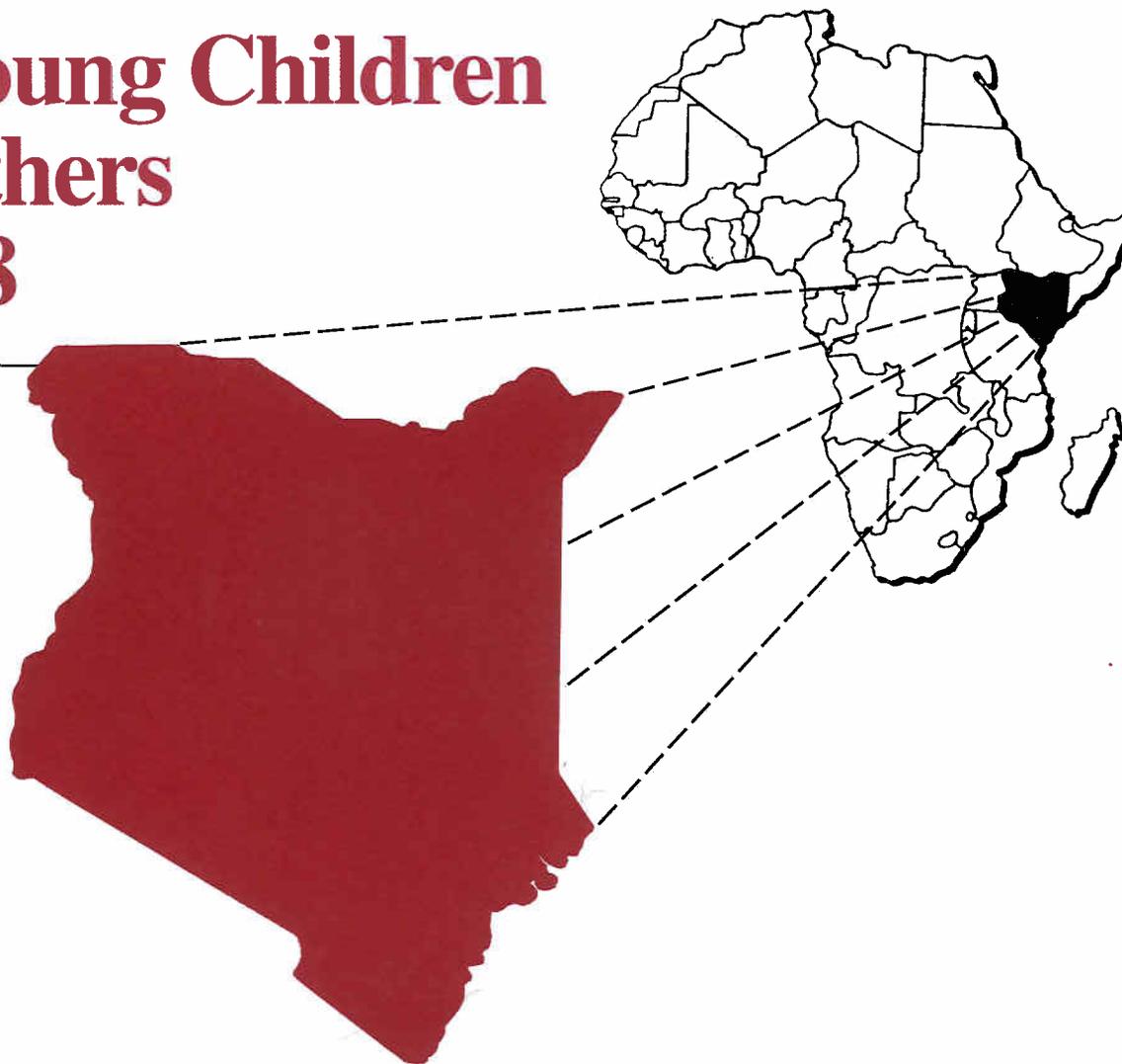

Nutrition of Young Children and Their Mothers in Kenya, 1998

AFRICA NUTRITION CHARTBOOKS



U.S. Agency for
International Development



Macro International Inc.

AFRICA NUTRITION CHARTBOOKS

**NUTRITION OF YOUNG CHILDREN AND THEIR MOTHERS
IN KENYA**

Findings from the 1998 Kenya DHS Survey

Macro International Inc.
11785 Beltsville Drive,
Calverton, Maryland, U.S.A.

December 1999

This chartbook was produced by the Demographic and Health Surveys Program (DHS) which is funded by the U. S. Agency for International Development (USAID), through the Global Bureau Office of Health and Nutrition. The chartbook benefited from funds provided by the USAID Bureau for Africa Office of Sustainable Development's Health and Human Resources Analysis for Africa Project (HHRAA). Copies of this chartbook may be obtained by contacting the DHS program, Macro International Inc., at the above address, or by telephone at (301) 572-0200, or by fax at (301) 572-0999.

LIST OF FIGURES

Figure 1	Malnutrition among Children under 5 Years, Kenya.....	2
Figure 2	Changes in Malnutrition Rates among Children under 5 Years, Kenya 1993-1998.....	4
Figure 3	Stunting among Children under 3 Years in Sub-Saharan Countries, DHS Surveys 1992-1998.....	6
Figure 4	Underweight among Children under 3 Years in Sub-Saharan Countries, DHS Surveys 1992-1998.....	8
Figure 5	Stunting, Wasting and Underweight by Age, Kenya.....	10
Figure 6	Feeding Practices of Infants under 4 Months, Kenya.....	12
Figure 7	Infants under 4 Months Who Are Exclusively Breastfed and Those Who Receive a Bottle in Kenya Compared with Other Sub-Saharan Countries.....	14
Figure 8	Feeding Practices of Infants Age 6 to 9 Months, Kenya.....	16
Figure 9	Infants Age 6 to 9 Months Receiving Solid Foods in Addition to Breast Milk in Kenya Compared with Other Sub-Saharan Countries.....	18
Figure 10	Stunting and Wasting among Children under 5 Years by Region, Kenya.....	20
Figure 11	Stunting and Wasting among Children under 5 Years by Urban-Rural Residence, Kenya.....	22

Figure 12	Stunting and Wasting among Children under 5 Years by Mother's Education, Kenya	24
Figure 13	Stunting and Wasting among Children under 5 Years by Source of Drinking Water, Kenya	26
Figure 14	Stunting and Wasting among Children under 5 Years by Type of Toilet, Kenya.....	28
Figure 15	Diarrhea and Cough with Rapid Breathing among Children under 3 Years, Kenya	30
Figure 16	Fertility and Under-Five Mortality in Kenya Compared with Other Sub-Saharan Countries	32
Figure 17	Survival and Nutritional Status of Children under 5 Years, Kenya.....	34
Figure 18	Malnutrition and Under-Five Mortality, Kenya.....	36
Figure 19	Malnutrition among Mothers of Children under 5 Years by Region, Kenya.....	38
Figure 20	Malnutrition among Mothers of Children under 5 Years by Residence and Education, Kenya	40
Figure 21	Malnutrition among Mothers of Children under 3 Years in Kenya Compared with Other Sub-Saharan Countries	42
Appendix 1	Stunting, Wasting and Underweight Rates by Background Characteristics, Kenya.....	45
Appendix 2	WHO/CDC/NCHS International Reference Population, Normal Distribution.....	46

Introduction

Malnutrition¹ is one of the most important health and welfare problems among infants and young children in Kenya. It is a result of both inadequate food intake and illness. Inadequate food intake is a consequence of insufficient food available at the household level and/or improper feeding practices. Improper feeding practices include both the quality and quantity of foods offered to young children as well as the timing of their introduction. Poor sanitation puts young children at increased risk of illness, in particular diarrheal disease, which adversely affects their nutritional status. Both inadequate food intake and poor environmental sanitation reflect underlying social and economic conditions.

Malnutrition has significant health and economic consequences, the most serious of which is an increased risk of death. Other outcomes include an increased risk of illness and a lower level of cognitive development, which results in lower educational attainment. In adulthood, the accumulated effect of long-term malnutrition can be a reduction in worker productivity and increased absenteeism in the workplace; these may reduce a person's lifetime earning potential and ability to contribute to the national economy. Furthermore, malnutrition can result in adverse pregnancy outcomes.

The Kenya data presented here are from the 1998 Kenya Demographic and Health Survey (KDHS), a nationally representative survey of 8,380 households implemented by the Central Bureau of Statistics (CBS) collaborating with the National Council for Population and Development (NCPD). The study was undertaken with funding from the U.S. Agency for International Development (USAID) and the British Department for International Development (DFID). Logistical assistance was provided by the United Nations Population Fund (UNFPA), the Division of Primary Health Care (DPHC) and the National AIDS Control Programme (NAS COP). Technical assistance was provided by Macro International Inc. Fieldwork was conducted from February to July 1998. Of the 5,617 living children age 0-59 months that were part of the study, 4,413 are included in these analyses. Nutritional data collected on these children include height, weight, age, breastfeeding history, and feeding patterns. Information was also collected on diarrhea and acute respiratory illness in the two weeks prior to the survey and on relevant socio-demographic characteristics of both the child and the mother. For comparison purposes, data are presented from DHS surveys conducted in other sub-Saharan countries.

¹ The technical method of determining a *malnourished* population as defined by the National Center for Health Statistics (NCHS), the Centers for Disease Control (CDC), and the World Health Organization (WHO) is presented in Appendix 2.

Figure 1: Malnutrition among Children under 5 Years, Kenya

In Kenya:

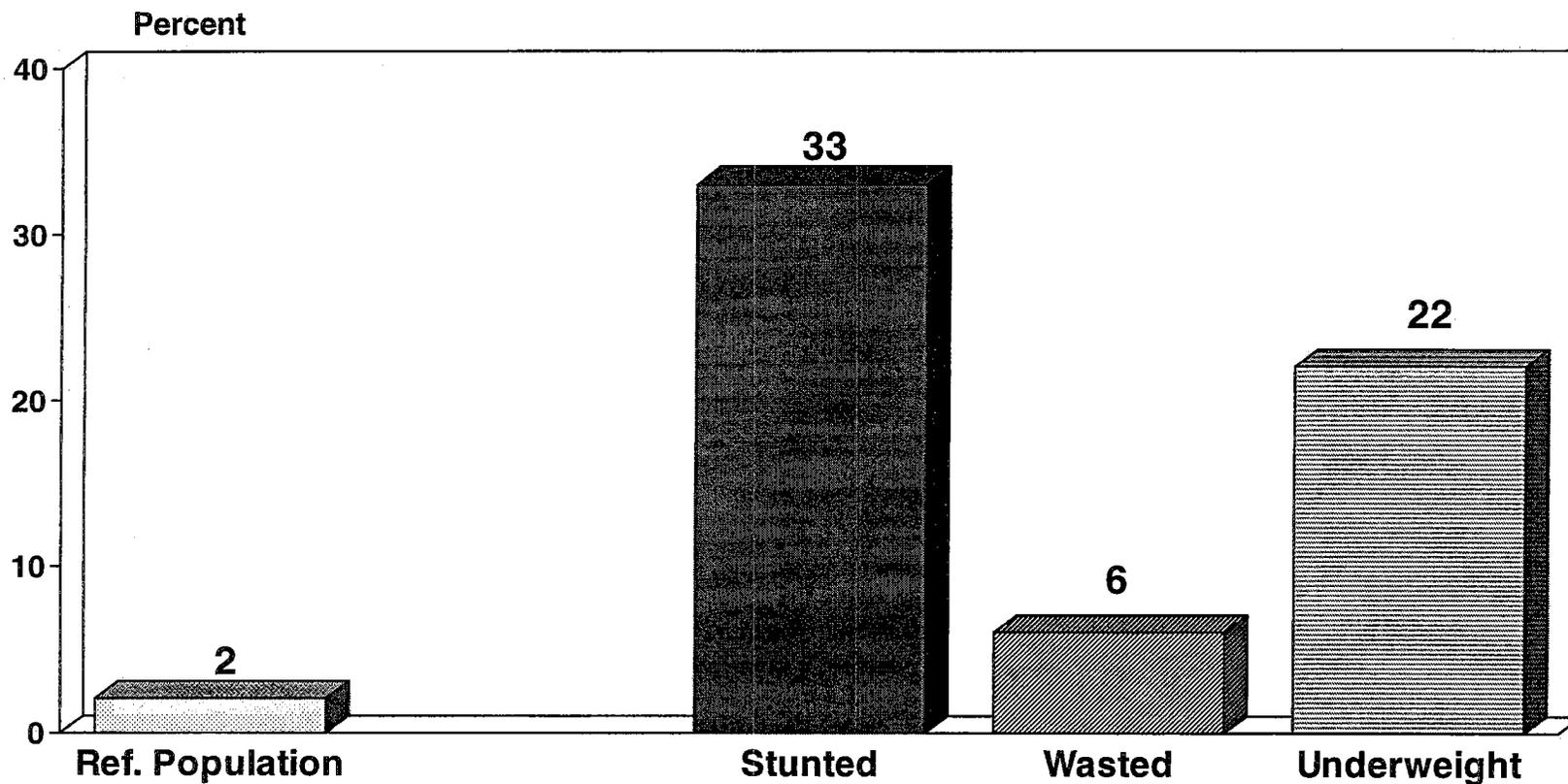
- **Thirty-three percent of children age 0 to 59 months are chronically malnourished.** In other words, they are too short for their age or *stunted*.¹ The proportion of Kenyan children who are stunted is more than sixteen times the level expected in a healthy, well-nourished population.
- **Six percent of children under 5 years are wasted.**² Acute malnutrition manifested by wasting results in a child being too thin for his or her height. In Kenya, wasting is 3 times the level expected in a well-nourished population.
- **Twenty-two percent of children under 5 years are *underweight***³ for their age. This is 11 times the level expected in a healthy, well-nourished population.

¹ A *stunted* child has a height-for-age Z-score that is below -2 standard deviations (SD) based on the NCHS/CDC/WHO reference population. Chronic malnutrition is the result of an inadequate intake of food over a long period of time and may be exacerbated by chronic illness.

² A *wasted* child has a weight-for-height Z-score that is below -2 SD based on the NCHS/CDC/WHO reference population. Acute malnutrition is the result of a recent failure to receive adequate nutrition and may be affected by acute illness, especially diarrhea.

³ An *underweight* child has a weight-for-age Z-score that is below -2 SD based on the NCHS/CDC/WHO reference population. This condition can result from either chronic or acute malnutrition, or a combination of both.

Figure 1
Malnutrition among Children under 5 Years, Kenya



Note: *Stunted* reflects chronic malnutrition; *wasted* reflects acute malnutrition; *underweight* reflects chronic or acute malnutrition, or a combination of both.

Source: KDHS 1998

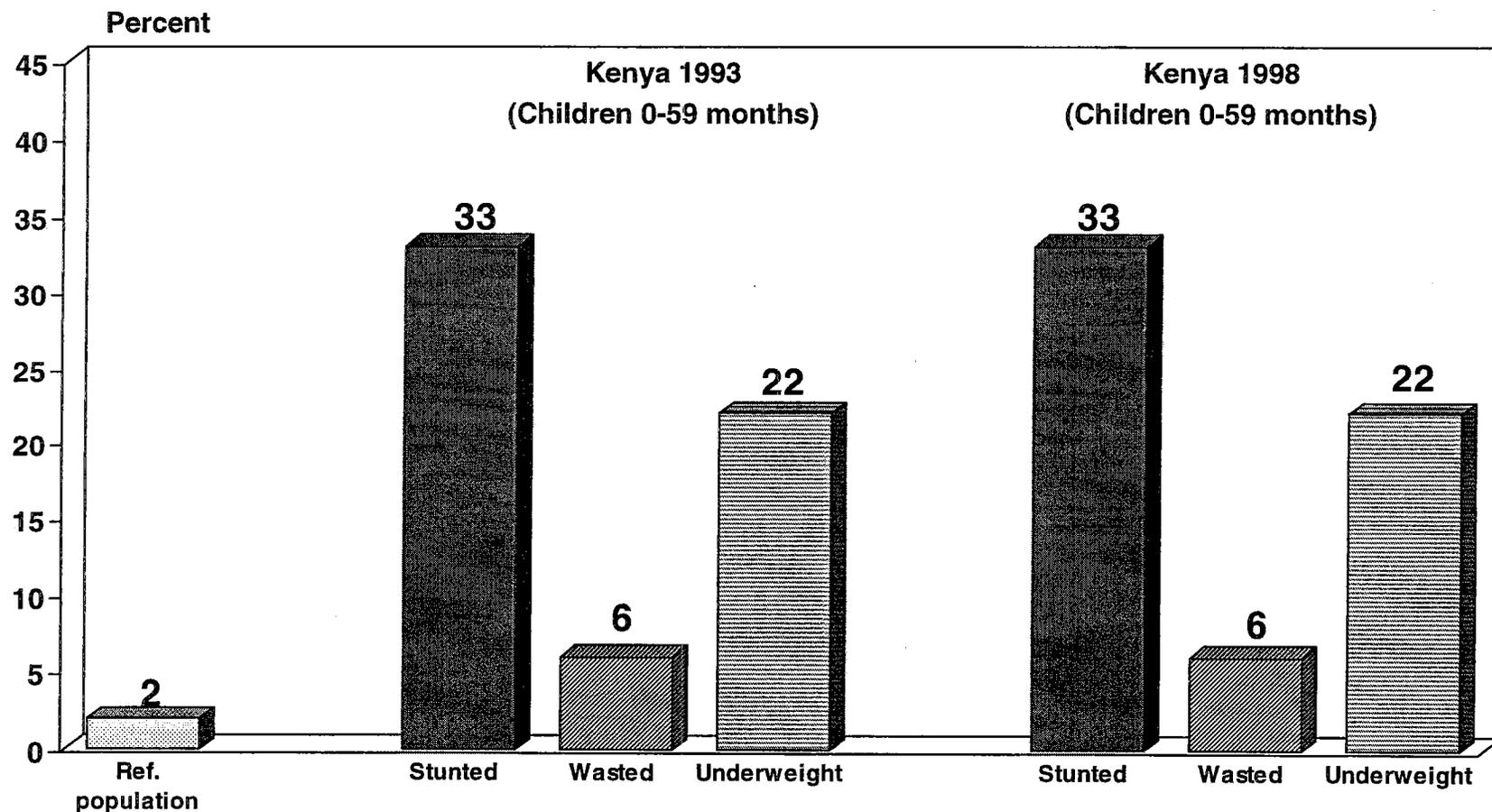
**Figure 2: Changes in Malnutrition Rates among Children under 5 Years,
Kenya 1993-1998**

The findings of the 1998 KDHS suggest that the nutritional status of children in Kenya has not changed since the 1993 KDHS.

- **The percentage of stunted, wasted and underweight children did not change substantially between 1993 and 1998.**

Figure 2

Changes in Malnutrition Rates among Children under 5 Years, Kenya 1993-1998



Note: *Stunted* reflects chronic malnutrition; *wasted* reflects acute malnutrition; *underweight* reflects chronic or acute malnutrition, or a combination of both. Figures have been rounded.

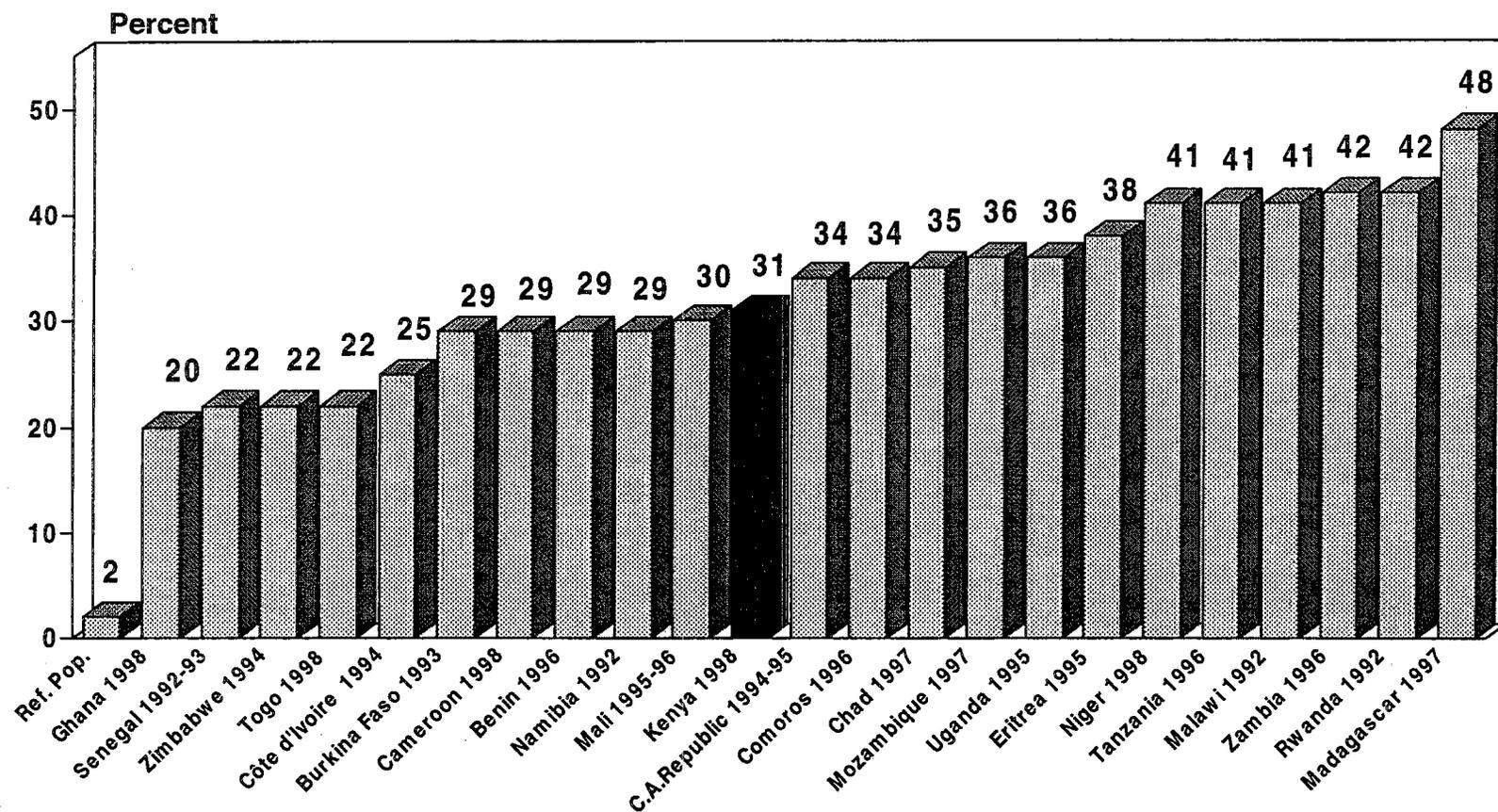
Source: KDHS 1993, 1998

Figure 3: Stunting Among Children under 3 Years in Sub-Saharan Countries, DHS Surveys 1992-1998

Among the sub-Saharan countries surveyed:

- The percentage of children less than 3 years who are *stunted* ranges from 22 to 48 percent. **At 31 percent, the proportion of children stunted in Kenya is in the middle range of countries measured.** Stunting is a good long-term indicator of the nutritional status of a population because it is not markedly affected by short-term factors such as season of data collection, epidemics, or acute food shortages.

Figure 3
Stunting among Children under 3 Years in Sub-Saharan Countries, DHS Surveys 1992-1998



Note: *Stunting* reflects chronic malnutrition.

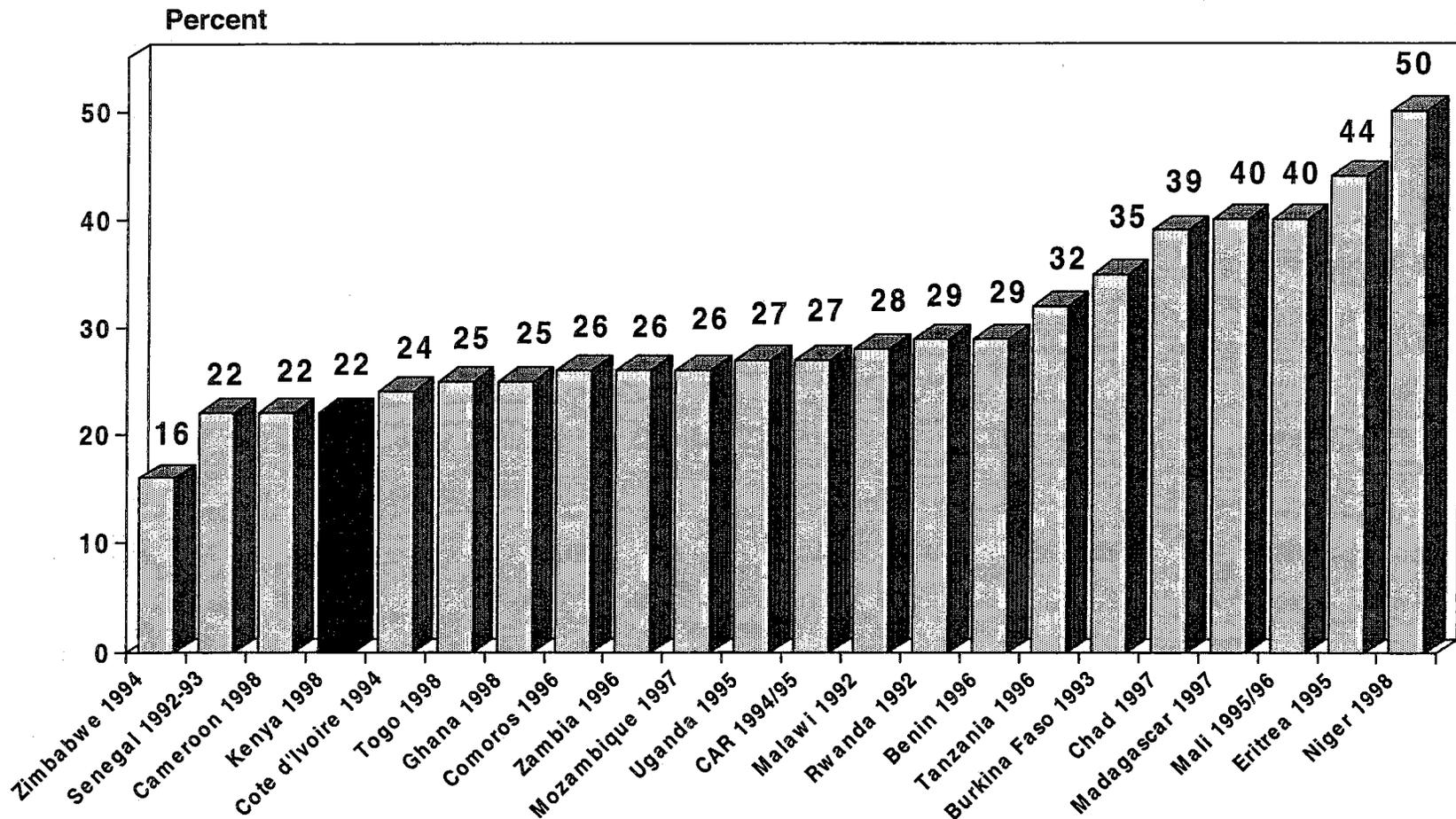
Source: DHS Surveys 1992-1998

Figure 4: Underweight among Children under 3 Years in Sub-Saharan Countries, DHS Surveys 1992-1998

Among the sub-Saharan countries surveyed:

- The percentage of children less than 3 years who are *underweight* ranges from 16 to 50 percent. **Kenya is in the lower fourth of the range with 22 percent of children underweight.** Underweight status is indicative of children who suffer from chronic malnutrition, acute malnutrition, or both. Underweight status may be influenced by both short- and long-term determinants of malnutrition, and is often used as a general indicator of a population's health status.

Figure 4
Underweight among Children under 3 Years in
Sub-Saharan Countries, DHS Surveys 1992-1998



Note: *Underweight* reflects chronic or acute malnutrition or a combination of both.

Source: DHS Surveys 1992-1998

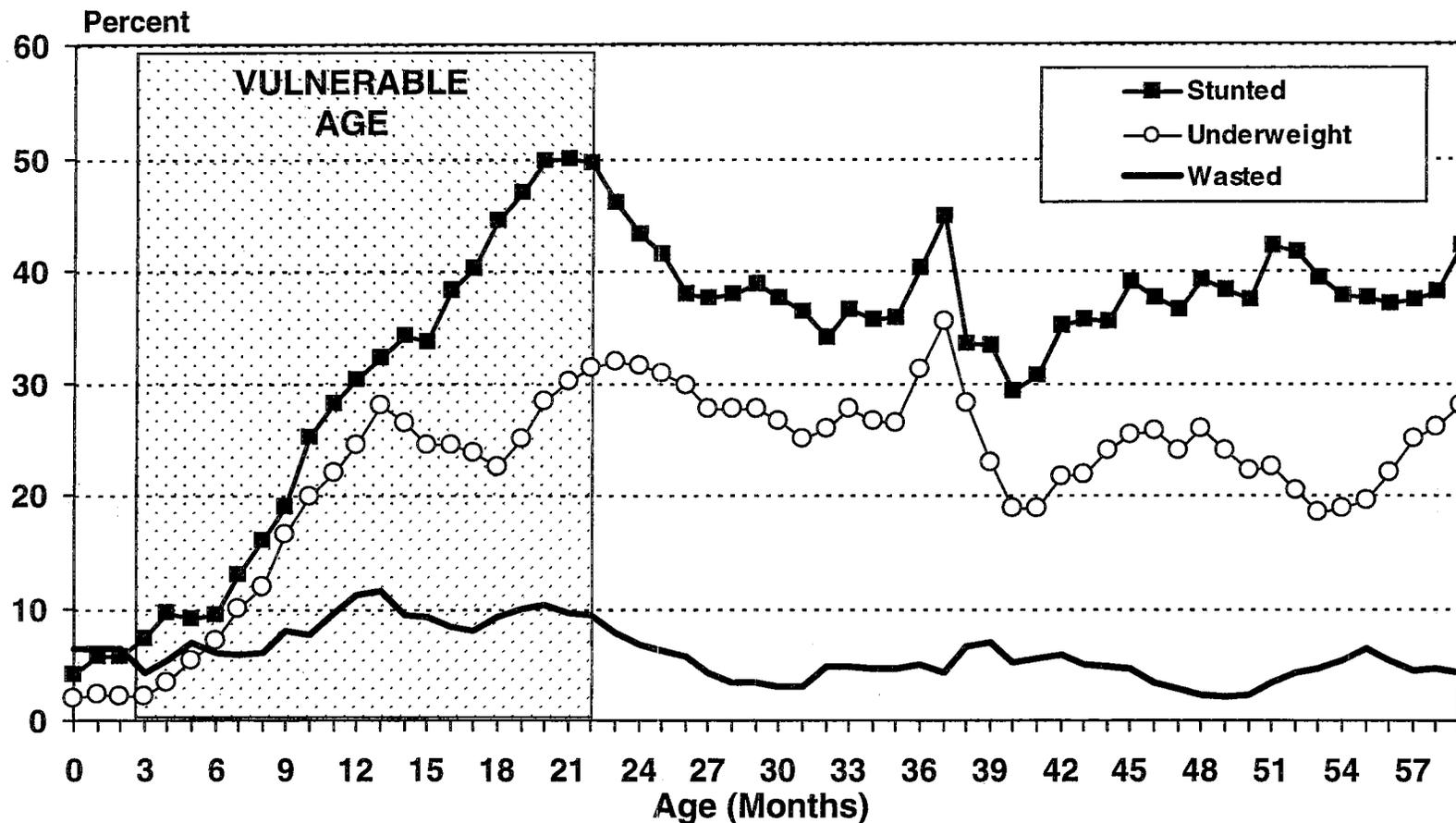
Figure 5: Stunting, Wasting and Underweight by Age, Kenya

In Kenya, the time between 3 months and 22 months of age is a vulnerable period:

- **The proportion of children stunted rises steadily between 3 and 22 months and peaks at 50 percent.** From 22 to 35 months, stunting declines to 37 percent. After this decline, stunting rates jump to 45 percent at 36 months of age. This is followed by a swift decline to 34 percent around 38 months of age. From 40 months to 50 months stunting rates hover below 40 percent, then finally climb to 43 percent just before five years of age.
- **The proportion of children underweight increases between 3 and 23 months of age, reaching a peak of 32 percent at 23 months of age.** From 22 to 35 months of age, this rate dips slightly and then rockets to a high of 35 percent at 37 months of age. After this, the proportion of children underweight declines to low of 18 percent at 53 months. By the fifth year of life, this has risen to 29 percent.
- **The proportion of children wasted gradually increases to 12 percent by one year of age.** After declining to 10 percent at 21 months of age, the proportion of children wasted remains under 10 percent through 59 months of age.

Figure 5

Stunting, Wasting, and Underweight by Age, Kenya



Note: *Stunting* reflects chronic malnutrition; *wasting* reflects acute malnutrition; *underweight* reflects chronic or acute malnutrition, or a combination of both. Plotted values are smoothed using a five-month moving average.

Source: KDHS 1998

Figure 6: Feeding Practices of Infants under 4 Months, Kenya

Improper feeding practices, in addition to diarrheal disease, are important determinants of malnutrition. WHO recommends that *all infants be exclusively breastfed from birth to about 6 months of age.*¹ In other words, infants should be fed only breast milk during the first six months.

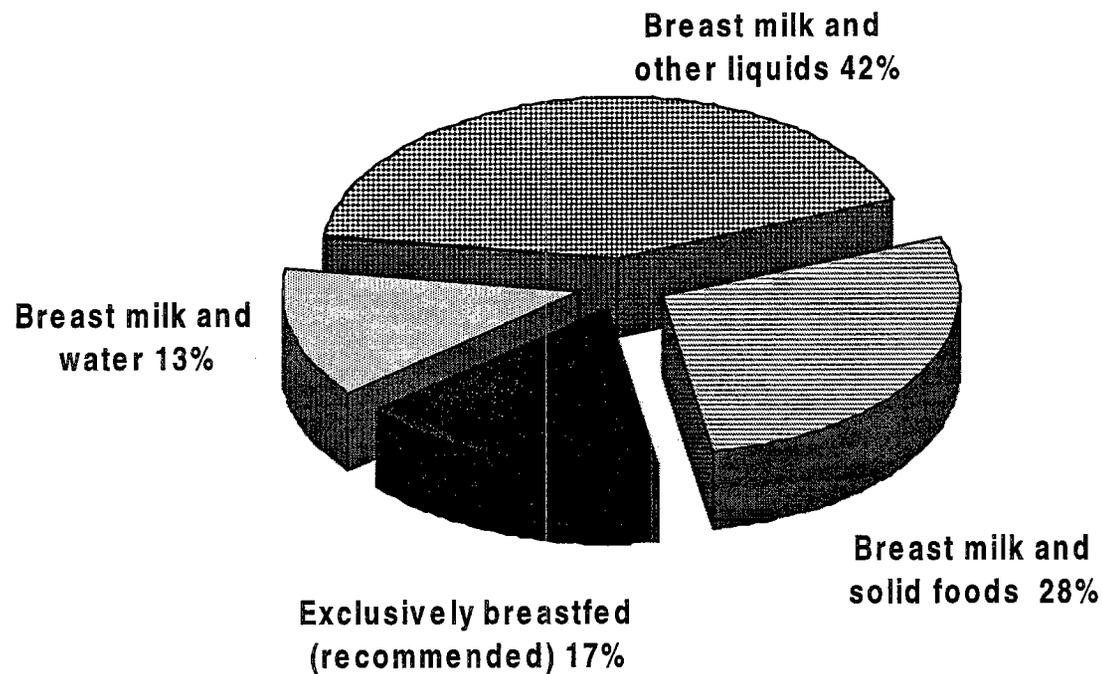
In Kenya, the introduction of liquids (water, sugar water, juice, other milks, and formula) and solid foods takes place earlier than the recommended age of about 6 months. This practice has a deleterious effect on nutritional status for a number of reasons. First, the liquids and solid foods offered are nutritionally inferior to breast milk. Second, the consumption of liquids and solid foods decreases the infant's intake of breast milk, which in turn reduces the mother's supply of milk. (Breast milk production is determined, in part, by the frequency and intensity of suckling.) Third, feeding infants liquids and solid foods increases their exposure to pathogens and thus puts them at a greater risk of diarrheal disease.

- **In Kenya, only 17 percent of infants under the age of 4 months are exclusively breastfed, as recommended by WHO.** This rate is the same as it was in 1993.²
- **Seventy percent of infants under 4 months of age are not fully breastfed.** This means that 70 percent of infants are given other liquids and solid foods when their dietary needs would be better satisfied by breast milk only.
- **The percentage of infants who are not fully breastfed has increased since 1993.** In 1993, 56 percent of infants were not fully breastfed.²

¹ World Health Organization, Forty-seventh World Health Assembly (WHA 47.5), May 9, 1994.

² Kenya Demographic and Health Survey, 1993.

Figure 6
Feeding Practices of Infants under 4 Months, Kenya



Note: WHO recommends that all infants be breastfed exclusively to about six months of age.

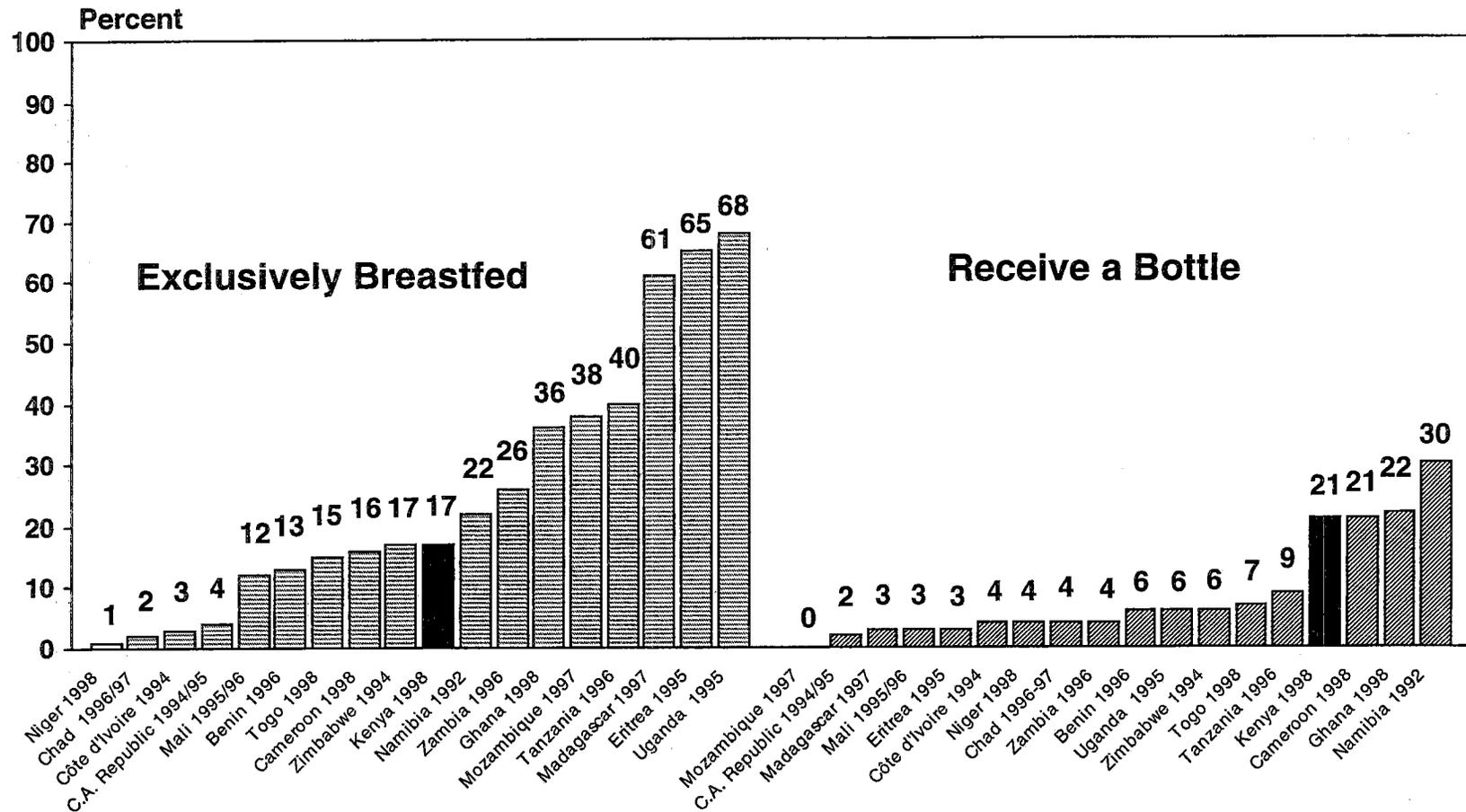
Source: KDHS 1998

Figure 7: Infants under 4 Months Who are Exclusively Breastfed and Those Who Receive a Bottle in Kenya Compared with Other Sub-Saharan Countries

The failure to exclusively breastfeed young infants and the introduction of liquids and solid foods at too early an age increases the risk of diarrheal disease, an important cause of morbidity and mortality in Africa.

- In most of the sub-Saharan countries surveyed relatively few mothers of infants under 4 months follow the recommended practice of exclusive breastfeeding. **In Kenya, only 17 percent of mothers breastfeed their infants exclusively.**
- **Bottle-feeding, which is not recommended by WHO, is practiced by 21 percent of mothers of infants under 4 months in Kenya.** Improper sanitation with bottle-feeding can introduce pathogens to the infant. Infant formulas (which are often watered down) and other types of milk do not provide comparable nutrition to breast milk for infants less than 6 months of age. For these reasons, bottle-feeding puts infants at a higher risk of illness and malnutrition.
- **Bottle-feeding rates have increased since 1993.** In 1993 only 16 percent of infants under 4 months of age were fed by a bottle with a nipple.

Figure 7
Infants under 4 Months Who Are Exclusively Breastfed
and Those Who Receive a Bottle in Kenya Compared
with Other Sub-Saharan Countries



Note: Information on feeding practices is based on the 24 hours preceding the survey. WHO recommends that all infants should receive nothing but breast milk up to 6 months of age.

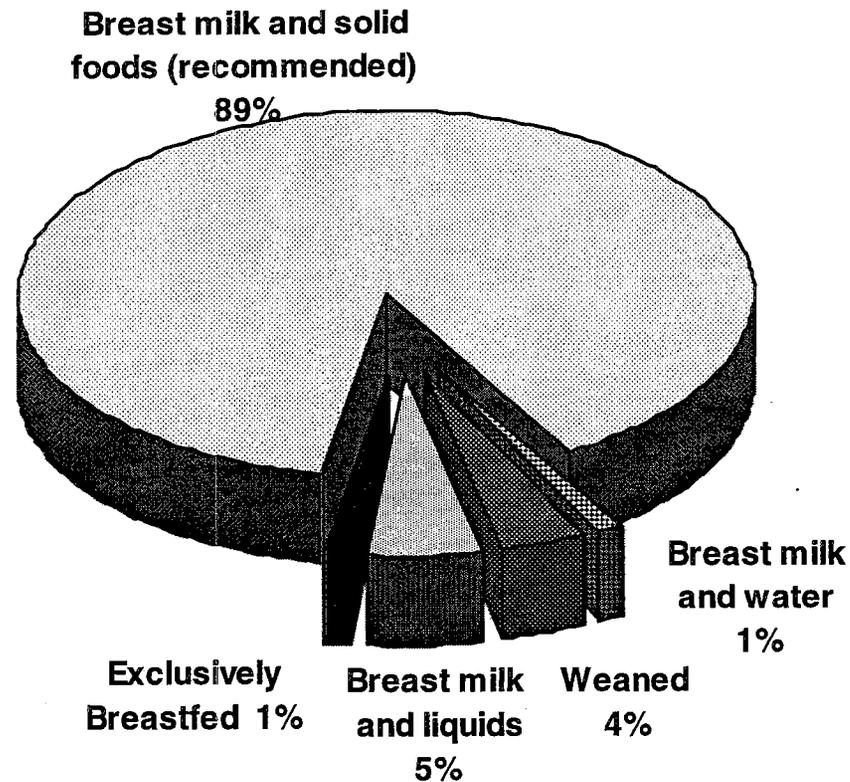
Source: DHS Surveys 1992-1998

Figure 8: Feeding Practices of Infants Age 6 to 9 Months, Kenya

WHO recommends that solid foods be introduced to infants around the age of 6 months because breast milk alone is no longer sufficient to maintain a child's optimal growth. Thus, *all infants over 6 months of age should receive solid foods* along with breast milk.

- **Eighty-nine percent of infants age 6 to 9 months receive solid food in addition to breast milk.** This means that most infants age 6 to 9 months are fed according to the recommended practice. About four percent of children are weaned by this period, i.e., only a small minority of children do not receive the continued benefits of breast milk.

Figure 8
Feeding Practices of Infants Age 6 to 9 Months, Kenya



Note: WHO recommends that by the age of 6 months all infants should receive solid foods and liquids in addition to breast milk.

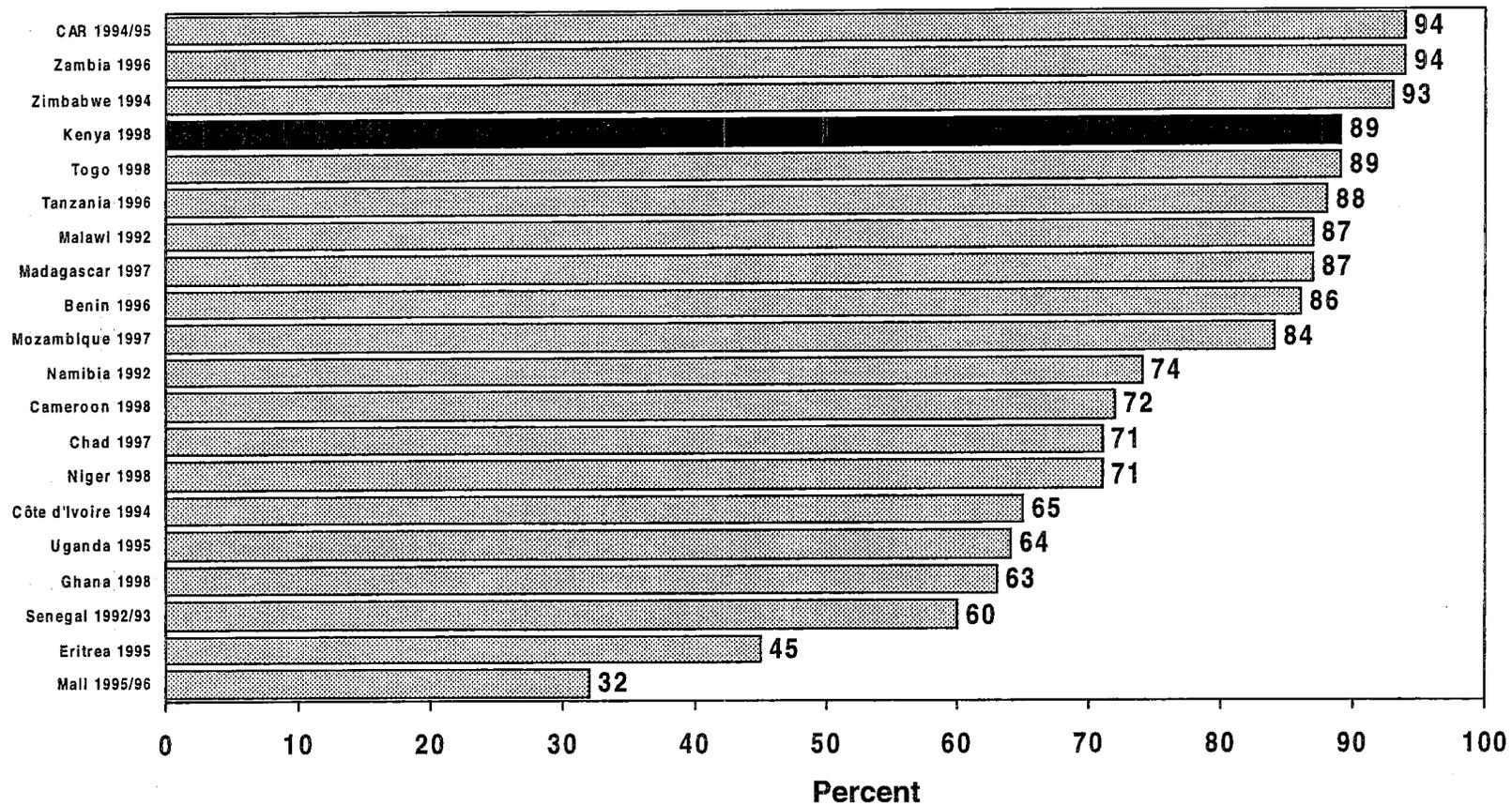
Source: KDHS 1998

Figure 9: Infants Age 6 to 9 Months Receiving Solid Foods in Addition to Breast Milk in Kenya Compared with Other Sub-Saharan Countries

Optimal infant feeding practices include the introduction of complementary foods around 6 months of age. The introduction of complementary feeding is necessary because breast milk is no longer sufficient to satisfy the developing infant's energy, protein, and micronutrient needs. All infants between age 6 and 9 months should receive complementary foods in addition to breast milk.

- Compared with some other sub-Saharan countries Kenya has a healthy level of complementary feeding. **Eighty-nine percent of infants age 6 to 9 months receive solid foods**, or a combination of solid foods and milk in addition to breast milk.

Figure 9
Infants Age 6 to 9 Months Receiving Solid Foods in
Addition to Breast Milk in Kenya Compared with Other
Sub-Saharan Countries



Note: WHO recommends that by the age of 6 months all infants should receive solid foods and liquids in addition to breast milk.

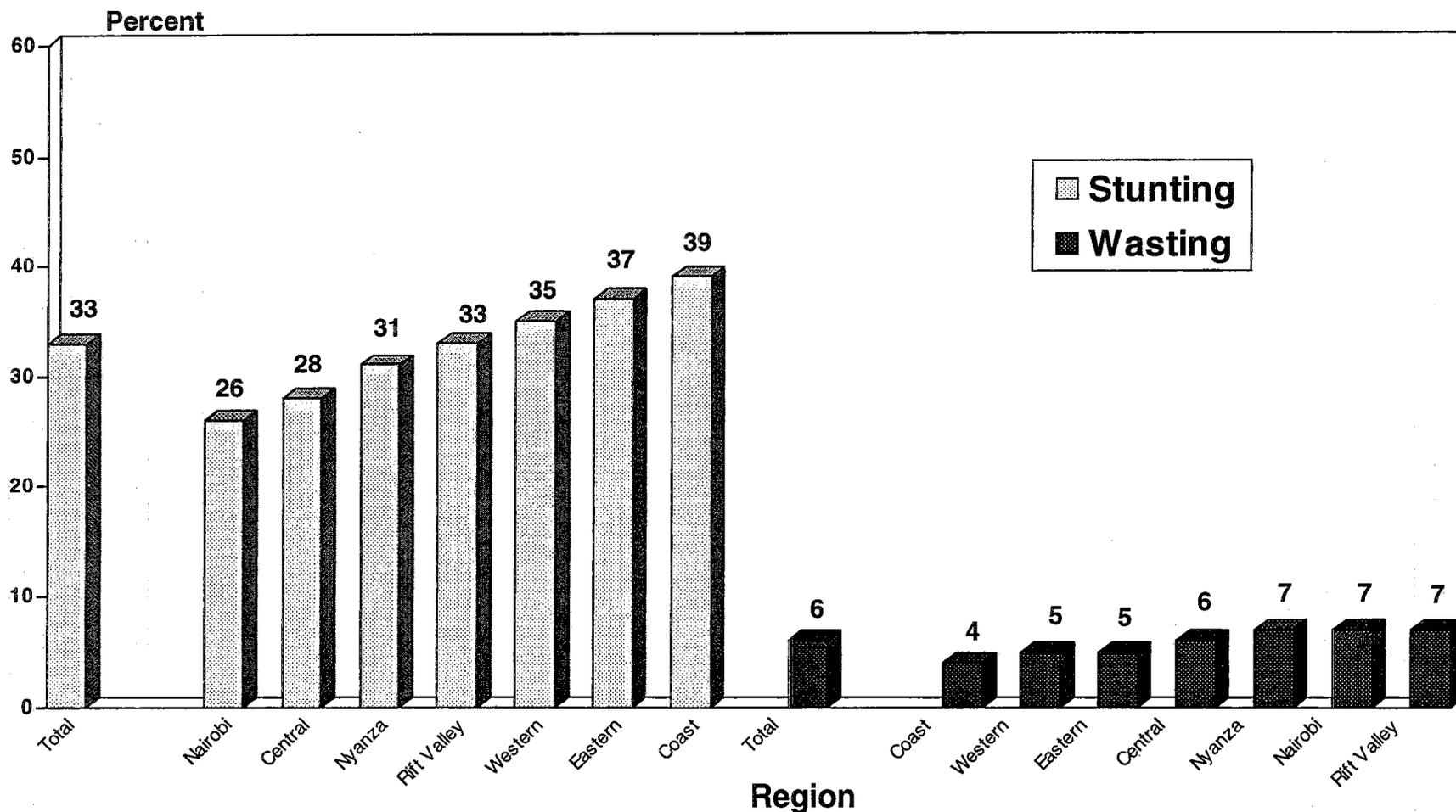
Source: DHS Surveys 1992-1998

Figure 10: Stunting and Wasting among Children under 5 Years by Region, Kenya

In the seven regions of Kenya:

- **Stunting ranges from 26 to 39 percent among children under 5 years.** The highest levels of stunting were reported in the Coast region where 39 percent of children under age five are stunted. The lowest levels of stunting were reported in the urban areas of Nairobi (26 percent).
- **Wasting levels range from 4 to 7 percent among children under 5 years.** The lowest levels were found in the Coast region (4 percent), while the highest levels of wasting were found in the Rift Valley region (7 percent).

Figure 10
Stunting and Wasting among Children
under 5 Years by Region, Kenya



Note: *Stunting* reflects chronic malnutrition; *wasting* reflects acute malnutrition.

Source: KDHS 1998

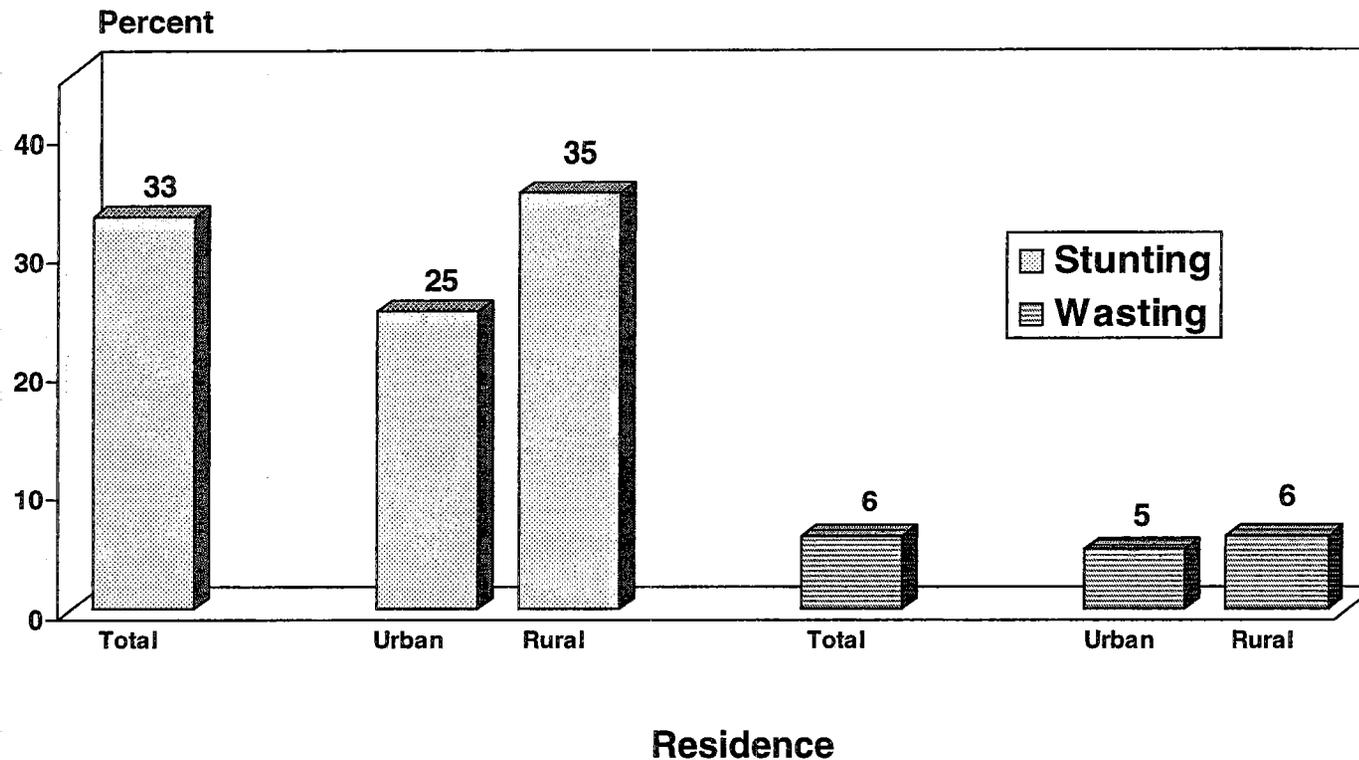
Figure 11: Stunting and Wasting among Children under 5 Years by Urban-Rural Residence, Kenya

Health and socio-economic conditions often differ in urban and rural areas. Greater access to health care and better economic conditions contribute to the higher nutritional status of children in urban areas.

In Kenya:

- **Stunting is highest in rural areas.** A little over one-third (35 percent) of children in rural areas are stunted while the rate in urban areas is 25 percent.
- **Wasting is also higher in rural areas** (6 percent) compared with urban areas (5 percent).

Figure 11
Stunting and Wasting among Children under 5 Years by
Urban-Rural Residence, Kenya



Note: *Stunting* reflects chronic malnutrition;
wasting reflects acute malnutrition.

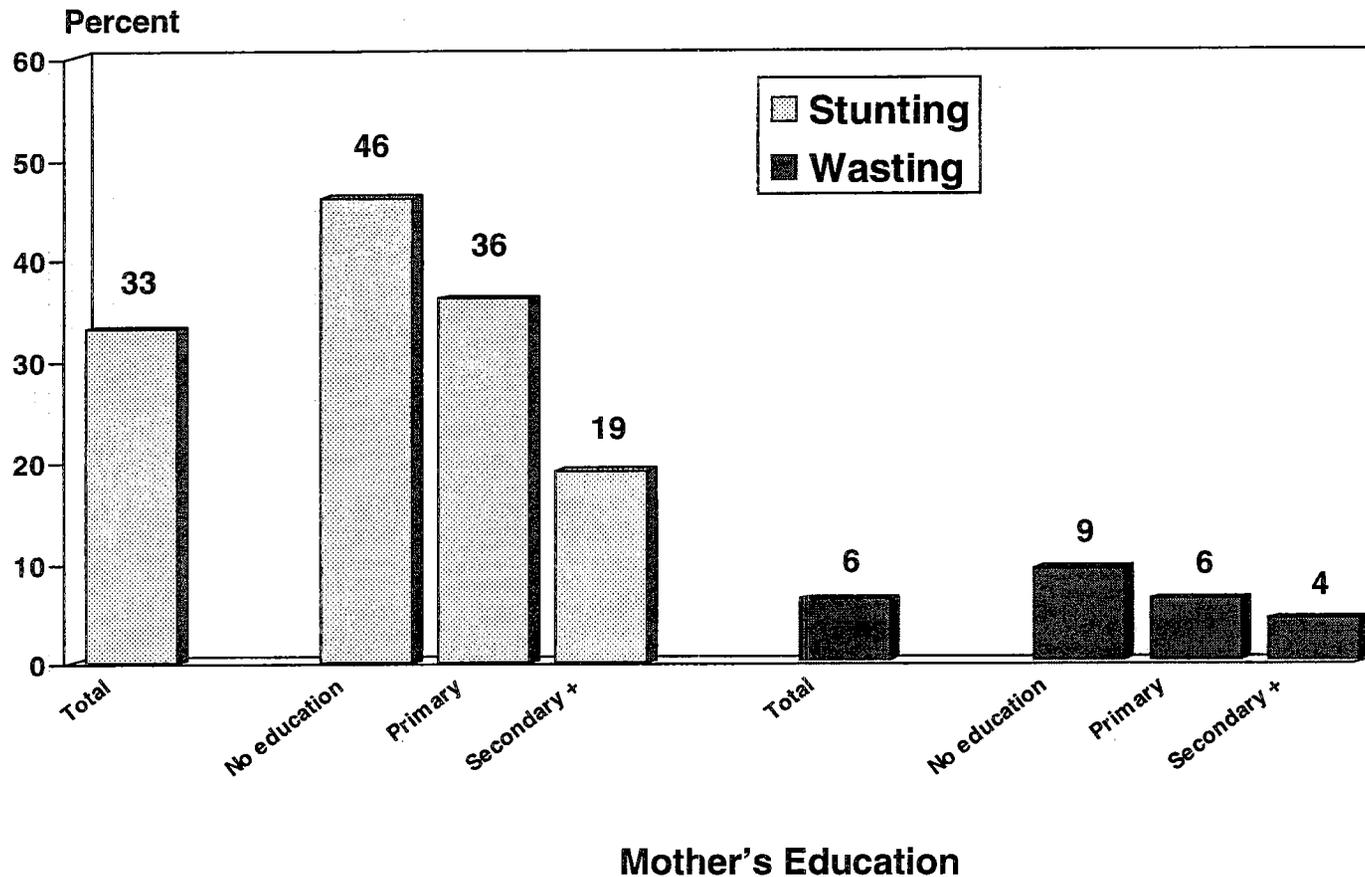
Source: KDHS 1998

Figure 12: Stunting and Wasting among Children under 5 Years by Mother's Education, Kenya

Maternal education is related to knowledge of good child-care practices and to household wealth. In Kenya, 11 percent of the mothers of children under five years of age have never attended school, while 62 percent have a primary education and 27 percent have a secondary or higher education. There are variations in school attendance especially between urban and rural areas. In rural areas, 12 percent of the mothers have never attended school and 22 percent have gone to secondary school. In contrast, only 5 percent of mothers in urban areas have never attended school and almost 49 percent have gone to secondary school. The lowest percentage of mothers reporting no education is in Nairobi, where virtually all mothers have either a primary or a secondary education.

- **Children of mothers with secondary education have less stunting.** Children under five whose mothers have secondary education have lower rates of stunting (19 percent) than those whose mothers have primary (36 percent) or no education (46 percent).
- **Children of mothers with secondary education have less wasting.** Children whose mothers have no education are more likely to be wasted (9 percent) than children whose mothers have primary or secondary education (6 and 4 percent, respectively).

Figure 12
Stunting and Wasting among Children under 5 Years by
Mother's Education, Kenya



Note: *Stunting* reflects chronic malnutrition;
wasting reflects acute malnutrition.

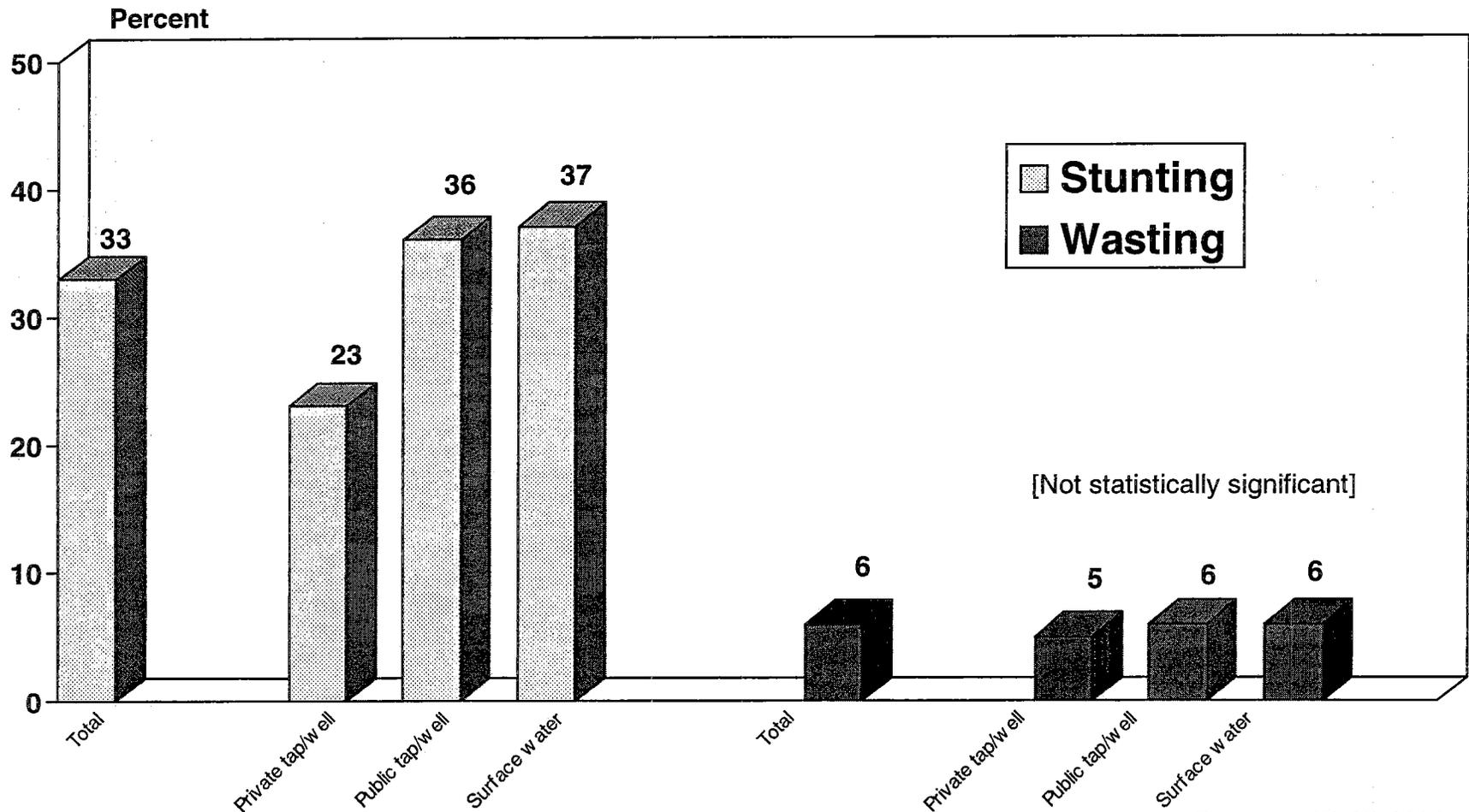
Source: KDHS 1998

Figure 13: Stunting and Wasting among Children under 5 Years by Source of Drinking Water, Kenya

A household's source of drinking water is linked with its socio-economic status. Poor households are more likely to obtain drinking water from contaminated sources such as surface water or open wells than more affluent households. Without an adequate supply of quality water, the risks of food contamination, diarrheal disease, and malnutrition rise. Children from households that do not have water piped into the residence are at a higher risk of being malnourished than those from households with this amenity. Among the households surveyed with children under five years, 27 percent have private taps or wells, almost 48 percent use surface water, and 23 percent use a public tap or well as their main source of drinking water.

- **The lowest rate of stunting among children under 5 years of age was found in households that use private taps or wells (23 percent) as their source of water.** The results show that other types of water sources are more likely to be associated with higher rates of stunting in children.
- **There is no association between wasting and source of drinking water.** The percentage of children under 5 years who are wasted in households that rely on private taps or wells (5 percent) was not statistically different from that of children in households that use public taps or wells, or surface water (both 6 percent).

Figure 13
Stunting and Wasting among Children under 5 Years by
Source of Drinking Water, Kenya



Note: *Stunting* reflects chronic malnutrition;
wasting reflects acute malnutrition.

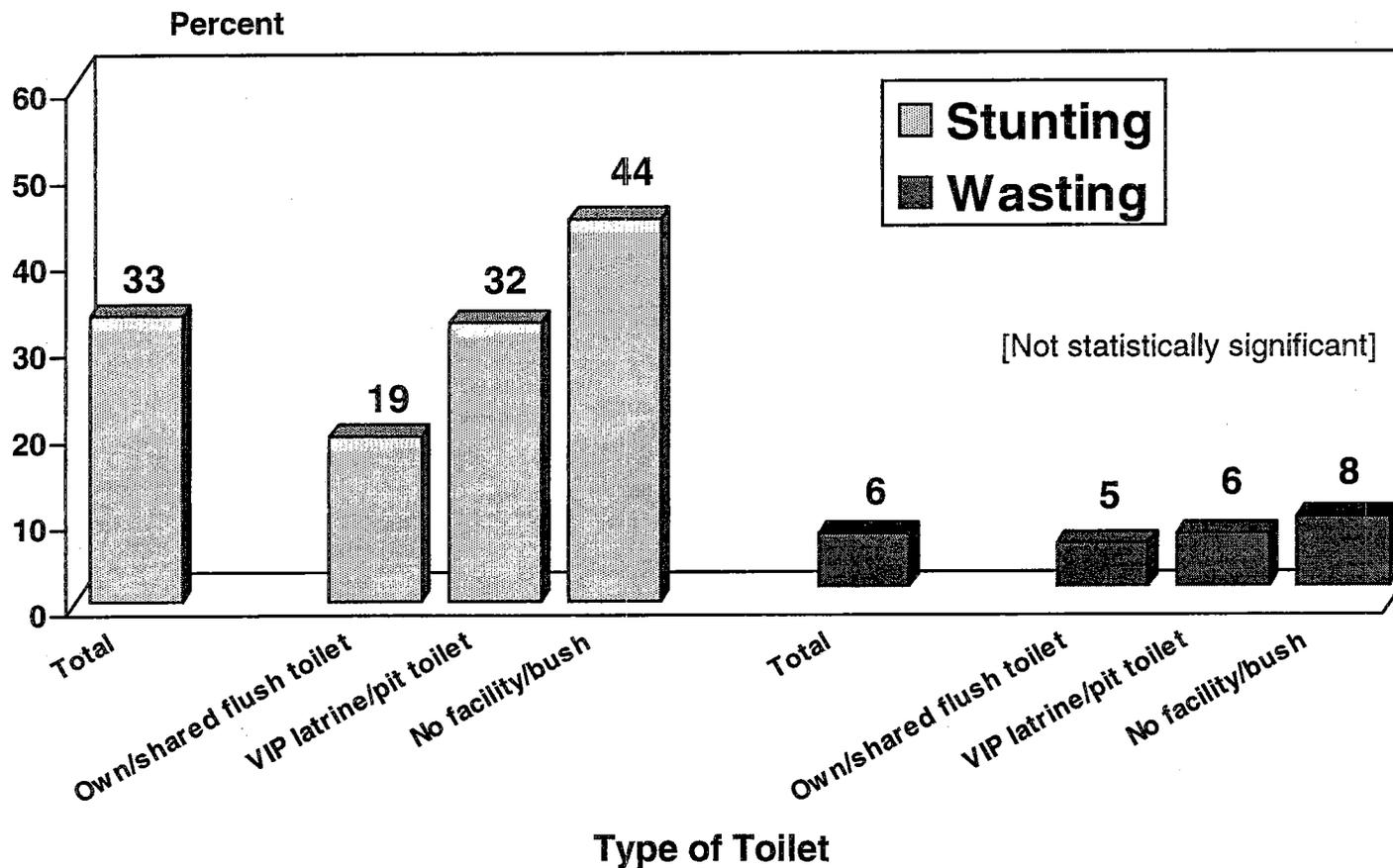
Source: KDHS 1998

Figure 14: Stunting and Wasting among Children under 5 Years by Type of Toilet, Kenya

The type of toilet used by a household reflects its wealth, and poor households are less likely to have adequate toilet facilities. Inadequate sanitation facilities result in an increased risk of diarrheal disease, which contributes to malnutrition. As with source of drinking water, easy access to a flush toilet may be associated with a reduced risk of a child being malnourished but it does not ensure that a child will be well nourished. In Kenya, most households do not have flush toilets. Fully 73 percent of households have a pit toilet or a latrine. Eighteen percent have no toilet facilities, whereas less than 8 percent (7.7) have access to a flush toilet.

- **Forty-four percent of children in households that do not have toilet facilities were stunted.** Households with other kinds of toilets showed lower rates of stunting.
- **There is no association between toilet facilities and wasting.** However, households with access to flush toilet facilities have the lowest rate of wasting (5 percent).

Figure 14
Stunting and Wasting among Children under 5 Years by
Type of Toilet, Kenya



Note: *Stunting* reflects chronic malnutrition;
wasting reflects acute malnutrition. *VIP latrine*
 is ventilated improved pit latrine

Source: KDHS 1998

Figure 15: Diarrhea and Cough with Rapid Breathing among Children under 3 Years, Kenya

Acute respiratory infection (ARI) and dehydration due to diarrhea are major causes of morbidity and mortality in most sub-Saharan countries. In order to estimate the prevalence of ARI, mothers were asked if their children under three years had been ill with coughing accompanied by short rapid breathing in the past two weeks. For diarrhea, mothers were asked if their children under three years had had symptoms of diarrhea in the past two weeks. Early diagnosis and treatment can reduce the rates of illness, or death caused by these conditions.

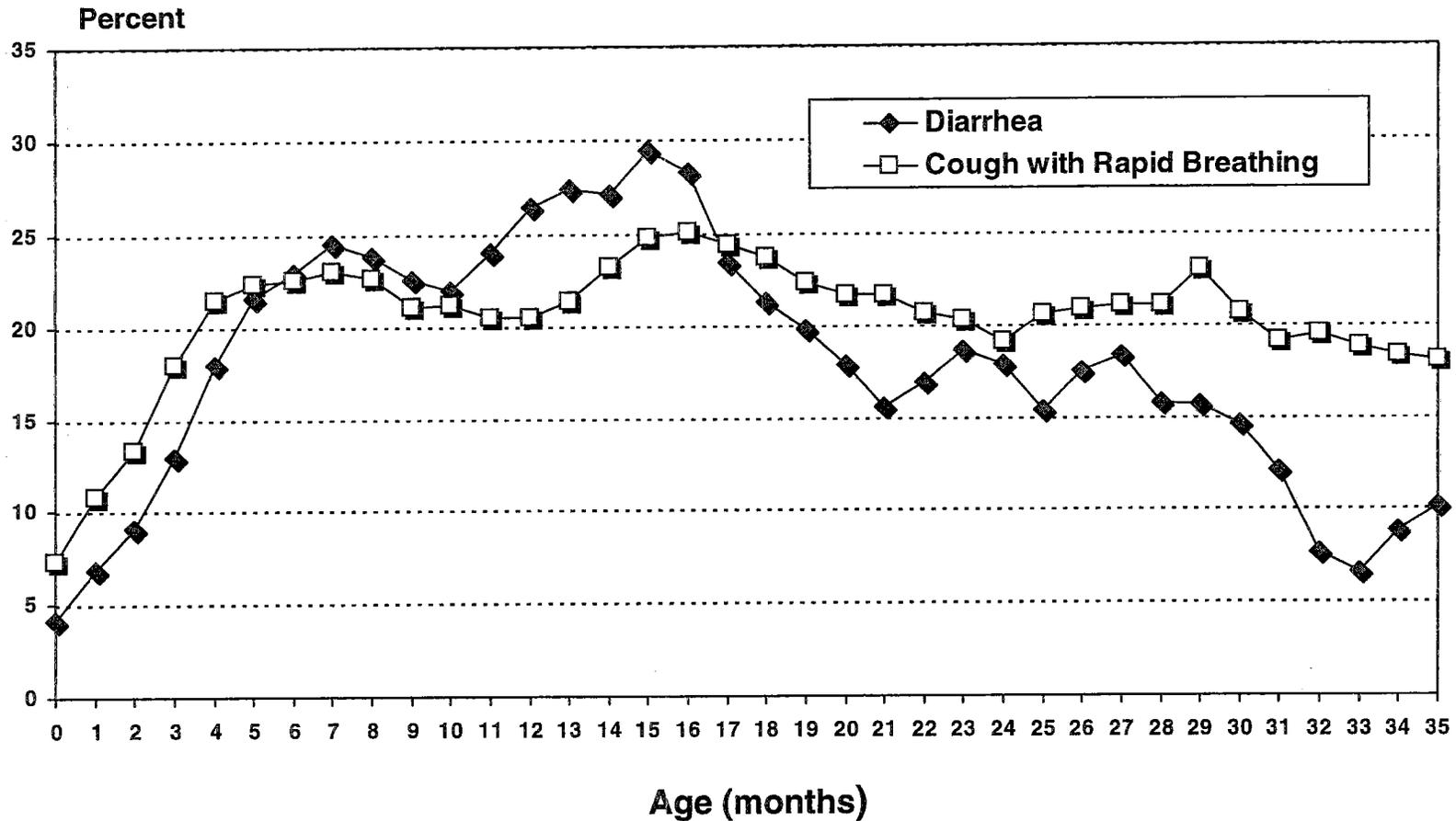
In Kenya:

- **The prevalence of cough with rapid breathing is 7 percent in the first month of life.** This increases to a peak of 25 percent by 16 months. From 18 months of age, cough with rapid breathing prevalence declines to 19 percent at 24 months of age. After reaching a high of 23 percent at 29 months of age, the percent of children under three reported to have cough with rapid breathing falls to 17 percent by the third year of life.
- **The prevalence of diarrhea increases steadily from the first month of life to 29 percent at fifteen months of age.** By 21 months of age, diarrhea prevalence has fallen to 15 percent. This decline continues to a low of 7 percent at 33 months of age, finally rising to 10 percent at the beginning of the third year of life.

The rapid rise in the prevalence of diarrhea during infancy reflects the increased risk of pathogen contamination associated with the early introduction of water, other liquids, and solid foods. In addition, once infants begin to crawl and move around they put objects in their mouth, also increasing the risk of pathogen contamination.

Figure 15

Diarrhea and Cough with Rapid Breathing among Children under 3 Years, Kenya



Note: Rates have been smoothed using a five-month moving average.

Source: KDHS 1998

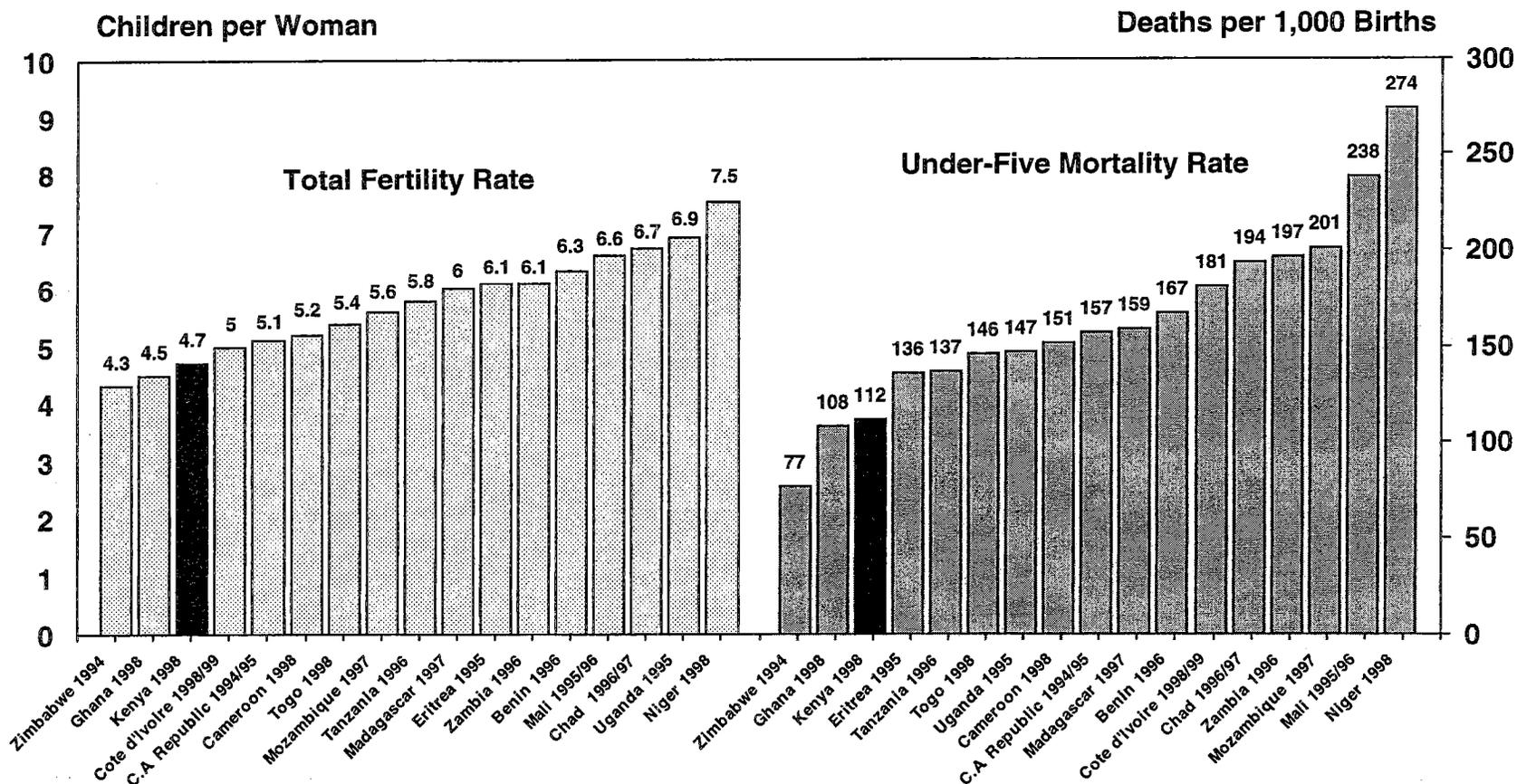
Figure 16: Fertility and Child Mortality in Kenya Compared with Other Sub-Saharan Countries

High fertility rates, especially when accompanied by short intervals between births, are detrimental to children's nutritional status. In most countries in sub-Saharan Africa, families have limited resources to provide adequate nutrition and health care for their children. As the number of children per woman increases, fewer household resources are available for each child. High fertility also has a negative impact on women's health, thus increasing the chances that a mother may not be able to breastfeed or care for her children adequately. Young children, who are more vulnerable to malnutrition and disease, are more likely to die.

- **At current fertility levels, a woman in Kenya will have an average of 4.7 children by the end of her childbearing years** (this is the total fertility rate for women age 15 to 49 years). This rate has declined since 1993 when the TRF was 5.4. The 1998 total fertility rate for Kenya is among the lowest of all the sub-Saharan countries surveyed.
- **Kenya's under-five mortality rate (112 deaths per 1,000 births) indicates that approximately 12 percent of children born in Kenya will die before their fifth birthday.** The under-five mortality rate has increased from 96 in 1993 to 112 in 1998. Despite this increase, Kenya's 1998 rate remains in the lower range of the sub-Saharan countries surveyed.

Figure 16

Fertility and Under-Five Mortality in Kenya Compared with Other Sub-Saharan Countries



Source: DHS Surveys 1992-1998

Figure 17: Survival and Nutritional Status of Children, Kenya

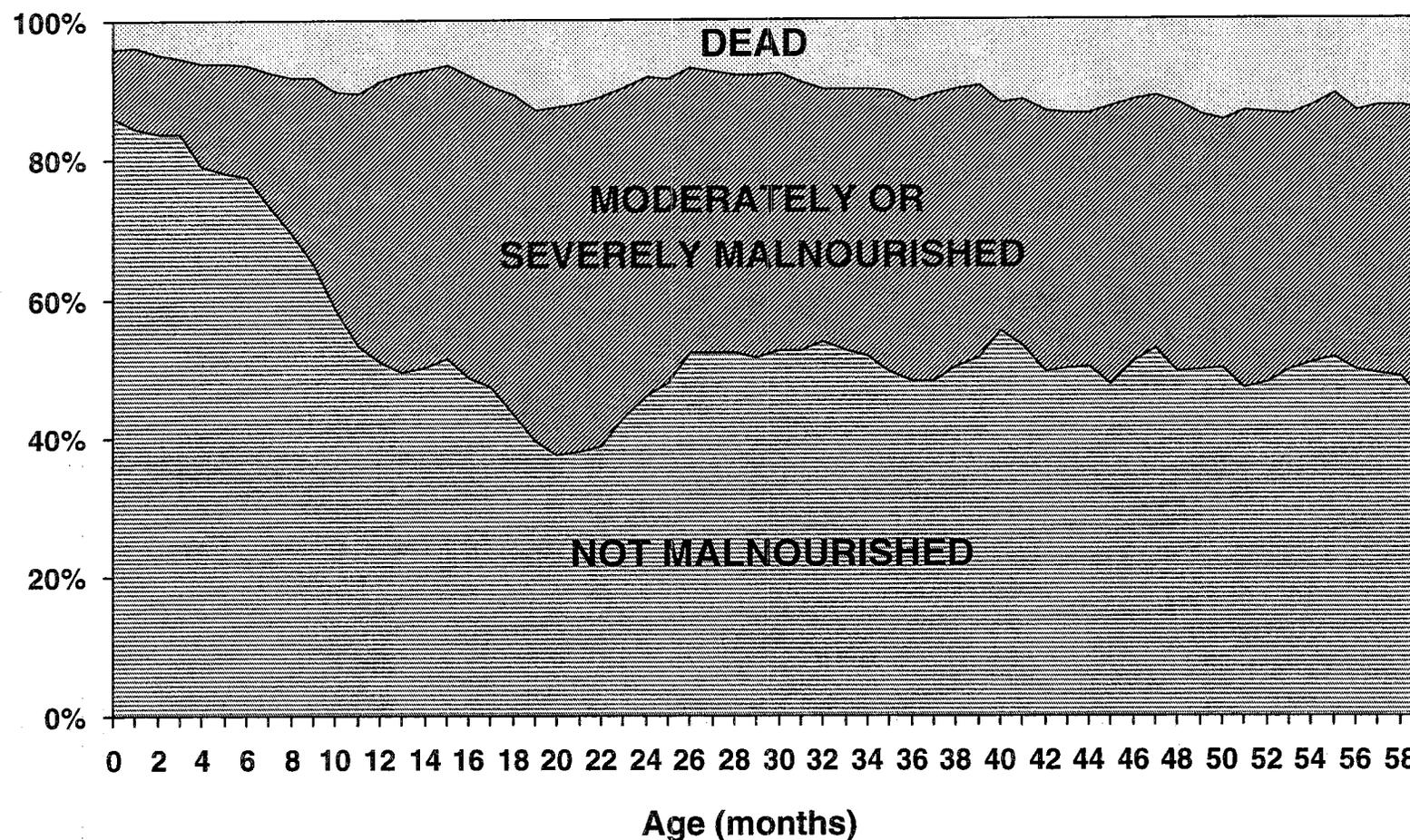
Malnutrition and death take a tremendous toll on young children. This figure illustrates the proportion of children who are malnourished or have died at each month of age.

In Kenya:

- **Between birth and 21 months of age, the percentage of children who are alive and not malnourished drops rapidly from 85 percent to approximately 40 percent.**
- **At age 21 months, 12 percent of children have died and 45 percent are severely or moderately malnourished.¹**
- **After 26 months of age, an average of 45 percent of children are alive and not malnourished. These conditions remain about the same through the fifth year of life.**

¹A child with a Z-score below -3 SD on the reference standards is considered severely malnourished while one with a Z-score between -3 and -2 SD is considered moderately malnourished.

Figure 17
Survival and Nutritional Status of Children under 5,
Kenya



Note: A child with a Z-score below -3 SD on the reference standard is considered severely malnourished while one with a Z-score between -3 and -2 SD is considered moderately malnourished. Values have been smoothed using a five-month rolling average.

Source: KDHS 1998

Figure 18: Malnutrition and Under-five Mortality, Kenya

Malnutrition is an important factor in the death of many young children in Kenya. Formulas developed by Pelletier et al.¹ are used to quantify the contributions of mild, moderate and severe malnutrition to under-five mortality.

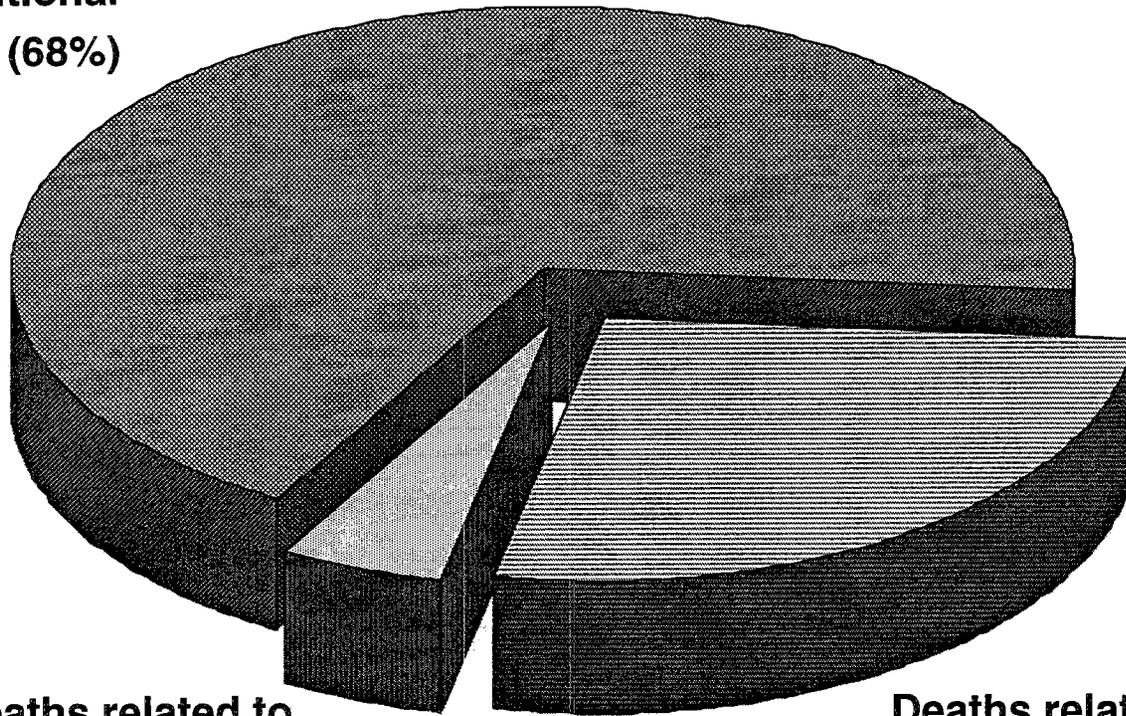
In Kenya,

- **Thirty-two percent of all deaths that occur before age five are related to malnutrition.**
- **Because of its prevalence, mild-to-moderate malnutrition (27 percent) contributes to more deaths than does severe malnutrition (5 percent).** Malnutrition contributes to child deaths by weakening the child's immune system.

¹Pelletier, D.L., E.A. Frongillo, Jr., D.G. Schroeder, and J.P. Habicht. 1994. A methodology for estimating the contribution of malnutrition to child mortality in developing countries. *Journal of Nutrition* 124 (10 Suppl.): 2106S-2122S.

Figure 18 Malnutrition and Under-five Mortality, Kenya

Deaths not related
to nutritional
status (68%)



Deaths related to
severe malnutrition (5%)

Deaths related to
mild-to-moderate
malnutrition (27%)

Note: Calculation based on Pelletier et al., 1994.

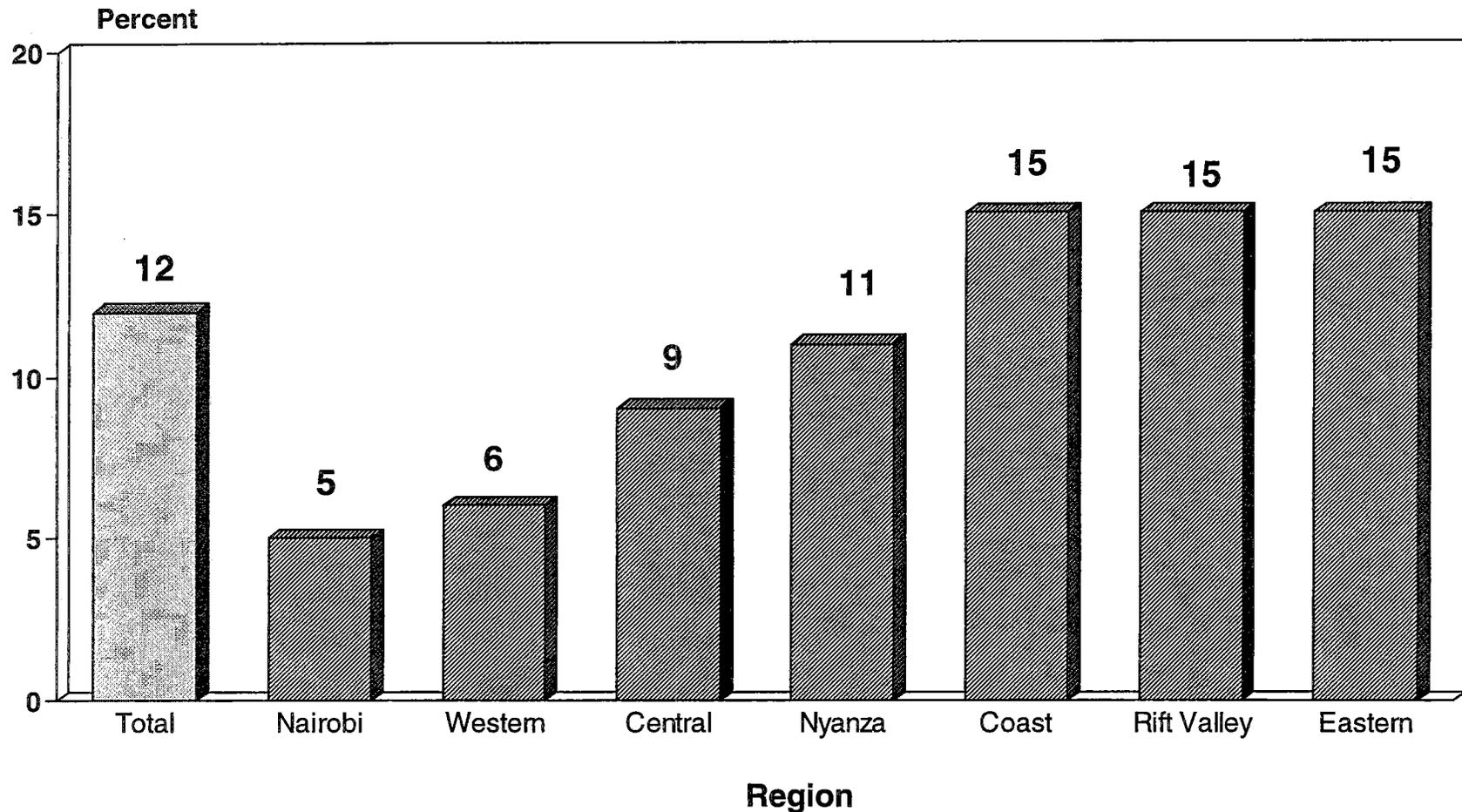
Source: KDHS 1998

Figure 19: Malnutrition among Mothers of Children under 5 Years by Region, Kenya

A mother's nutritional status affects her ability to successfully carry, deliver, and care for her children and is, therefore, of great concern in its own right. Malnutrition in women can be assessed using the Body Mass Index (BMI), which is defined as a woman's weight in kilograms divided by the square of her height in meters. Thus, $BMI = \text{kg/m}^2$. When the BMI falls below the suggested cut-off point of 18.5, this indicates chronic energy deficiency or malnutrition for non-pregnant women.

- **Twelve percent of all mothers of children under age five in Kenya are malnourished.**
- **High rates (15 percent) of maternal malnutrition occur in the Coast, Rift Valley and Eastern provinces.** The lowest levels are found in Nairobi (5 percent) and Western Province (6 percent).

Figure 19
Malnutrition among Mothers of Children under 5 Years
by Region, Kenya



Note: Malnutrition levels are based on the percentage of mothers whose BMI is less than 18.5.

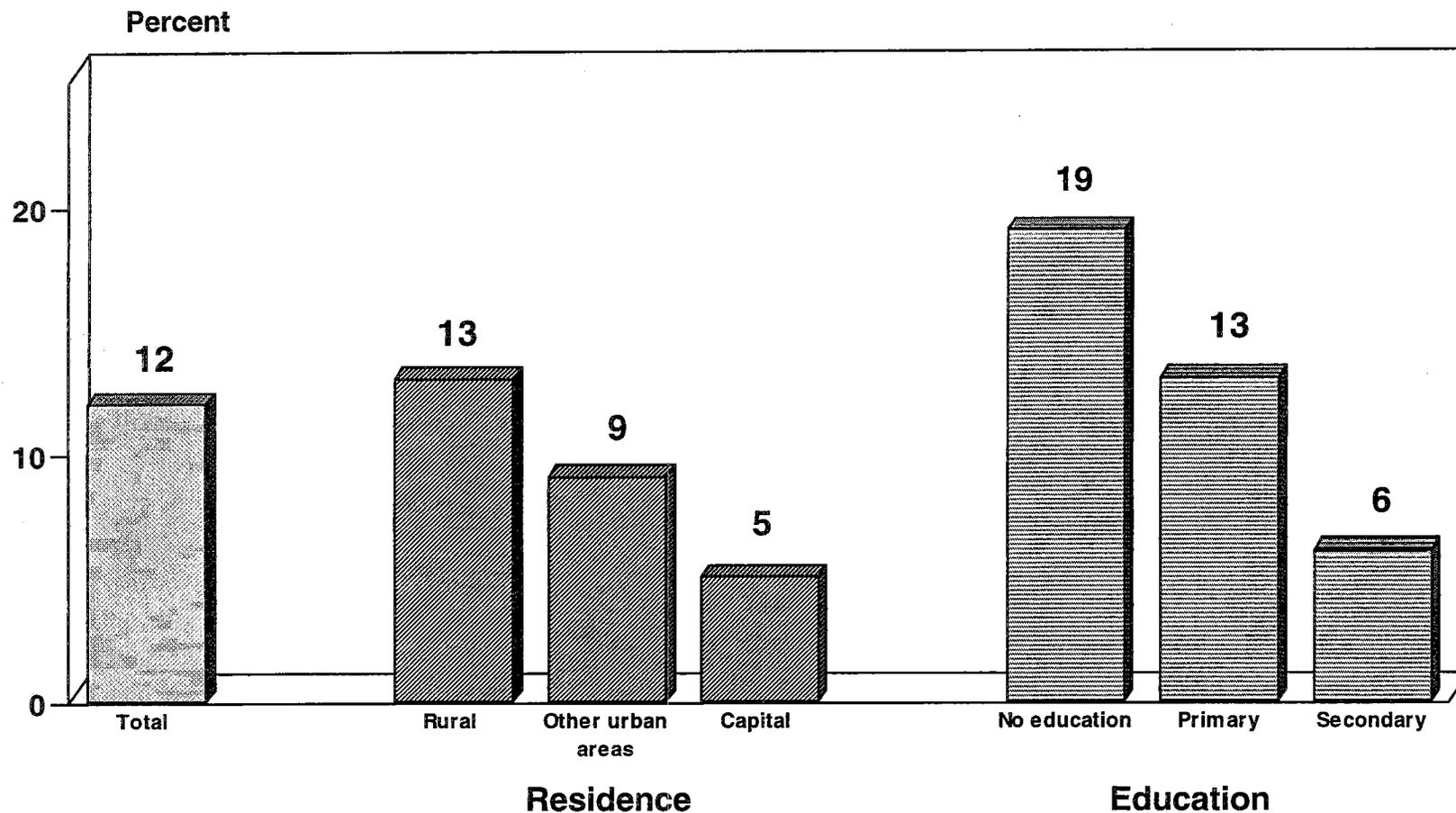
Source: KDHS 1998

Figure 20: Malnutrition among Mothers of Children under 5 Years by Residence and Education, Kenya

In Kenya,

- **Mothers living in the capital city (Nairobi) and other urban areas are less likely to be malnourished than those in rural areas.** Only 5 percent of mothers in the capital city and 9 percent in other urban areas are malnourished. Thirteen percent of mothers in rural areas are malnourished.
- **Mothers with no education are most likely to be malnourished.** Mothers with no education have higher rates of malnutrition (19 percent) than mothers with primary or secondary education (13 percent and 6 percent, respectively).
- **Malnutrition among mothers of children under 5 years has increased since 1993.** In 1993 only 10 percent of all mothers of children under 5 had malnutrition. In 1998 nearly 12 percent of mothers had malnutrition.

Figure 20
Malnutrition among Mothers of Children under 5 Years,
by Residence and Education, Kenya



Note: Malnutrition levels are based on the percentage of mothers whose BMI is less than 18.5.

Source: KDHS 1998

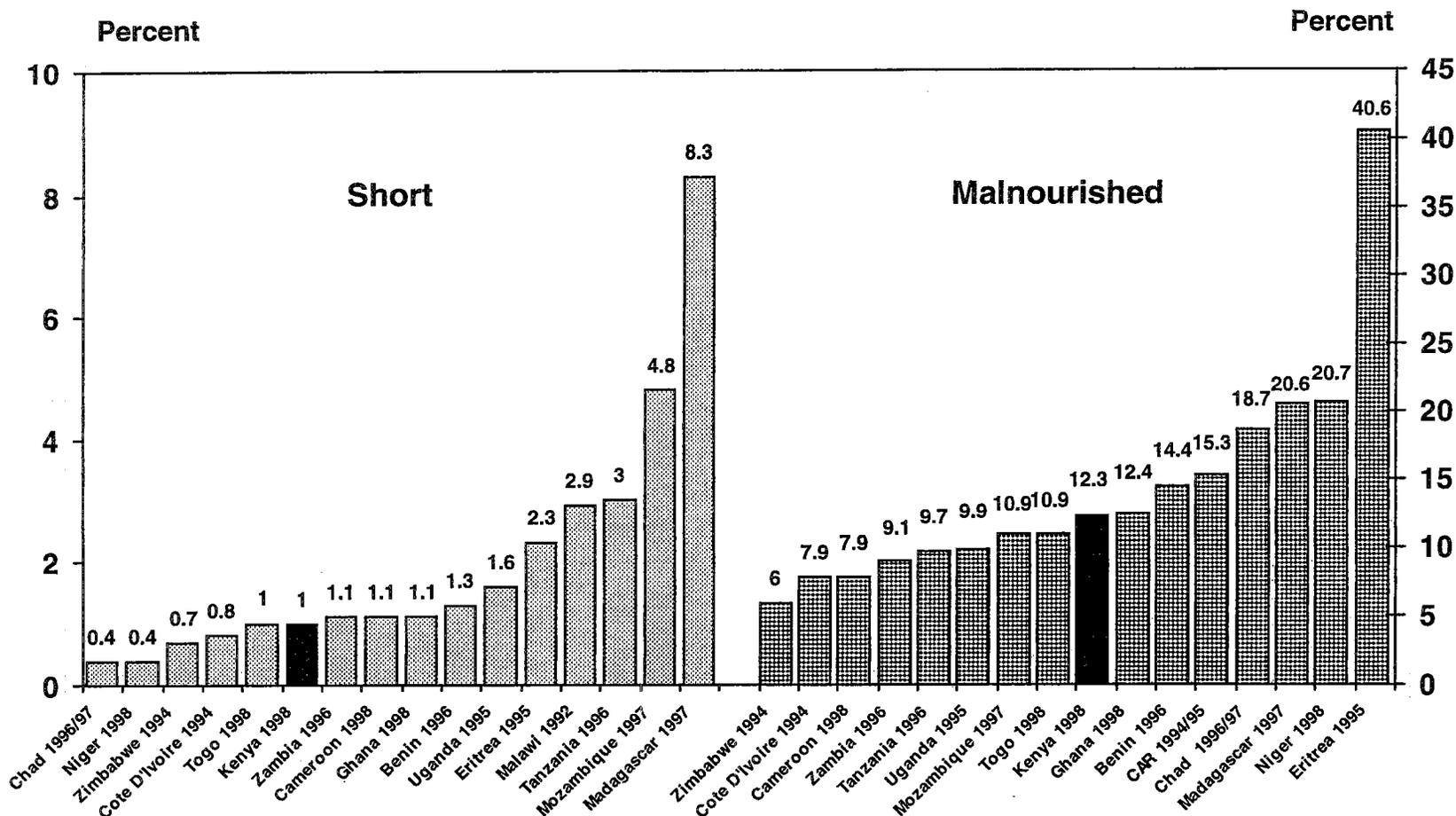
Figure 21: Malnutrition among Mothers of Children under 3 Years in Kenya Compared with Other Sub-Saharan Countries

Malnutrition among mothers is likely to have a major impact on their ability to care for themselves and their children. Women less than 145 centimeters in height are considered too short. Mothers who are too short (a condition largely due to stunting during childhood and adolescence) may have difficulty during childbirth because of the small size of their pelvis. Evidence also suggests there is an association between maternal height and low birth weight. Underweight status in women is assessed using the Body Mass Index (BMI). Mothers whose BMI is less than 18.5 are considered malnourished.

- **One percent of mothers of children under three years of age are too short (<145 cm). This rate is in the lower range among the sub-Saharan countries surveyed.**
- **Approximately 12 percent of mothers with children under three years of age are malnourished. This is in the middle of the sub-Saharan countries surveyed.**

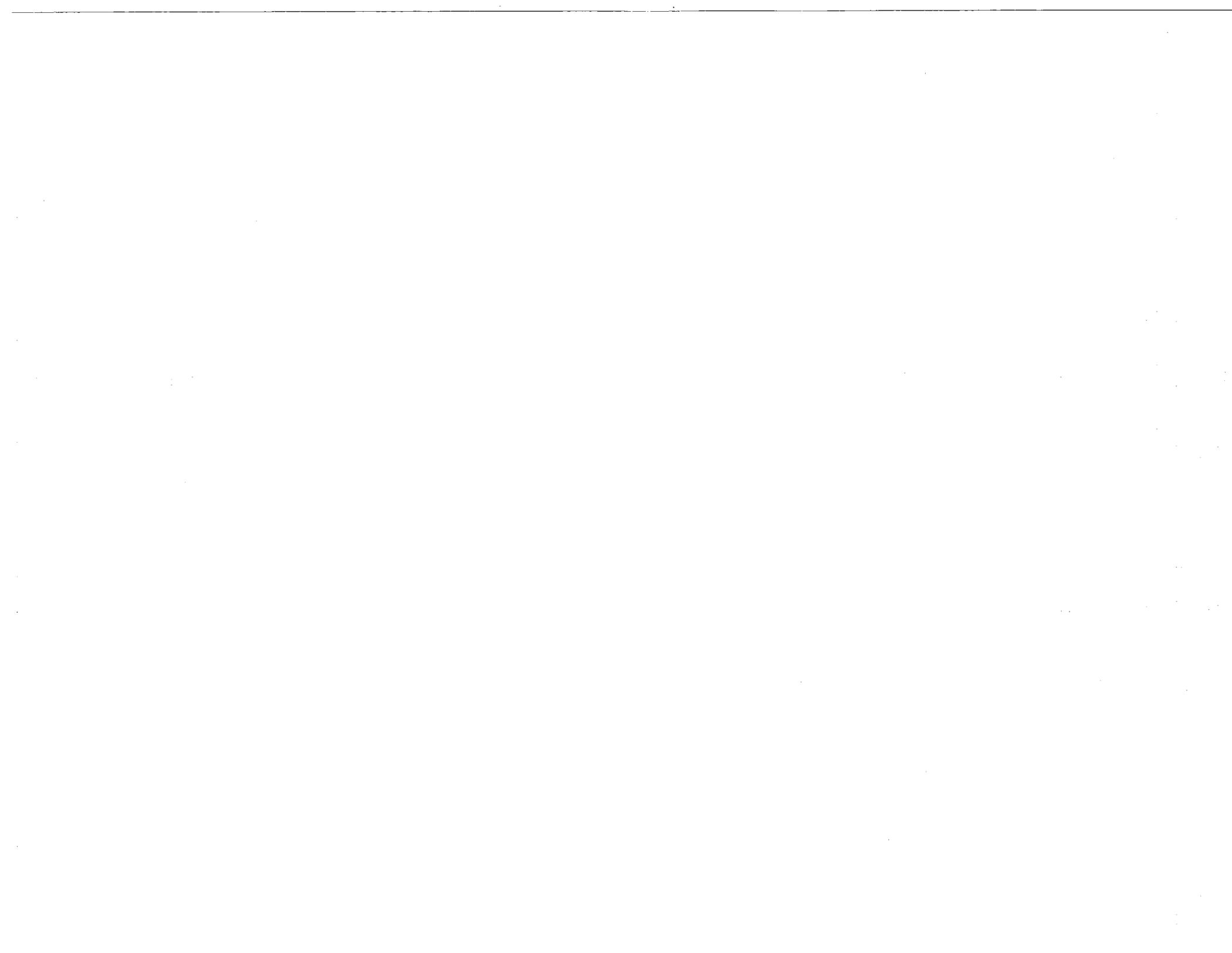
Figure 21

Malnutrition among Mothers of Children under 3 Years in Kenya Compared with Other Sub-Saharan Countries



Note: *Short* is the percentage of mothers under 145 cm; *Malnourished* is the percentage of mothers whose BMI is less than 18.5.

Source: DHS Surveys 1992-1998



Appendix 1
Stunting, Wasting and Underweight Rates by Background Characteristics
Kenya

Background Characteristic	Stunted	Wasted	Under-weight	Background Characteristic	Stunted	Wasted	Under-weight
Child's Age in Months				Region			
0-5	7.0	5.1	2.3	Nairobi	25.7	7.1	11.3
6-11	17.6	7.9	14.8	Central	27.5	5.5	14.3
12-17	34.7	9.0	25.1	Coast	39.0	4.3	27.5
18-23	49.9	9.9	28.9	Eastern	36.8	4.8	25.7
24-29	38.6	5.4	28.5	Nyanza	30.8	7.0	22.2
30-35	36.9	4.4	23.8	Rift Valley	33.1	7.5	24.9
36-47	35.6	4.9	22.7	Western	34.9	4.6	19.0
48-59	38.0	4.1	22.1				
n=4,413	p<0.000	p<0.000	p<0.002	n=4,413	p<0.000	NS	p<0.000
Child's Sex				Urban-Rural Residence			
Female	30.8	6.2	22.0	Rural	34.7	6.2	23.9
Male	35.2	6.0	22.2	Capital city	24.1	4.2	14.2
				Other urban areas	25.7	6.9	11.3
n=4,413	p<0.002	NS	NS	n=4,413	p<0.000	NS	p<0.000
Overall	33.0	6.1	22.1		33.0	6.1	22.1

Note: Level of significance is determined using the chi-square test. NS = Not significant

Appendix 2

WHO/CDC/NCHS International Reference Population

The assessment of nutritional status is based on the concept that in a well-nourished population the distributions of children's height and weight, at a given age, will approximate a normal distribution. This means that about 68 percent of children will have a weight within 1 standard deviation of the mean for children of that age or height, and a height within 1 standard deviation of the mean for children of that age. About 14 percent of children will be between 1 and 2 standard deviations above the mean; these children are considered relatively tall or overweight for their age or relatively fat for their height. Another 14 percent will be between 1 and 2 standard deviations below the mean; these children are considered relatively short or underweight for their age or relatively thin for their height. Of the remainder, 2 percent will be very tall or very overweight for their age or very overweight for their height, that is, they are more than 2 standard deviations above the mean. Another 2 percent will fall more than 2 standard deviations below the mean and be considered malnourished. These children are very short (stunted) or very underweight for their age or very thin (wasted) for their height.

For comparative purposes nutritional status has been determined using the International Reference Population defined by the United States National Center for Health Statistics (NCHS standard) as recommended by the World Health Organization and the Centers for Disease Control.

Appendix 2
WHO/CDC/NCHS International Reference Population,
Normal Distribution

