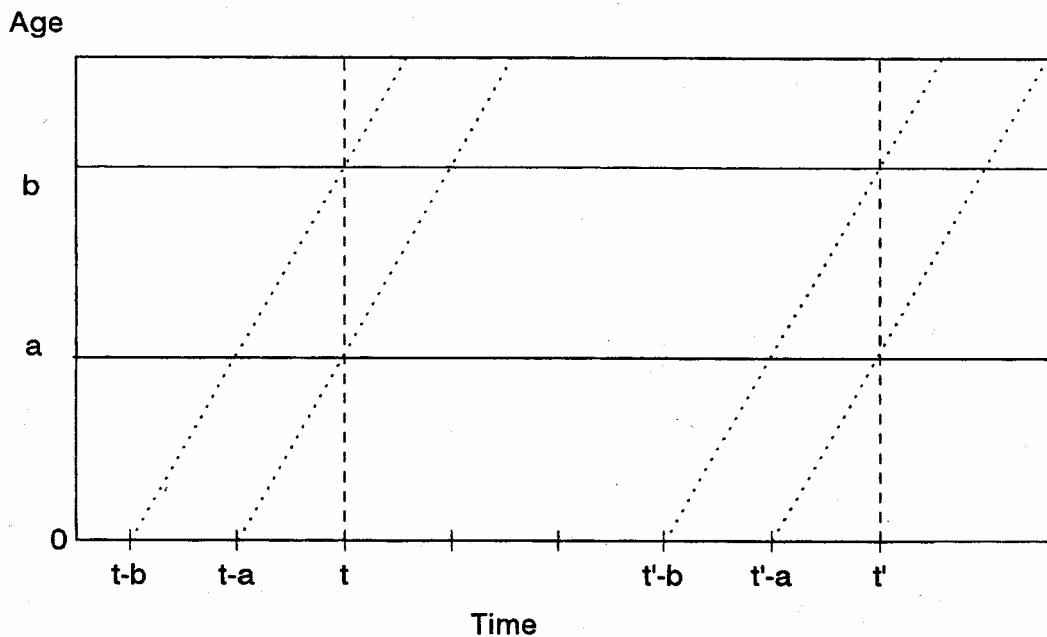
Sullivan, J.M., S.O. Rutstein, and G.T. Bicego. 1994. *Infant and child mortality*. DHS Comparative Studies No. 15. Calverton, Maryland: Macro International Inc.

## Appendix A Calculation of Synthetic Cohort Probabilities of Dying

The procedure for calculating synthetic cohort probabilities of dying is based on the procedure first developed by Somoza (1980) and modified by Rutstein (1984). Probabilities of dying are built up from probabilities calculated for specific age intervals: less than 1 month, 1-2 months, 3-5 months, 6-11 months, 12-23 months, 24-35 months (2 years), 36-47 months (3 years), and 48-59 months (4 years). The probability of dying is the result of dividing the number of deaths occurring in the relevant age interval for children who were exposed to death in a specific calendar period by the number of children exposed in the calendar period.

The figure below shows that three groups of children are exposed to death between ages  $a$  and  $b$  during the time  $t$  to  $t'$ :

- (1) children born between  $t-a$  (age  $a$  at time  $t$ ) and  $t'-b$  (age  $b$  at time  $t'$ ),
- (2) children born between  $t-b$  and  $t-a$ , and
- (3) children born between  $t'-b$  and  $t'-a$ .



Children in the first group were exposed during the entire period in question, while children in the latter groups have been exposed only during part of that period. Due to the short length of the intervals used to code age at death, it can be safely assumed that in the latter case half of the deaths and exposure occurred in the relevant period. The numerator thus becomes the sum of all deaths at ages  $a$  to  $b$  among children born between  $t-a$  and  $t'-b$ , plus half of the deaths among children born between  $t-b$  and  $t'-a$ , plus half of the deaths among children born between  $t'-b$  and  $t'-a$ . Similarly, the denominator becomes the number of children born between  $t-a$  and  $t'-b$  who survived to age  $a$  plus half of the children born between  $t-b$  and  $t-a$  who survived to age  $a$ , plus half the children born between  $t'-b$  and  $t'-a$  who survived to age  $a$ .

An exception must be made for the period immediately before the survey since all deaths recorded for children exposed during this period must have occurred before the date of the survey. Therefore, all the

deaths (rather than half) are counted for children born between  $t'-b$  and  $t'-a$ , although the children have been exposed on average for half of the time.

To calculate the conventional probabilities of dying, which are presented in the tables in this report, the authors first calculated the probability of surviving through the subinterval by subtracting the probability of dying (the quotient given above) from 1. Then they multiplied together the subinterval survival probabilities included in the conventional age limits and, finally, subtracted this product from 1 to give the probability of dying within the conventional limits:

$$({}_n)q(x) = 1 - \prod_{i=x}^{i=x+n} (1 - q[i])$$

where  $({}_n)q(x)$  is the conventional probability of dying between ages  $x$  and  $x+n$  and  $q[i]$  is the subinterval probabilities of dying.

The conventional postneonatal mortality rate is defined differently from conventional rates. Although it refers to the age interval between 1 and 11 months (completed), it is not a probability, but rather is the arithmetic difference between the infant mortality rate (the probability of dying in the first year of life) and the neonatal mortality rate (the probability of dying in the first month of life).

## Appendix B Ratio of Infant to Under-five Mortality, Five-year Rates, Demographic and Health Surveys 1990-2002

Country	Infant mortality ( ${}_1q_0$ )	Under-5 mortality ( ${}_5q_0$ )	Ratio
<b>Sub-Saharan Africa</b>			
South Africa 1998	45	59	0.76
Zimbabwe 1994	53	77	0.68
Namibia 1992	57	84	0.67
Gabon 2000	57	89	0.65
Kenya 1993	62	96	0.64
Zimbabwe 1999	65	102	0.64
Comoros 1996	77	104	0.74
Ghana 1998	57	108	0.53
Kenya 1998	74	112	0.66
Ghana 1993	66	119	0.56
Sudan 1990	70	124	0.57
Cameroon 1991	64	125	0.51
Senegal 1992/93	68	132	0.52
Eritrea 1995	66	136	0.48
Tanzania 1996	88	137	0.64
Senegal 1997	68	139	0.49
Nigeria 1999	75	140	0.54
Tanzania 1992	92	141	0.65
Togo 1998	80	146	0.54
Tanzania 1999	99	147	0.68
Uganda 1995	81	147	0.55
Cote d'Ivoire 1994	89	150	0.59
Cameroon 1998	77	151	0.51
Rwanda 1992	85	151	0.56
Uganda 2000/01	88	152	0.58
CAR 1994/95	97	158	0.61
Madagascar 1997	96	159	0.60
Benin 2001	89	160	0.56
Madagascar 1992	93	163	0.57
Ethiopia 2000	97	166	0.58
Benin 1996	94	167	0.56
Zambia 2001/02	95	168	0.56
Guinea 1999	98	177	0.55
Côte d'Ivoire 1998/99	112	181	0.62
Burkina Faso 1992/93	94	187	0.50
Malawi 2000	104	189	0.55
Zambia 1992	107	191	0.56
Nigeria 1990	87	193	0.45
Chad 1996/97	103	194	0.53
Rwanda 2000	107	196	0.55
Zambia 1996	109	197	0.55
Mozambique 1997	135	201	0.67
Burkina Faso 1998/99	105	219	0.48
Mali 2001	113	229	0.49
Malawi 1992	135	234	0.58
Mali 1995/96	123	238	0.52
Niger 1998	123	274	0.45
Niger 1992	123	318	0.39
<b>North Africa/West Asia/Europe</b>			
Jordan 1997	29	34	0.83
Jordan 1990	34	39	0.87
Armenia 2000	36	39	0.93
Turkey 1998	43	52	0.82
Egypt 2000	44	54	0.80
Turkey 1993	53	61	0.86
Morocco 1992	57	76	0.75
Egypt 1995	63	81	0.78
Egypt 1992	62	85	0.72
Yemen 1997	75	105	0.72
Yemen 1991/92	85	121	0.70

*Continued...*

Table B.1—Continued

Country	Infant mortality ( <sub>1</sub> q <sub>0</sub> )	Under-5 mortality ( <sub>5</sub> q <sub>0</sub> )	Ratio
<b>Central Asia</b>			
Kazakhstan 1995	40	46	0.87
Uzbekistan 1996	49	59	0.83
Kazakhstan 1999	62	71	0.87
Kyrgyz Republic 1997	61	72	0.85
Turkmenistan 2000	74	94	0.78
<b>South/Southeast Asia</b>			
Sri Lanka 1987	25	34	0.73
Vietnam 1997	29	38	0.76
Thailand 1987	35	44	0.80
Philippines 1998	35	48	0.73
Philippines 1993	34	54	0.62
Indonesia 1997	46	58	0.79
Indonesia 1994	57	81	0.70
Nepal 2001	64	91	0.71
Bangladesh 1999/2000	66	94	0.70
India 1998/99	68	95	0.71
Indonesia 1991	68	97	0.70
Indonesia 1987	67	98	0.69
India 1992/93	79	109	0.72
Pakistan 1990/91	86	112	0.77
Bangladesh 1996/97	82	116	0.71
Nepal 1996	79	118	0.66
Cambodia 2000	95	124	0.76
Bangladesh 1993/94	88	134	0.66
<b>Latin America/Caribbean</b>			
Colombia 1990	17	23	0.73
Colombia 2000	21	25	0.86
Dominican Republic 1999	22	30	0.73
Colombia 1995	28	36	0.79
Paraguay 1990	34	43	0.79
Peru 2000	33	47	0.71
Brazil 1996	39	49	0.81
Nicaragua 1997/98	40	50	0.79
Dominican Republic 1996	47	57	0.81
Guatemala 1998/99	45	59	0.77
Peru 1996	43	59	0.72
Dominican Republic 1991	43	59	0.72
Guatemala 1995	51	68	0.75
Peru 1992	55	78	0.70
Brazil 1991 <sup>1</sup>	75	85	0.87
Bolivia 1998	67	92	0.73
Bolivia 1994	75	116	0.65
Haiti 2000	80	119	0.68
Bolivia 1989	82	129	0.63
Haiti 1994/95	74	131	0.56
South Africa 1998	45	59	0.76

<sup>1</sup> Northeast region



## Appendix C Childhood Mortality Rates by Background Characteristics, Ten-year Rates, Demographic and Health Surveys 1990-2002

Table C.1 Childhood mortality rates by mother's age at birth (less than 20, 20-29, 30-39 and 40-49 years), ten-year rates, Demographic and Health Surveys 1990-2001

Country	Mother's age at birth	Neonatal mortality (NN)	Post- neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>Sub-Saharan Africa</b>						
Benin 2001	< 20	56	59	115	79	185
Benin 2001	20-29	36	51	86	71	151
Benin 2001	30-39	45	54	99	81	172
Benin 2001	40-49	42	65	107	70	170
Burkina Faso 1998/99	< 20	68	74	142	143	265
Burkina Faso 1998/99	20-29	40	66	106	130	222
Burkina Faso 1998/99	30-39	35	60	94	121	204
Burkina Faso 1998/99	40-49	52	56	108	124	219
Cameroon 1998	< 20	52	50	102	88	181
Cameroon 1998	20-29	36	33	69	69	133
Cameroon 1998	30-39	40	41	81	67	142
Cameroon 1998	40-49	47	45	92	52	139
CAR 1994/95	< 20	59	74	133	59	184
CAR 1994/95	20-29	39	53	91	68	153
CAR 1994/95	30-39	43	49	92	55	142
CAR 1994/95	40-49	84	50	134	75	198
Chad 1996/97	< 20	59	67	126	106	219
Chad 1996/97	20-29	42	62	104	101	194
Chad 1996/97	30-39	49	56	104	103	196
Chad 1996/97	40-49	49	94	143	111	238
Comoros 1996	< 20	77	33	110	36	142
Comoros 1996	20-29	38	38	76	30	104
Comoros 1996	30-39	36	40	76	32	106
Comoros 1996	40-49	93	59	152	26	174
Côte d'Ivoire 1998/99	< 20	73	73	145	77	211
Côte d'Ivoire 1998/99	20-29	49	54	102	57	153
Côte d'Ivoire 1998/99	30-39	56	48	104	91	185
Côte d'Ivoire 1998/99	40-49	51	48	99	114	201
Eritrea 1995	< 20	41	49	90	80	163
Eritrea 1995	20-29	36	39	74	89	156
Eritrea 1995	30-39	36	41	77	76	147
Eritrea 1995	40-49	15	28	43	97	136
Ethiopia 2000	< 20	85	63	149	90	225
Ethiopia 2000	20-29	51	53	104	83	179
Ethiopia 2000	30-39	57	52	109	84	184
Ethiopia 2000	40-49	53	61	114	80	185
Gabon 2000	< 20	34	31	65	39	101
Gabon 2000	20-29	27	27	54	30	83
Gabon 2000	30-39	35	32	67	29	95
Gabon 2000	40-49	85	16	102	29	128
Ghana 1998	< 20	49	28	76	59	131
Ghana 1998	20-29	25	31	57	51	105
Ghana 1998	30-39	38	26	65	51	112
Ghana 1998	40-49	18	20	39	54	91
Guinea 1999	< 20	66	61	127	111	224
Guinea 1999	20-29	45	50	96	96	183
Guinea 1999	30-39	51	59	110	97	196
Guinea 1999	40-49	67	52	119	76	185
Kenya 1998	< 20	37	60	97	48	141
Kenya 1998	20-29	22	37	59	32	89
Kenya 1998	30-39	31	44	75	37	109
Kenya 1998	40-49	39	70	109	69	171
Madagascar 1997	< 20	54	65	119	80	190
Madagascar 1997	20-29	36	58	94	73	159
Madagascar 1997	30-39	34	55	89	64	148
Madagascar 1997	40-49	69	71	140	64	195

*Continued...*

Table C.1—Continued

Country	Mother's age at birth	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>Sub-Saharan Africa</b>						
Malawi 2000	< 20	68	81	148	126	255
Malawi 2000	20-29	38	67	104	99	193
Malawi 2000	30-39	41	56	96	89	176
Malawi 2000	40-49	67	61	129	83	201
Mali 2001	< 20	111	70	181	154	306
Mali 2001	20-29	59	52	111	121	219
Mali 2001	30-39	52	61	112	124	223
Mali 2001	40-49	77	52	128	112	226
Mozambique 1997	< 20	63	107	170	76	233
Mozambique 1997	20-29	58	89	146	84	218
Mozambique 1997	30-39	46	84	130	93	211
Mozambique 1997	40-49	71	62	133	61	186
Namibia 1992	< 20	39	28	67	36	100
Namibia 1992	20-29	34	29	64	29	91
Namibia 1992	30-39	33	21	54	34	87
Namibia 1992	40-49	47	20	67	46	110
Niger 1998	< 20	77	101	178	209	350
Niger 1998	20-29	45	82	126	198	299
Niger 1998	30-39	40	81	121	174	274
Niger 1998	40-49	52	71	123	148	253
Nigeria 1999	< 20	36	38	74	92	159
Nigeria 1999	20-29	34	31	65	61	122
Nigeria 1999	30-39	32	39	71	61	128
Nigeria 1999	40-49	76	78	154	95	234
Rwanda 2000	< 20	53	84	138	111	234
Rwanda 2000	20-29	48	65	113	106	207
Rwanda 2000	30-39	50	65	115	96	200
Rwanda 2000	40-49	70	74	144	61	196
Senegal 1997	< 20	53	36	89	88	169
Senegal 1997	20-29	32	28	60	74	130
Senegal 1997	30-39	38	36	73	71	139
Senegal 1997	40-49	54	24	78	69	142
South Africa 1998	< 20	20	22	43	19	61
South Africa 1998	20-29	19	21	40	15	55
South Africa 1998	30-39	18	24	43	13	55
South Africa 1998	40-49	18	56	75	30	103
Sudan 1990	< 20	53	35	87	79	159
Sudan 1990	20-29	40	36	76	62	133
Sudan 1990	30-39	43	30	73	53	122
Sudan 1990	40-49	42	38	80	66	140
Tanzania 1999	< 20	76	88	164	75	227
Tanzania 1999	20-29	35	54	89	67	149
Tanzania 1999	30-39	46	61	107	40	142
Tanzania 1999	40-49	33	71	103	3	106
Togo 1998	< 20	50	45	95	85	172
Togo 1998	20-29	37	38	75	67	137
Togo 1998	30-39	47	36	83	64	142
Togo 1998	40-49	52	32	84	74	152
Uganda 2000/01	< 20	43	63	106	84	181
Uganda 2000/01	20-29	30	52	82	71	147
Uganda 2000/01	30-39	38	53	91	70	155
Uganda 2000/01	40-49	39	49	89	75	157
Zambia 2001/02	< 20	43	67	110	84	185
Zambia 2001/02	20-29	29	61	89	84	166
Zambia 2001/02	30-39	34	53	87	75	155
Zambia 2001/02	40-49	38	72	110	90	191
Zimbabwe 1999	< 20	35	32	66	33	97
Zimbabwe 1999	20-29	25	33	58	34	90
Zimbabwe 1999	30-39	21	33	54	28	80
Zimbabwe 1999	40-49	32	57	89	44	129
<b>North Africa/West Asia/Europe</b>						
Armenia 2000	< 20	30	19	50	2	52
Armenia 2000	20-29	21	16	37	4	41
Armenia 2000	30-39	44	25	69	5	73
Armenia 2000	40-49	-	-	-	-	-
Egypt 2000	< 20	37	38	74	15	88
Egypt 2000	20-29	24	22	46	13	58
Egypt 2000	30-39	36	29	65	21	85
Egypt 2000	40-49	30	36	66	14	79

Continued...

Table C.1—Continued

Country	Mother's age at birth	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>North Africa/West Asia/Europe</b>						
Jordan 1997	< 20	26	23	50	6	55
Jordan 1997	20-29	16	9	26	5	30
Jordan 1997	30-39	19	10	29	5	34
Jordan 1997	40-49	34	8	42	9	50
Morocco 1992	< 20	65	42	107	20	125
Morocco 1992	20-29	33	27	59	22	80
Morocco 1992	30-39	29	29	59	23	80
Turkey 1998	< 20	28	25	54	15	67
Turkey 1998	20-29	29	18	47	11	58
Turkey 1998	30-39	22	23	45	12	56
Turkey 1998	40-49	86	26	111	10	120
Yemen 1997	< 20	67	61	128	38	161
Yemen 1997	20-29	37	46	84	33	114
Yemen 1997	30-39	33	46	79	36	112
Yemen 1997	40-49	37	43	80	40	116
<b>Central Asia</b>						
Kazakhstan 1999	< 20	52	27	80	5	84
Kazakhstan 1999	20-29	24	27	51	10	61
Kazakhstan 1999	30-39	26	25	50	5	56
Kazakhstan 1999	40-49	91	56	146	0	146
Kyrgyz Republic 1997	< 20	53	45	98	10	107
Kyrgyz Republic 1997	20-29	34	32	67	10	76
Kyrgyz Republic 1997	30-39	21	27	48	11	58
Kyrgyz Republic 1997	40-49	41	90	131	0	131
Turkmenistan 2000	< 20	51	35	87	24	109
Turkmenistan 2000	20-29	30	40	70	19	88
Turkmenistan 2000	30-39	38	36	75	15	88
Turkmenistan 2000	40-49	27	25	51	12	63
Uzbekistan 1996	< 20	28	17	45	15	59
Uzbekistan 1996	20-29	18	24	42	14	55
Uzbekistan 1996	30-39	29	17	46	7	52
Uzbekistan 1996	40-49	79	0	79	8	86
<b>South/Southeast Asia</b>						
Bangladesh 1999/2000	< 20	72	32	104	29	130
Bangladesh 1999/2000	20-29	41	29	70	34	102
Bangladesh 1999/2000	30-39	40	26	66	37	100
Bangladesh 1999/2000	40-49	17	15	32	25	56
Cambodia 2000	< 20	45	56	101	28	126
Cambodia 2000	20-29	36	52	88	30	116
Cambodia 2000	30-39	42	53	94	34	126
Cambodia 2000	40-49	41	77	117	43	156
India 1998/99	< 20	63	30	93	31	121
India 1998/99	20-29	41	23	63	29	90
India 1998/99	30-39	49	28	77	37	111
India 1998/99	40-49	62	44	106	57	157
Indonesia 1997	< 20	32	32	63	22	84
Indonesia 1997	20-29	23	25	47	17	64
Indonesia 1997	30-39	27	30	57	24	80
Indonesia 1997	40-49	21	21	41	6	47
Nepal 2001	< 20	71	37	108	29	134
Nepal 2001	20-29	40	27	68	33	98
Nepal 2001	30-39	43	30	73	43	112
Nepal 2001	40-49	80	16	96	23	117
Pakistan 1990/91	< 20	70	51	121	27	145
Pakistan 1990/91	20-29	51	40	91	29	117
Pakistan 1990/91	30-39	49	35	84	32	113
Pakistan 1990/91	40-49	56	50	107	27	131
Philippines 1998	< 20	26	15	41	19	60
Philippines 1998	20-29	16	17	33	18	51
Philippines 1998	30-39	21	17	38	23	60
Philippines 1998	40-49	35	17	52	16	67
Vietnam 1997	< 20	40	6	46	5	51
Vietnam 1997	20-29	22	12	34	11	44
Vietnam 1997	30-39	18	17	35	14	48
Vietnam 1997	40-49	26	0	26	17	43

Continued...

Table C.1—Continued

Country	Mother's age at birth	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>Latin America/Caribbean</b>						
Bolivia 1998	< 20	39	58	97	31	125
Bolivia 1998	20-29	34	33	67	26	91
Bolivia 1998	30-39	38	34	72	31	100
Bolivia 1998	40-49	50	38	89	21	107
Brazil 1996	< 20	25	32	57	10	66
Brazil 1996	20-29	21	23	44	8	51
Brazil 1996	30-39	22	29	51	11	62
Brazil 1996	40-49	21	42	64	19	82
Colombia 2000	< 20	18	13	31	2	33
Colombia 2000	20-29	14	6	21	3	24
Colombia 2000	30-39	18	8	26	6	31
Colombia 2000	40-49	37	5	42	0	42
Dominican Republic 1999	< 20	45	26	71	10	80
Dominican Republic 1999	20-29	12	16	28	10	38
Dominican Republic 1999	30-39	10	16	26	11	36
Dominican Republic 1999	40-49	-	-	-	-	-
Guatemala 1998/99	< 20	35	36	71	21	90
Guatemala 1998/99	20-29	23	18	41	14	54
Guatemala 1998/99	30-39	19	24	43	15	57
Guatemala 1998/99	40-49	71	45	116	54	163
Haiti 2000	< 20	48	83	131	71	192
Haiti 2000	20-29	34	49	83	56	135
Haiti 2000	30-39	35	48	83	44	123
Haiti 2000	40-49	30	51	81	22	101
Nicaragua 1997/98	< 20	21	34	55	11	65
Nicaragua 1997/98	20-29	17	21	38	11	48
Nicaragua 1997/98	30-39	25	25	50	14	64
Nicaragua 1997/98	40-49	40	24	64	2	66
Paraguay 1990	< 20	30	23	53	14	66
Paraguay 1990	20-29	15	14	29	10	39
Paraguay 1990	30-39	20	18	38	9	47
Paraguay 1990	40-49	40	13	53	35	86
Peru 2000	< 20	26	27	52	17	68
Peru 2000	20-29	20	19	40	18	56
Peru 2000	30-39	22	19	41	19	60
Peru 2000	40-49	52	29	80	24	102

Table C.2 Childhood mortality rates by length of preceding birth interval (less than 24, 24-47, and 48+ months), ten-year rates, Demographic and Health Surveys 1990-2002

Country	Birth interval	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>Sub-Saharan Africa</b>						
Benin 2001	<24 mos	70	84	154	86	227
Benin 2001	24-47 mos	30	52	81	76	151
Benin 2001	48+ mos	37	27	64	66	126
Burkina Faso 1998/99	<24 mos	64	91	155	165	294
Burkina Faso 1998/99	24-47 mos	33	59	91	128	207
Burkina Faso 1998/99	48+ mos	20	28	48	62	107
Cameroon 1998	<24 mos	59	59	117	102	208
Cameroon 1998	24-47 mos	31	36	67	65	127
Cameroon 1998	48+ mos	22	19	41	38	78
CAR 1994/95	<24 mos	64	82	146	85	219
CAR 1994/95	24-47 mos	29	40	69	58	122
CAR 1994/95	48+ mos	18	37	55	42	95
Chad 1996/97	<24 mos	63	83	146	129	256
Chad 1996/97	24-47 mos	39	58	97	102	190
Chad 1996/97	48+ mos	26	35	61	47	105
Comoros 1996	<24 mos	54	58	112	33	142
Comoros 1996	24-47 mos	29	31	61	38	96
Comoros 1996	48+ mos	41	21	63	13	75
Côte d'Ivoire 1998/99	<24 mos	81	80	161	105	249
Côte d'Ivoire 1998/99	24-47 mos	51	51	101	68	162
Côte d'Ivoire 1998/99	48+ mos	29	19	48	53	99
Eritrea 1995	<24 mos	52	61	113	115	216
Eritrea 1995	24-47 mos	25	33	58	77	130
Eritrea 1995	48+ mos	18	19	37	40	76
Ethiopia 2000	<24 mos	92	86	178	115	272
Ethiopia 2000	24-47 mos	42	46	88	88	168
Ethiopia 2000	48+ mos	25	33	57	41	96
Gabon 2000	<24 mos	41	46	87	42	125
Gabon 2000	24-47 mos	24	29	52	28	79
Gabon 2000	48+ mos	32	21	53	27	79
Ghana 1998	<24 mos	58	48	106	65	164
Ghana 1998	24-47 mos	23	29	52	60	108
Ghana 1998	48+ mos	17	18	36	32	66
Guinea 1999	<24 mos	67	74	142	108	234
Guinea 1999	24-47 mos	48	57	105	105	199
Guinea 1999	48+ mos	25	24	49	52	99
Kenya 1998	<24 mos	42	61	102	54	150
Kenya 1998	24-47 mos	27	41	68	34	99
Kenya 1998	48+ mos	13	31	44	25	68
Madagascar 1997	<24 mos	66	87	153	95	233
Madagascar 1997	24-47 mos	25	50	75	67	137
Madagascar 1997	48+ mos	23	25	47	47	93
Malawi 2000	<24 mos	73	93	166	144	287
Malawi 2000	24-47 mos	33	54	88	91	171
Malawi 2000	48+ mos	26	52	78	58	131
Mali 2001	<24 mos	94	84	177	176	322
Mali 2001	24-47 mos	47	47	94	114	197
Mali 2001	48+ mos	28	32	61	76	132
Mozambique 1997	<24 mos	78	135	212	122	308
Mozambique 1997	24-47 mos	47	78	125	84	199
Mozambique 1997	48+ mos	18	57	75	52	124
Namibia 1992	<24 mos	64	34	98	43	136
Namibia 1992	24-47 mos	28	25	53	31	83
Namibia 1992	48+ mos	26	22	48	25	72
Niger 1998	<24 mos	68	109	176	240	374
Niger 1998	24-47 mos	37	79	117	187	282
Niger 1998	48+ mos	26	53	79	89	162
Nigeria 1999	<24 mos	52	52	104	79	174
Nigeria 1999	24-47 mos	26	34	59	71	126
Nigeria 1999	48+ mos	24	26	51	44	93
Rwanda 2000	<24 mos	83	103	186	139	299
Rwanda 2000	24-47 mos	41	58	99	93	183
Rwanda 2000	48+ mos	25	40	66	61	123
Senegal 1997	<24 mos	49	49	98	85	174
Senegal 1997	24-47 mos	31	28	59	76	131
Senegal 1997	48+ mos	27	23	51	53	100

Continued...

Table C.2—Continued

Country	Birth interval	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>Sub-Saharan Africa</b>						
South Africa 1998	<24 mos	35	42	77	26	101
South Africa 1998	24-47 mos	18	20	39	14	52
South Africa 1998	48+ mos	14	20	34	13	47
Sudan 1990	<24 mos	50	47	97	86	175
Sudan 1990	24-47 mos	33	30	63	51	111
Sudan 1990	48+ mos	23	15	37	27	63
Tanzania 1999	<24 mos	52	90	141	63	195
Tanzania 1999	24-47 mos	39	54	93	64	152
Tanzania 1999	48+ mos	29	51	80	35	112
Togo 1998	<24 mos	79	63	142	108	234
Togo 1998	24-47 mos	31	35	66	68	130
Togo 1998	48+ mos	33	20	53	36	87
Uganda 2000/01	<24 mos	49	76	125	89	203
Uganda 2000/01	24-47 mos	23	41	64	71	131
Uganda 2000/01	48+ mos	24	42	66	48	111
Zambia 2001/02	<24 mos	62	96	157	107	247
Zambia 2001/02	24-47 mos	22	51	73	76	144
Zambia 2001/02	48+ mos	26	46	72	70	137
Zimbabwe 1999	<24 mos	54	58	112	49	155
Zimbabwe 1999	24-47 mos	18	26	44	37	80
Zimbabwe 1999	48+ mos	21	33	54	25	78
<b>North Africa/West Asia/Europe</b>						
Armenia 2000	<24 mos	29	27	56	5	60
Armenia 2000	24-47 mos	28	22	50	7	57
Armenia 2000	48+ mos	27	18	45	4	48
Egypt 2000	<24 mos	52	48	100	34	130
Egypt 2000	24-47 mos	21	22	43	12	54
Egypt 2000	48+ mos	18	16	34	8	42
Jordan 1997	<24 mos	24	12	37	6	43
Jordan 1997	24-47 mos	12	8	20	4	24
Jordan 1997	48+ mos	15	12	27	6	32
Morocco 1992	<24 mos	57	47	104	31	132
Morocco 1992	24-47 mos	22	24	47	21	67
Morocco 1992	48+ mos	19	12	32	14	45
Turkey 1998	<24 mos	44	48	91	24	113
Turkey 1998	24-47 mos	15	19	34	13	46
Turkey 1998	48+ mos	26	7	33	3	36
Yemen 1997	<24 mos	54	70	124	48	166
Yemen 1997	24-47 mos	23	32	55	26	79
Yemen 1997	48+ mos	15	20	36	19	54
<b>Central Asia</b>						
Kazakhstan 1999	<24 mos	42	40	83	6	88
Kazakhstan 1999	24-47 mos	15	31	46	9	54
Kazakhstan 1999	48+ mos	24	17	40	7	46
Kyrgyz Republic 1997	<24 mos	40	47	87	12	98
Kyrgyz Republic 1997	24-47 mos	23	25	48	10	58
Kyrgyz Republic 1997	48+ mos	24	26	51	9	59
Turkmenistan 2000	<24 mos	39	55	94	28	119
Turkmenistan 2000	24-47 mos	27	37	64	16	79
Turkmenistan 2000	48+ mos	33	16	49	9	57
Uzbekistan 1996	<24 mos	20	30	51	16	66
Uzbekistan 1996	24-47 mos	19	17	35	9	44
Uzbekistan 1996	48+ mos	28	20	48	9	57
<b>South/Southeast Asia</b>						
Bangladesh 1999/2000	<24 mos	70	47	116	53	163
Bangladesh 1999/2000	24-47 mos	36	27	63	40	100
Bangladesh 1999/2000	48+ mos	23	20	44	19	61
Cambodia 2000	<24 mos	63	71	133	45	172
Cambodia 2000	24-47 mos	32	51	83	33	113
Cambodia 2000	48+ mos	23	37	60	23	81
India 1998/99	<24 mos	72	38	110	49	153
India 1998/99	24-47 mos	36	23	58	31	88
India 1998/99	48+ mos	24	14	39	14	52
Indonesia 1997	<24 mos	47	57	103	35	135
Indonesia 1997	24-47 mos	22	29	52	21	72
Indonesia 1997	48+ mos	15	17	32	17	48
Nepal 2001	<24 mos	80	45	124	55	172
Nepal 2001	24-47 mos	35	25	60	34	92
Nepal 2001	48+ mos	22	17	39	20	58

Continued...

Table C.2—Continued

Country	Birth interval	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>South/Southeast Asia</b>						
Pakistan 1990/91	<24 mos	75	60	135	44	172
Pakistan 1990/91	24-47 mos	36	27	64	25	88
Pakistan 1990/91	48+ mos	14	18	32	14	45
Philippines 1998	<24 mos	21	25	46	29	73
Philippines 1998	24-47 mos	14	14	28	22	49
Philippines 1998	48+ mos	23	15	38	11	48
Vietnam 1997	<24 mos	36	24	60	20	79
Vietnam 1997	24-47 mos	20	12	31	11	42
Vietnam 1997	48+ mos	12	9	21	11	31
<b>Latin America/Caribbean</b>						
Bolivia 1998	<24 mos	60	63	123	46	163
Bolivia 1998	24-47 mos	33	33	67	25	90
Bolivia 1998	48+ mos	19	14	33	15	47
Brazil 1996	<24 mos	29	52	81	17	96
Brazil 1996	24-47 mos	19	22	42	10	51
Brazil 1996	48+ mos	24	15	40	6	45
Colombia 2000	<24 mos	22	16	38	7	44
Colombia 2000	24-47 mos	14	10	25	4	28
Colombia 2000	48+ mos	17	3	20	3	23
Dominican Republic 1999	<24 mos	36	28	63	10	72
Dominican Republic 1999	24-47 mos	7	4	11	9	20
Dominican Republic 1999	48+ mos	19	20	40	18	57
Guatemala 1998/99	<24 mos	34	36	70	30	98
Guatemala 1998/99	24-47 mos	21	17	39	14	52
Guatemala 1998/99	48+ mos	9	23	33	7	39
Haiti 2000	<24 mos	54	73	127	79	196
Haiti 2000	24-47 mos	28	47	75	48	119
Haiti 2000	48+ mos	20	32	51	17	68
Nicaragua 1997/98	<24 mos	31	44	75	20	93
Nicaragua 1997/98	24-47 mos	14	16	30	8	37
Nicaragua 1997/98	48+ mos	17	15	31	9	40
Paraguay 1990	<24 mos	20	22	42	14	56
Paraguay 1990	24-47 mos	21	16	37	12	49
Paraguay 1990	48+ mos	10	9	19	7	26
Peru 2000	<24 mos	41	37	78	32	107
Peru 2000	24-47 mos	21	21	42	20	60
Peru 2000	48+ mos	16	12	28	9	37

Table C.3 Childhood mortality rates by birth order (1, 2-3, 4-6, and 7+), ten-year rates, Demographic and Health Surveys 1990-2002

Country	Birth order	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>Sub-Saharan Africa</b>						
Benin 2001	1	47	46	93	69	155
Benin 2001	2-3	35	50	84	69	147
Benin 2001	4-6	36	55	92	81	165
Benin 2001	7+	58	65	124	83	197
Burkina Faso 1998/99	1	68	77	144	131	256
Burkina Faso 1998/99	2-3	40	54	95	125	208
Burkina Faso 1998/99	4-6	30	67	97	134	218
Burkina Faso 1998/99	7+	50	68	118	127	230
Cameroon 1998	1	49	35	84	71	149
Cameroon 1998	2-3	34	38	72	73	140
Cameroon 1998	4-6	39	43	82	70	146
Cameroon 1998	7+	48	38	86	76	156
CAR 1994/95	1	66	69	135	59	186
CAR 1994/95	2-3	37	54	91	70	155
CAR 1994/95	4-6	33	53	85	58	139
CAR 1994/95	7+	61	50	110	62	166
Chad 1996/97	1	57	59	116	92	197
Chad 1996/97	2-3	46	62	107	104	200
Chad 1996/97	4-6	38	60	98	98	186
Chad 1996/97	7+	59	73	132	124	239
Comoros 1996	1	61	30	91	25	113
Comoros 1996	2-3	40	33	73	33	104
Comoros 1996	4-6	38	46	84	29	110
Comoros 1996	7+	49	43	93	38	127
Côte d'Ivoire 1998/99	1	63	72	136	59	187
Côte d'Ivoire 1998/99	2-3	51	45	96	71	160
Côte d'Ivoire 1998/99	4-6	52	54	105	67	165
Côte d'Ivoire 1998/99	7+	62	59	121	95	205
Eritrea 1995	1	46	41	87	77	157
Eritrea 1995	2-3	32	37	69	93	155
Eritrea 1995	4-6	30	43	73	77	145
Eritrea 1995	7+	37	42	79	83	156
Ethiopia 2000	1	85	59	144	73	206
Ethiopia 2000	2-3	49	50	99	87	177
Ethiopia 2000	4-6	46	54	100	90	182
Ethiopia 2000	7+	66	60	126	80	196
Gabon 2000	1	34	23	57	34	90
Gabon 2000	2-3	26	32	58	30	86
Gabon 2000	4-6	27	25	52	37	87
Gabon 2000	7+	49	43	92	24	113
Ghana 1998	1	43	25	69	49	114
Ghana 1998	2-3	28	31	59	47	103
Ghana 1998	4-6	27	30	57	61	114
Ghana 1998	7+	36	27	64	52	113
Guinea 1999	1	65	54	119	108	214
Guinea 1999	2-3	42	47	89	94	174
Guinea 1999	4-6	50	57	107	97	194
Guinea 1999	7+	61	69	130	105	221
Kenya 1998	1	22	41	63	34	95
Kenya 1998	2-3	24	39	63	32	93
Kenya 1998	4-6	27	41	67	37	102
Kenya 1998	7+	41	66	107	54	155
Madagascar 1997	1	45	57	102	63	159
Madagascar 1997	2-3	37	50	87	75	155
Madagascar 1997	4-6	33	59	91	75	159
Madagascar 1997	7+	52	74	126	71	188
Malawi 2000	1	60	80	140	114	238
Malawi 2000	2-3	42	68	109	104	202
Malawi 2000	4-6	36	59	95	92	178
Malawi 2000	7+	52	59	111	99	199
Mali 2001	1	115	65	180	124	282
Mali 2001	2-3	60	53	113	125	224
Mali 2001	4-6	50	53	103	129	219
Mali 2001	7+	69	67	136	134	252

Continued...



Table C.3—Continued

Country	Birth order	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>Sub-Saharan Africa</b>						
Mozambique 1997	1	77	97	174	67	229
Mozambique 1997	2-3	53	87	140	77	207
Mozambique 1997	4-6	50	87	136	90	214
Mozambique 1997	7+	48	99	146	114	243
Namibia 1992	1	31	25	56	31	85
Namibia 1992	2-3	33	31	65	30	92
Namibia 1992	4-6	38	23	62	31	91
Namibia 1992	7+	43	21	64	45	106
Niger 1998	1	78	84	162	191	322
Niger 1998	2-3	47	87	134	189	298
Niger 1998	4-6	41	81	122	199	297
Niger 1998	7+	49	91	140	190	303
Nigeria 1999	1	39	27	66	61	123
Nigeria 1999	2-3	26	29	55	59	111
Nigeria 1999	4-6	33	37	70	74	139
Nigeria 1999	7+	55	60	115	85	190
Rwanda 2000	1	52	63	115	102	206
Rwanda 2000	2-3	42	66	109	100	198
Rwanda 2000	4-6	48	66	113	109	210
Rwanda 2000	7+	69	74	143	85	216
Senegal 1997	1	53	28	81	75	149
Senegal 1997	2-3	32	30	62	73	131
Senegal 1997	4-6	30	31	61	75	132
Senegal 1997	7+	47	37	84	79	156
South Africa 1998	1	19	21	41	15	55
South Africa 1998	2-3	15	18	33	14	47
South Africa 1998	4-6	23	27	50	20	69
South Africa 1998	7+	31	60	91	7	98
Sudan 1990	1	64	34	97	65	156
Sudan 1990	2-3	34	32	66	66	128
Sudan 1990	4-6	37	34	71	58	125
Sudan 1990	7+	46	38	84	63	141
Tanzania 1999	1	64	66	130	63	186
Tanzania 1999	2-3	42	66	108	71	171
Tanzania 1999	4-6	27	63	90	59	144
Tanzania 1999	7+	58	51	108	29	134
Togo 1998	1	48	38	86	63	143
Togo 1998	2-3	35	35	69	70	134
Togo 1998	4-6	40	40	80	71	145
Togo 1998	7+	59	42	101	72	166
Uganda 2000/01	1	48	62	111	74	176
Uganda 2000/01	2-3	26	53	79	77	150
Uganda 2000/01	4-6	30	51	82	75	150
Uganda 2000/01	7+	45	54	98	68	160
Zambia 2001/02	1	42	65	107	81	180
Zambia 2001/02	2-3	28	59	87	90	169
Zambia 2001/02	4-6	31	62	93	72	157
Zambia 2001/02	7+	37	56	93	83	169
Zimbabwe 1999	1	31	35	66	25	89
Zimbabwe 1999	2-3	22	31	53	34	86
Zimbabwe 1999	4-6	26	29	55	37	90
Zimbabwe 1999	7+	26	48	74	38	110
<b>North Africa/West Asia/Europe</b>						
Armenia 2000	1	22	10	32	2	34
Armenia 2000	2-3	24	22	46	5	52
Armenia 2000	4-6	46	21	67	5	72
Armenia 2000	7+	215	68	283	0	283
Egypt 2000	1	26	20	46	8	54
Egypt 2000	2-3	24	21	45	11	55
Egypt 2000	4-6	32	30	62	22	82
Egypt 2000	7+	47	49	96	30	123
Jordan 1997	1	17	12	29	5	33
Jordan 1997	2-3	17	10	26	4	30
Jordan 1997	4-6	17	10	28	6	34
Jordan 1997	7+	24	12	37	6	42

Continued...

Table C.3—Continued

Country	Birth order	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>North Africa/West Asia/Europe</b>						
Morocco 1992	1	42	29	70	17	86
Morocco 1992	2-3	31	28	59	25	83
Morocco 1992	4-6	28	25	53	24	75
Morocco 1992	7+	41	39	80	19	98
Turkey 1998	1	28	11	39	8	47
Turkey 1998	2-3	27	19	46	9	54
Turkey 1998	4-6	35	35	70	19	87
Turkey 1998	7+	18	36	54	26	79
Yemen 1997	1	63	48	110	25	132
Yemen 1997	2-3	42	48	90	33	120
Yemen 1997	4-6	32	45	76	38	111
Yemen 1997	7+	38	54	93	37	126
<b>Central Asia</b>						
Kazakhstan 1999	1	30	21	51	11	62
Kazakhstan 1999	2-3	26	26	52	5	57
Kazakhstan 1999	4-6	24	38	61	14	74
Kazakhstan 1999	7+	86	55	141	0	141
Kyrgyz Republic 1997	1	42	31	73	10	83
Kyrgyz Republic 1997	2-3	29	35	64	7	70
Kyrgyz Republic 1997	4-6	30	31	60	16	75
Kyrgyz Republic 1997	7+	35	40	75	15	89
Turkmenistan 2000	1	32	35	67	15	81
Turkmenistan 2000	2-3	32	41	73	21	92
Turkmenistan 2000	4-6	35	41	76	18	92
Turkmenistan 2000	7+	41	33	74	12	85
Uzbekistan 1996	1	21	21	42	15	56
Uzbekistan 1996	2-3	19	21	40	14	53
Uzbekistan 1996	4-6	23	23	46	8	54
Uzbekistan 1996	7+	50	26	76	9	84
<b>South/Southeast Asia</b>						
Bangladesh 1999/2000	1	77	29	106	21	125
Bangladesh 1999/2000	2-3	40	27	67	35	99
Bangladesh 1999/2000	4-6	42	32	74	36	108
Bangladesh 1999/2000	7+	39	34	72	49	118
Cambodia 2000	1	39	51	90	19	108
Cambodia 2000	2-3	37	49	86	34	117
Cambodia 2000	4-6	35	50	85	36	118
Cambodia 2000	7+	53	75	128	35	158
India 1998/99	1	52	22	75	19	92
India 1998/99	2-3	42	23	64	29	91
India 1998/99	4-6	47	30	77	40	114
India 1998/99	7+	72	40	112	54	159
Indonesia 1997	1	26	22	48	12	59
Indonesia 1997	2-3	23	26	49	18	66
Indonesia 1997	4-6	21	29	50	28	76
Indonesia 1997	7+	45	53	98	29	124
Nepal 2001	1	57	32	89	23	110
Nepal 2001	2-3	44	28	72	29	98
Nepal 2001	4-6	40	30	69	45	111
Nepal 2001	7+	63	31	94	51	140
Pakistan 1990/91	1	61	38	99	13	110
Pakistan 1990/91	2-3	45	39	84	32	113
Pakistan 1990/91	4-6	52	43	95	34	125
Pakistan 1990/91	7+	63	44	107	32	136
Philippines 1998	1	21	11	32	11	42
Philippines 1998	2-3	17	15	32	14	46
Philippines 1998	4-6	19	20	39	28	66
Philippines 1998	7+	27	26	53	40	91
Vietnam 1997	1	25	11	35	8	43
Vietnam 1997	2-3	22	9	31	10	40
Vietnam 1997	4-6	16	21	37	18	54
Vietnam 1997	7+	38	29	67	21	87

Continued...

Table C.3—Continued

Country	Birth order	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>Latin America/Caribbean</b>						
Bolivia 1998	1	28	32	59	21	79
Bolivia 1998	2-3	32	34	66	24	88
Bolivia 1998	4-6	40	39	79	34	110
Bolivia 1998	7+	56	51	107	37	140
Brazil 1996	1	18	18	37	5	42
Brazil 1996	2-3	20	25	44	7	51
Brazil 1996	4-6	32	35	67	14	80
Brazil 1996	7+	37	49	86	26	110
Colombia 2000	1	14	6	20	3	22
Colombia 2000	2-3	16	9	25	4	29
Colombia 2000	4-6	25	10	35	6	41
Colombia 2000	7+	19	6	24	2	26
Dominican Republic 1999	1	16	20	37	8	44
Dominican Republic 1999	2-3	20	16	36	7	42
Dominican Republic 1999	4-6	23	10	33	26	58
Dominican Republic 1999	7+	9	63	72	0	72
Guatemala 1998/99	1	33	20	52	11	63
Guatemala 1998/99	2-3	17	23	40	15	54
Guatemala 1998/99	4-6	25	23	48	21	67
Guatemala 1998/99	7+	37	30	68	20	86
Haiti 2000	1	39	54	93	53	141
Haiti 2000	2-3	31	56	87	53	135
Haiti 2000	4-6	31	48	79	54	129
Haiti 2000	7+	51	59	110	51	156
Nicaragua 1997/98	1	19	24	43	9	51
Nicaragua 1997/98	2-3	17	23	39	10	49
Nicaragua 1997/98	4-6	16	23	38	13	50
Nicaragua 1997/98	7+	40	37	76	19	94
Paraguay 1990	1	23	13	36	9	45
Paraguay 1990	2-3	12	12	25	10	35
Paraguay 1990	4-6	22	19	41	14	54
Paraguay 1990	7+	28	25	52	13	64
Peru 2000	1	17	16	33	13	45
Peru 2000	2-3	21	18	39	15	54
Peru 2000	4-6	26	25	51	24	73
Peru 2000	7+	37	30	67	30	95

Table C.4 Childhood mortality rates by sex (male, female), ten-year rates, Demographic and Health Surveys 1990-2002

Country	Sex of child	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>Sub-Saharan Africa</b>						
Benin 2001	M	44	54	98	72	162
Benin 2001	F	39	53	92	79	163
Burkina Faso 1998/99	M	52	64	116	131	232
Burkina Faso 1998/99	F	35	66	101	128	216
Cameroon 1998	M	48	37	85	69	149
Cameroon 1998	F	34	41	75	75	144
CAR 1994/95	M	52	58	109	63	165
CAR 1994/95	F	39	55	94	64	152
Chad 1996/97	M	56	64	120	106	213
Chad 1996/97	F	39	61	100	99	189
Comoros 1996	M	50	42	93	32	122
Comoros 1996	F	40	35	75	31	103
Côte d'Ivoire 1998/99	M	65	66	130	83	203
Côte d'Ivoire 1998/99	F	47	46	93	58	146
Eritrea 1995	M	43	39	82	89	163
Eritrea 1995	F	27	42	69	78	141
Ethiopia 2000	M	67	57	124	83	197
Ethiopia 2000	F	49	52	101	86	178
Gabon 2000	M	39	35	74	32	103
Gabon 2000	F	25	24	49	33	80
Ghana 1998	M	36	28	64	53	114
Ghana 1998	F	28	30	58	51	106
Guinea 1999	M	59	53	112	101	202
Guinea 1999	F	44	57	101	98	188
Kenya 1998	M	30	45	75	36	108
Kenya 1998	F	24	42	67	38	103
Madagascar 1997	M	47	61	109	75	176
Madagascar 1997	F	33	56	90	68	152
Malawi 2000	M	50	67	117	101	207
Malawi 2000	F	41	67	108	102	199
Mali 2001	M	80	57	136	132	250
Mali 2001	F	56	59	116	125	226
Mozambique 1997	M	60	93	153	85	225
Mozambique 1997	F	54	88	142	82	213
Namibia 1992	M	39	27	67	30	95
Namibia 1992	F	32	25	57	34	89
Niger 1998	M	59	82	141	184	299
Niger 1998	F	42	89	131	202	306
Nigeria 1999	M	38	35	73	66	134
Nigeria 1999	F	32	36	68	69	132
Rwanda 2000	M	58	65	123	105	215
Rwanda 2000	F	43	69	112	97	198
Senegal 1997	M	42	32	74	76	144
Senegal 1997	F	34	31	65	74	134
South Africa 1998	M	24	25	49	18	66
South Africa 1998	F	15	21	35	13	48
Sudan 1990	M	50	34	84	62	141
Sudan 1990	F	35	35	70	63	129
Tanzania 1999	M	56	63	118	61	172
Tanzania 1999	F	34	63	97	58	150
Togo 1998	M	49	40	89	73	156
Togo 1998	F	35	36	71	65	132
Uganda 2000/01	M	37	56	93	78	164
Uganda 2000/01	F	33	53	86	70	150
Zambia 2001/02	M	34	61	95	89	176
Zambia 2001/02	F	32	60	93	74	160
Zimbabwe 1999	M	28	35	63	35	95
Zimbabwe 1999	F	24	32	56	31	85

Continued...

Table C.4—Continued

Country	Sex of child	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>North Africa/West Asia/Europe</b>						
Armenia 2000	M	29	17	46	5	51
Armenia 2000	F	23	19	42	3	45
Egypt 2000	M	33	22	55	15	69
Egypt 2000	F	25	29	55	16	70
Jordan 1997	M	22	13	34	4	38
Jordan 1997	F	15	9	23	7	30
Morocco 1992	M	39	30	69	21	88
Morocco 1992	F	29	28	57	24	80
Turkey 1998	M	32	19	51	10	61
Turkey 1998	F	24	22	46	13	58
Yemen 1997	M	45	53	98	33	128
Yemen 1997	F	36	44	80	36	114
<b>Central Asia</b>						
Kazakhstan 1999	M	33	30	62	11	72
Kazakhstan 1999	F	24	23	47	6	53
Kyrgyz Republic 1997	M	37	35	72	10	81
Kyrgyz Republic 1997	F	30	31	60	11	70
Turkmenistan 2000	M	37	46	83	19	101
Turkmenistan 2000	F	29	31	60	17	76
Uzbekistan 1996	M	24	26	50	15	65
Uzbekistan 1996	F	19	17	37	9	46
<b>South/Southeast Asia</b>						
Bangladesh 1999/2000	M	55	28	82	28	108
Bangladesh 1999/2000	F	46	31	77	38	112
Cambodia 2000	M	44	59	103	34	133
Cambodia 2000	F	34	48	82	30	110
India 1998/99	M	51	24	75	25	98
India 1998/99	F	45	27	71	37	105
Indonesia 1997	M	27	32	59	19	77
Indonesia 1997	F	23	22	45	20	64
Nepal 2001	M	52	27	79	28	105
Nepal 2001	F	43	32	75	40	112
Pakistan 1990/91	M	60	42	102	22	122
Pakistan 1990/91	F	46	39	86	37	119
Philippines 1998	M	21	19	39	21	59
Philippines 1998	F	18	15	32	19	50
Vietnam 1997	M	28	14	42	10	51
Vietnam 1997	F	16	11	27	13	40
<b>Latin America/Caribbean</b>						
Bolivia 1998	M	41	37	78	26	102
Bolivia 1998	F	32	37	69	29	96
Brazil 1996	M	22	30	52	9	60
Brazil 1996	F	22	22	44	9	53
Colombia 2000	M	20	9	29	4	32
Colombia 2000	F	13	7	20	3	23
Dominican Republic 1999	M	19	20	39	13	51
Dominican Republic 1999	F	19	16	35	8	43
Guatemala 1998/99	M	28	22	50	15	64
Guatemala 1998/99	F	24	24	48	18	65
Haiti 2000	M	39	58	97	52	143
Haiti 2000	F	33	49	83	54	132
Nicaragua 1997/98	M	22	28	50	12	62
Nicaragua 1997/98	F	18	22	40	11	51
Paraguay 1990	M	21	18	39	10	49
Paraguay 1990	F	18	15	33	12	45
Peru 2000	M	25	21	46	19	64
Peru 2000	F	20	20	40	17	57

Table C.5 Childhood mortality rates by multiple birth status (multiple birth, singleton birth), ten-year rates, Demographic and Health Surveys 1990-2000

Country	Birth status	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>Sub-Saharan Africa</b>						
Benin96	M	201	114	315	123	399
Benin96	S	35	55	90	87	169
Burkina Faso99	M	168	113	281	283	485
Burkina Faso99	S	40	64	104	127	217
Cameroon98	M	152	67	220	92	292
Cameroon98	S	37	38	75	73	142
CAR94	M	265	127	391	90	446
CAR94	S	39	54	93	63	151
Chad97	M	214	139	353	231	503
Chad97	S	42	60	102	100	192
Comoros96	M	189	31	220	59	266
Comoros96	S	39	39	78	31	106
Côte d'Ivoire98	M	177	104	280	126	371
Côte d'Ivoire98	S	52	55	107	70	169
Eritrea95	M	192	175	368	159	468
Eritrea95	S	31	37	68	81	143
Ethiopia00	M	369	138	506	194	602
Ethiopia00	S	52	53	105	83	179
Gabon00	M	158	45	203	10	211
Gabon00	S	27	29	55	33	86
Ghana98	M	173	82	255	75	311
Ghana98	S	27	27	53	51	102
Guinea99	M	174	123	297	161	410
Guinea99	S	47	52	99	96	186
Kenya98	M	153	86	238	81	300
Kenya98	S	23	43	66	36	100
Madagascar97	M	166	126	291	123	378
Madagascar97	S	37	57	95	69	158
Malawi00	M	226	107	333	132	421
Malawi00	S	37	64	102	100	192
Mali96	M	234	145	380	183	493
Mali96	S	63	63	126	135	244
Morocco92	M	165	90	255	22	272
Morocco92	S	31	28	59	22	80
Mozambique97	M	161	219	380	97	440
Mozambique97	S	53	86	139	83	211
Namibia92	M	128	89	217	17	230
Namibia92	S	32	24	56	33	87
Niger98	M	202	206	408	228	543
Niger98	S	45	81	126	191	293
Nigeria99	M	142	76	217	77	278
Nigeria99	S	31	34	64	67	127
Rwanda92	M	301	83	384	89	439
Rwanda92	S	42	43	85	78	156
Senegal97	M	180	85	265	109	345
Senegal97	S	34	30	64	74	133
Tanzania99	M	155	104	259	58	302
Tanzania99	S	41	61	103	60	157
Togo97	M	198	51	249	66	298
Togo97	S	35	37	71	69	136
Uganda00	M	200	129	328	129	415
Uganda00	S	30	53	83	72	149
Zambia96	M	175	147	322	140	417
Zambia96	S	30	69	99	94	183
Zimbabwe99	M	151	69	220	49	258
Zimbabwe99	S	22	33	55	33	86

Continued...

Table C.5—Continued

Country	Birth status	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>North Africa/West Asia/Europe</b>						
Egypt00	M	156	91	247	32	271
Egypt00	S	24	23	48	15	62
Turkey98	M	161	59	220	26	240
Turkey98	S	25	20	45	12	56
Yemen97	M	223	142	365	91	423
Yemen97	S	38	47	85	34	116
<b>Central Asia</b>						
Kazakhstan99	M	278	103	381	0	381
Kazakhstan99	S	23	25	48	9	57
Kyrgyzstan97	M	228	122	350	5	353
Kyrgyzstan97	S	29	31	60	11	69
Turkmenistan99	M	208	104	313	10	320
Turkmenistan99	S	29	37	66	19	84
Uzbekistan96	M	250	101	351	36	375
Uzbekistan96	S	17	20	37	12	48
<b>South/Southeast Asia</b>						
Bangladesh00	M	335	117	452	126	521
Bangladesh00	S	45	28	73	32	102
Cambodia00	M	246	102	348	28	366
Cambodia00	S	35	53	88	32	117
India99	M	273	75	348	56	385
India99	S	44	25	69	30	97
Indonesia97	M	125	55	181	34	208
Indonesia97	S	24	27	50	19	69
Nepal96	M	417	85	502	107	555
Nepal96	S	53	34	87	50	132
Pakistan91	M	220	86	306	63	350
Pakistan91	S	50	40	90	29	116
Philippines98	M	129	29	159	71	219
Philippines98	S	18	16	34	18	52
<b>Latin America/Caribbean</b>						
Bolivia98	M	147	109	256	56	297
Bolivia98	S	35	36	71	27	96
Brazil96	M	94	61	154	11	163
Brazil96	S	21	25	46	9	54
Colombia00	M	90	23	113	0	113
Colombia00	S	15	8	23	4	27
Dom. Republic96	M	150	58	208	8	214
Dom. Republic96	S	25	20	45	13	57
Guatemala99	M	118	38	156	22	175
Guatemala99	S	25	23	48	16	63
Haiti00	M	198	108	305	133	398
Haiti00	S	32	52	83	52	131
Nicaragua97	M	136	75	211	22	228
Nicaragua97	S	18	24	42	11	53
Paraguay90	M	88	48	137	20	154
Paraguay90	S	18	16	34	11	44
Peru00	M	130	97	226	37	255
Peru00	S	21	19	40	18	57

Note: All values for neonatal are based on fewer than 500 child years during the 10-year time frame except for Ethiopia, Malawi, Zambia, Benin, Mali, Niger, Nigeria, Togo, Egypt, India, and Indonesia.

Table C.6 Childhood mortality rates by residence (Urban, rural), ten-year rates, Demographic and Health Surveys 1990-2002

Country	Residence	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( <sub>1</sub> q <sub>0</sub> )	Child mortality ( <sub>5</sub> q <sub>0</sub> )	Under-5 mortality ( <sub>5</sub> q <sub>0</sub> )
<b>Sub-Saharan Africa</b>						
Benin 2001	R	45	59	105	79	176
Benin 2001	U	33	40	73	66	134
Burkina Faso 1998/99	R	45	68	113	137	235
Burkina Faso 1998/99	U	31	37	67	66	129
Cameroon 1998	R	44	43	87	80	160
Cameroon 1998	U	32	29	61	53	111
CAR 1994/95	R	52	65	116	70	178
CAR 1994/95	U	36	44	80	53	129
Chad 1996/97	R	50	63	113	103	204
Chad 1996/97	U	38	61	99	101	190
Comoros 1996	R	47	43	90	36	123
Comoros 1996	U	39	25	64	18	81
Côte d'Ivoire 1998/99	R	60	64	124	83	197
Côte d'Ivoire 1998/99	U	47	38	85	44	125
Eritrea 1995	R	35	40	74	92	160
Eritrea 1995	U	38	42	80	53	129
Ethiopia 2000	R	60	55	115	88	193
Ethiopia 2000	U	46	50	97	58	149
Gabon 2000	R	30	33	62	40	100
Gabon 2000	U	33	28	61	30	88
Ghana 1998	R	35	32	68	58	122
Ghana 1998	U	23	19	43	36	77
Guinea 1999	R	55	61	116	107	211
Guinea 1999	U	41	38	79	76	149
Kenya 1998	R	28	45	74	38	109
Kenya 1998	U	20	35	55	35	88
Madagascar 1997	R	41	64	105	77	174
Madagascar 1997	U	37	41	78	53	127
Malawi 2000	R	48	69	117	106	210
Malawi 2000	U	30	53	83	71	148
Mali 2001	R	71	61	132	140	253
Mali 2001	U	58	48	106	88	185
Mozambique 1997	R	57	103	160	92	237
Mozambique 1997	U	55	46	101	55	150
Namibia 1992	R	36	25	61	36	95
Namibia 1992	U	34	29	63	25	86
Niger 1998	R	55	92	147	212	327
Niger 1998	U	27	53	80	107	178
Nigeria 1999	R	35	40	75	73	143
Nigeria 1999	U	36	23	59	52	108
Rwanda 2000	R	54	70	124	106	216
Rwanda 2000	U	31	47	78	69	141
Senegal 1997	R	43	36	79	94	165
Senegal 1997	U	29	22	50	41	90
South Africa 1998	R	22	30	52	20	71
South Africa 1998	U	16	16	33	11	43
Sudan 1990	R	46	33	79	71	144
Sudan 1990	U	37	37	74	46	117
Tanzania 1999	R	43	70	113	60	166
Tanzania 1999	U	52	35	87	60	142
Togo 1998	R	43	42	85	79	157
Togo 1998	U	41	25	65	38	101
Uganda 2000/01	R	36	57	94	77	164
Uganda 2000/01	U	22	32	55	49	101
Zambia 2001/02	R	35	68	103	89	182
Zambia 2001/02	U	31	46	77	69	140
Zimbabwe 1999	R	28	37	65	37	100
Zimbabwe 1999	U	22	25	47	23	69

Continued...



Table C.6—Continued

Country	Residence	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>North Africa/West Asia/Europe</b>						
Armenia 2000	R	30	23	53	7	59
Armenia 2000	U	23	13	36	1	37
Egypt 2000	R	31	31	62	19	79
Egypt 2000	U	27	17	43	10	53
Jordan 1997	R	20	19	39	7	46
Jordan 1997	U	18	9	27	5	31
Morocco 1992	R	36	33	69	31	98
Morocco 1992	U	30	22	52	7	59
Turkey 1998	R	30	28	59	16	74
Turkey 1998	U	27	16	42	10	51
Yemen 1997	R	42	52	94	38	128
Yemen 1997	U	38	37	75	22	96
<b>Central Asia</b>						
Kazakhstan 1999	R	31	33	64	10	73
Kazakhstan 1999	U	26	18	44	7	50
Kyrgyz Republic 1997	R	34	36	70	13	82
Kyrgyz Republic 1997	U	29	25	54	4	58
Turkmenistan 2000	R	33	47	80	22	100
Turkmenistan 2000	U	32	28	60	13	73
Uzbekistan 1996	R	21	23	44	14	57
Uzbekistan 1996	U	24	19	43	9	52
<b>South /Southeast Asia</b>						
Bangladesh 1999/2000	R	52	29	81	35	113
Bangladesh 1999/2000	U	42	32	74	24	97
Cambodia 2000	R	41	55	96	34	126
Cambodia 2000	U	27	45	72	22	93
India 1998/99	R	52	28	80	35	112
India 1998/99	U	34	16	49	17	65
Indonesia 1997	R	27	31	58	22	79
Indonesia 1997	U	19	17	36	12	48
Nepal 2001	R	49	31	79	35	112
Nepal 2001	U	37	14	50	17	66
Pakistan 1990/91	R	59	44	102	33	132
Pakistan 1990/91	U	41	34	75	21	94
Philippines 1998	R	21	20	40	23	63
Philippines 1998	U	18	13	31	15	46
Vietnam 1997	R	23	14	37	12	48
Vietnam 1997	U	19	4	23	7	30
<b>Latin America/Caribbean</b>						
Bolivia 1998	R	52	48	100	38	134
Bolivia 1998	U	24	29	53	20	72
Brazil 1996	R	26	40	65	15	79
Brazil 1996	U	21	21	42	7	49
Colombia 2000	R	19	12	31	5	36
Colombia 2000	U	15	6	21	3	24
Dominican Republic 1999	R	20	19	39	10	48
Dominican Republic 1999	U	18	17	35	11	46
Guatemala 1998/99	R	23	27	49	20	69
Guatemala 1998/99	U	31	18	49	9	58
Haiti 2000	R	40	51	91	65	149
Haiti 2000	U	29	59	87	27	112
Nicaragua 1997/98	R	23	28	51	14	64
Nicaragua 1997/98	U	18	22	40	9	49
Paraguay 1990	R	22	16	39	10	48
Paraguay 1990	U	16	16	33	13	45
Peru 2000	R	31	29	60	27	85
Peru 2000	U	15	13	28	11	39

Table C.7 Childhood mortality rates by mother's education (no education, primary education, and secondary or more education), ten-year rates, Demographic and Health Surveys 1990-2002

Country	Mother's education	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>Sub-Saharan Africa</b>						
Benin 2001	N	41	59	100	83	175
Benin 2001	P	49	39	88	58	141
Benin 2001	S	27	26	53	29	81
Burkina Faso 1998/99	N	44	66	110	134	230
Burkina Faso 1998/99	P	41	53	94	84	170
Burkina Faso 1998/99	S	43	35	79	23	100
Cameroon 1998	N	58	46	104	106	198
Cameroon 1998	P	35	40	74	58	128
Cameroon 1998	S	24	26	50	42	90
CAR 1994/95	N	51	63	114	69	175
CAR 1994/95	P	44	56	100	65	159
CAR 1994/95	S	24	28	52	33	83
Chad 1996/97	N	50	63	113	104	205
Chad 1996/97	P	41	61	102	98	189
Chad 1996/97	S	29	46	75	63	133
Comoros 1996	N	46	41	87	36	121
Comoros 1996	P	40	38	79	21	98
Comoros 1996	S	45	22	67	8	75
Côte d'Ivoire 1998/99	N	61	62	124	79	193
Côte d'Ivoire 1998/99	P	47	48	95	65	153
Côte d'Ivoire 1998/99	S	35	27	62	19	79
Eritrea 1995	N	35	41	76	89	158
Eritrea 1995	P	37	40	77	63	136
Eritrea 1995	S	32	36	67	36	101
Ethiopia 2000	N	61	58	119	89	197
Ethiopia 2000	P	46	39	85	68	147
Ethiopia 2000	S	25	39	64	27	89
Gabon 2000	N	41	25	66	50	112
Gabon 2000	P	30	29	59	37	94
Gabon 2000	S	32	30	63	26	87
Ghana 1998	N	34	32	66	69	131
Ghana 1998	P	41	29	70	45	113
Ghana 1998	S	26	25	51	38	87
Guinea 1999	N	54	58	112	103	204
Guinea 1999	P	40	38	78	91	162
Guinea 1999	S	25	36	61	47	104
Kenya 1998	N	28	55	82	44	123
Kenya 1998	P	31	49	80	42	118
Kenya 1998	S	17	23	40	21	60
Madagascar 1997	N	40	84	124	83	197
Madagascar 1997	P	45	57	102	78	172
Madagascar 1997	S	29	35	64	44	105
Malawi 2000	N	46	70	117	111	215
Malawi 2000	P	47	68	114	100	203
Malawi 2000	S	31	35	65	56	118
Mali 2001	N	70	60	130	134	247
Mali 2001	P	65	57	122	111	220
Mali 2001	S	31	21	52	40	90
Mozambique 1997	N	60	95	156	87	229
Mozambique 1997	P	56	88	144	82	214
Mozambique 1997	S	13	59	73	54	123
Namibia 1992	N	34	24	58	41	97
Namibia 1992	P	39	27	66	35	98
Namibia 1992	S	31	26	57	20	76
Niger 1998	N	52	89	141	201	314
Niger 1998	P	42	58	100	139	225
Niger 1998	S	24	46	70	64	130
Nigeria 1999	N	35	42	77	87	157
Nigeria 1999	P	36	35	71	55	122
Nigeria 1999	S	33	23	56	34	88
Rwanda 2000	N	63	72	135	113	233
Rwanda 2000	P	45	69	114	97	200
Rwanda 2000	S	26	33	60	61	117

Continued...

Table C.7—Continued

Country	Mother's education	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>Sub-Saharan Africa</b>						
Senegal 1997	N	42	34	76	85	154
Senegal 1997	P	24	28	52	46	96
Senegal 1997	S	20	9	29	27	55
South Africa 1998	N	20	39	59	27	84
South Africa 1998	P	22	25	48	20	67
South Africa 1998	S	18	19	36	10	46
Sudan 1990	N	45	37	82	76	152
Sudan 1990	P	41	29	70	41	108
Sudan 1990	S	33	30	63	23	84
Tanzania 1999	N	52	66	118	54	165
Tanzania 1999	P	43	63	106	65	164
Tanzania 1999	S	33	24	57	6	63
Togo 1998	N	45	42	87	79	159
Togo 1998	P	41	31	72	59	127
Togo 1998	S	27	27	54	30	83
Uganda 2000/01	N	39	68	107	90	187
Uganda 2000/01	P	35	53	88	72	155
Uganda 2000/01	S	25	28	53	43	93
Zambia 2001/02	N	39	70	108	101	198
Zambia 2001/02	P	34	65	99	87	177
Zambia 2001/02	S	27	44	70	55	121
Zimbabwe 1999	N	43	38	81	41	119
Zimbabwe 1999	P	29	32	61	35	94
Zimbabwe 1999	S	20	34	54	26	79
<b>North Africa/West Asia/Europe</b>						
Armenia 2000	N	*	*	*	*	*
Armenia 2000	P	*	*	*	*	*
Armenia 2000	S	26	18	44	4	48
Egypt 2000	N	33	35	68	22	89
Egypt 2000	P	31	28	59	16	74
Egypt 2000	S	23	13	36	5	40
Jordan 1997	N	34	20	54	8	62
Jordan 1997	P	17	15	32	9	41
Jordan 1997	S	17	9	26	4	29
Morocco 1992	N	36	32	68	25	91
Morocco 1992	P	32	21	53	7	60
Morocco 1992	S	14	7	21	2	22
Turkey 1998	N	34	33	66	19	84
Turkey 1998	P	27	19	46	11	56
Turkey 1998	S	22	6	28	4	32
Yemen 1997	N	41	51	93	37	126
Yemen 1997	P	39	33	72	22	92
Yemen 1997	S	39	28	67	4	71
<b>Central Asia</b>						
Kazakhstan 1999	N	*	*	*	*	*
Kazakhstan 1999	P	*	*	*	*	*
Kazakhstan 1999	S	29	27	55	9	63
Kyrgyz Republic 1997	N	*	*	*	*	*
Kyrgyz Republic 1997	P	*	*	*	*	*
Kyrgyz Republic 1997	S	33	33	66	10	76
Turkmenistan 2000	N	48	66	114	22	133
Turkmenistan 2000	P	*	30	30	*	30
Turkmenistan 2000	S	33	38	71	18	88
Uzbekistan 1996	N	*	*	*	*	*
Uzbekistan 1996	P	*	*	*	*	*
Uzbekistan 1996	S	22	22	44	12	55
<b>South /Southeast Asia</b>						
Bangladesh 1999/2000	N	55	37	92	42	130
Bangladesh 1999/2000	P	48	26	75	27	100
Bangladesh 1999/2000	S	41	14	55	14	68
Cambodia 2000	N	42	60	103	37	136
Cambodia 2000	P	40	54	94	32	122
Cambodia 2000	S	27	33	60	17	75
India 1998/99	N	56	32	87	41	125
India 1998/99	P	45	22	67	20	86
India 1998/99	S	31	12	42	9	51

Continued...

Table C.7—Continued

Country	Mother's education	Neonatal mortality (NN)	Post-neonatal mortality (PNN)	Infant mortality ( ${}_1q_0$ )	Child mortality ( ${}_5q_0$ )	Under-5 mortality ( ${}_5q_0$ )
<b>South/Southeast Asia</b>						
Indonesia 1997	N	40	38	78	33	108
Indonesia 1997	P	26	33	59	21	79
Indonesia 1997	S	17	11	28	7	35
Nepal 2001	N	52	33	85	40	121
Nepal 2001	P	41	20	61	13	74
Nepal 2001	S	25	14	39	12	50
Pakistan 1990/91	N	56	43	99	33	128
Pakistan 1990/91	P	50	41	90	18	107
Pakistan 1990/91	S	33	26	60	6	65
Philippines 1998	N	35	43	79	62	136
Philippines 1998	P	20	25	45	29	73
Philippines 1998	S	18	11	28	11	39
Vietnam 1997	N	27	22	49	26	74
Vietnam 1997	P	28	15	43	16	58
Vietnam 1997	S	19	10	29	8	37
<b>Latin America/Caribbean</b>						
Bolivia 1998	N	58	55	113	47	154
Bolivia 1998	P	42	45	87	33	116
Bolivia 1998	S	21	20	41	13	54
Brazil 1996	N	33	60	93	29	119
Brazil 1996	P	25	33	58	9	67
Brazil 1996	S	18	14	32	5	37
Colombia 2000	N	23	20	42	2	44
Colombia 2000	P	19	10	28	5	33
Colombia 2000	S	14	6	20	3	23
Dominican Republic 1999	N	8	27	35	4	39
Dominican Republic 1999	P	29	21	51	14	64
Dominican Republic 1999	S	5	13	18	6	24
Guatemala 1998/99	N	30	26	56	24	79
Guatemala 1998/99	P	23	24	47	14	60
Guatemala 1998/99	S	25	16	41	1	42
Haiti 2000	N	37	54	91	66	151
Haiti 2000	P	39	58	98	48	140
Haiti 2000	S	20	36	56	19	74
Nicaragua 1997/98	N	26	37	62	21	82
Nicaragua 1997/98	P	19	27	45	11	56
Nicaragua 1997/98	S	18	13	31	3	34
Paraguay 1990	N	27	26	52	27	78
Paraguay 1990	P	22	18	39	12	50
Paraguay 1990	S	13	10	23	6	29
Peru 2000	N	39	35	73	35	106
Peru 2000	P	27	27	54	24	76
Peru 2000	S	16	12	27	8	35

Note: Figures in parentheses are based on less than 500 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.

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