



Zambia

2001-02

Nutrition of Young Children and Mothers



Central Statistical Office



Central Board of Health



U.S. Agency for International Development



ORC Macro

AFRICA NUTRITION CHARTBOOKS

**NUTRITION OF YOUNG CHILDREN AND MOTHERS
IN ZAMBIA**

Findings from the 2001-2002 Zambia Demographic and Health Survey

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CONTENTS

INTRODUCTION.....	1
FIGURE 1: INFANT AND CHILD MORTALITY, ZAMBIA COMPARED WITH OTHER SUB-SAHARAN COUNTRIES	2
FIGURE 2: CONTRIBUTION OF UNDERNUTRITION TO UNDER-FIVE MORTALITY, ZAMBIA	4
FIGURE 3: SURVIVAL AND NUTRITIONAL STATUS OF CHILDREN, ZAMBIA	6
MALNUTRITION IN ZAMBIA	9
FIGURE 4: MALNUTRITION AMONG CHILDREN UNDER FIVE YEARS, ZAMBIA	10
FIGURE 5: CHANGES IN UNDERNUTRITION RATES AMONG CHILDREN UNDER FIVE YEARS, ZAMBIA 1992, 1996, AND 2001-02	12
FIGURE 6: STUNTING, WASTING, AND UNDERWEIGHT BY AGE, ZAMBIA	14
FIGURE 7: UNDERWEIGHT AMONG CHILDREN UNDER FIVE YEARS, ZAMBIA COMPARED WITH OTHER SUB-SAHARAN COUNTRIES	16
FIGURE 8: STUNTING AMONG CHILDREN UNDER FIVE YEARS, ZAMBIA COMPARED WITH OTHER SUB-SAHARAN COUNTRIES.....	18
CONCEPTUAL FRAMEWORK FOR NUTRITIONAL STATUS.....	20
IMMEDIATE INFLUENCES OF MALNUTRITION	233
FIGURE 9: CHILDREN UNDER FIVE YEARS LIVING IN HOUSEHOLDS WITH IODIZED SALT BY REGION, ZAMBIA.....	24
FIGURE 10: VITAMIN A SUPPLEMENTATION AMONG MOTHERS OF CHILDREN UNDER FIVE YEARS BY REGION, ZAMBIA	26
FIGURE 11: VITAMIN A SUPPLEMENTATION AMONG CHILDREN 6-59 MONTHS IN THE PAST SIX MONTHS BY REGION, ZAMBIA	28
FIGURE 12: IRON SUPPLEMENTATION AMONG MOTHERS OF CHILDREN UNDER FIVE YEARS, ZAMBIA	30
FIGURE 13: DIARRHEA AND COUGH WITH RAPID BREATHING AMONG CHILDREN UNDER FIVE YEARS COMPARED WITH MALNUTRITION RATES, ZAMBIA	32
UNDERLYING BIOLOGICAL AND BEHAVIORAL INFLUENCES OF MALNUTRITION.....	345
FIGURE 14: FERTILITY AND BIRTH INTERVALS, ZAMBIA COMPARED WITH OTHER SUB-SAHARAN COUNTRIES	36
FIGURE 15: UNDERNUTRITION AMONG CHILDREN AGE 12-23 MONTHS BY MEASLES VACCINATION STATUS, ZAMBIA.....	38
FIGURE 16: MEASLES VACCINATION COVERAGE AMONG CHILDREN AGE 12-23 MONTHS, ZAMBIA COMPARED WITH OTHER SUB- SAHARAN COUNTRIES.....	40
FIGURE 17: FEEDING PRACTICES FOR INFANTS UNDER SIX MONTHS, ZAMBIA.....	42
FIGURE 18: INFANTS UNDER FOUR MONTHS WHO ARE EXCLUSIVELY BREASTFED AND THOSE WHO RECEIVE A BOTTLE, ZAMBIA COMPARED WITH OTHER SUB-SAHARAN COUNTRIES.....	44

FIGURE 19: FEEDING PRACTICES FOR INFANTS AGE 6-9 MONTHS, ZAMBIA.....	46
FIGURE 20: INFANTS AGE 6-9 MONTHS RECEIVING SOLID FOODS IN ADDITION TO BREAST MILK, ZAMBIA COMPARED WITH OTHER SUB-SAHARAN COUNTRIES.....	48
FIGURE 21: CHILDREN 10-23 MONTHS WHO CONTINUE TO BE BREASTFED, ZAMBIA COMPARED WITH OTHER SUB-SAHARAN COUNTRIES.....	50
UNDERLYING SOCIAL AND ECONOMIC INFLUENCES OF MALNUTRITION	53
FIGURE 22: STUNTING AND WASTING AMONG CHILDREN UNDER FIVE YEARS BY MOTHER’S EDUCATION, ZAMBIA	54
FIGURE 23: STUNTING AND WASTING AMONG CHILDREN UNDER FIVE YEARS BY SOURCE OF DRINKING WATER, ZAMBIA.....	56
FIGURE 24: STUNTING AND WASTING AMONG CHILDREN UNDER FIVE YEARS BY TYPE OF TOILET, ZAMBIA.....	58
BASIC INFLUENCES	61
FIGURE 25: STUNTING AND WASTING AMONG CHILDREN UNDER FIVE YEARS BY REGION, ZAMBIA.....	62
FIGURE 26: STUNTING AND WASTING AMONG CHILDREN UNDER FIVE YEARS BY URBAN-RURAL RESIDENCE, ZAMBIA	64
MATERNAL NUTRITIONAL STATUS.....	67
FIGURE 27: MALNUTRITION AMONG MOTHERS OF CHILDREN UNDER FIVE YEARS BY REGION, ZAMBIA	68
FIGURE 28: MALNUTRITION AMONG MOTHERS OF CHILDREN UNDER FIVE YEARS BY RESIDENCE, ZAMBIA.....	70
FIGURE 29: MALNUTRITION AMONG MOTHERS OF CHILDREN UNDER FIVE YEARS BY EDUCATION, ZAMBIA	72
FIGURE 30: MALNUTRITION AMONG MOTHERS OF CHILDREN UNDER THREE YEARS, ZAMBIA COMPARED WITH OTHER SUB-SAHARAN COUNTRIES.....	74
APPENDICES.....	83
APPENDIX 1: STUNTING, WASTING, UNDERWEIGHT, AND OVERWEIGHT RATES BY BACKGROUND CHARACTERISTICS ZAMBIA 2001-2002	79
APPENDIX 2: WHO/CDC/NCHS INTERNATIONAL REFERENCE POPULATION COMPARED WITH THE DISTRIBUTION OF MALNUTRITION IN ZAMBIA.....	80

Introduction

Malnutrition¹ is one of the most important health and welfare problems among infants and young children in Zambia. 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, improper feeding practices, or both. Improper feeding practices include both the quality and the 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 effects of long-term malnutrition can be a reduction in workers' 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 data presented here are from the 2001-2002 Zambia Demographic and Health Survey (ZDHS 2001-02), a nationally representative survey of 7,126 households, conducted by the Central Statistical Office and the Central Board of Health and financed by the U.S. Agency for International Development (USAID), the Government of Japan through a trust fund managed by the United Nations Development Programme (UNDP), and through bilateral agreements between the Government of the Republic of Zambia, the United Nations Population Fund (UNFPA), and the Danish International Development Agency (DANIDA). ORC Macro provided technical assistance through its MEASURE DHS+ program.

Of the 6,648 children age 0-59 months who were part of the study, 5,216 whose mothers were interviewed and for whom complete anthropometric data had been collected, were included in the nutrition analyses. Unless otherwise noted, all analyses include only children whose mothers were interviewed. Nutritional data collected on these children include height, weight, age, breastfeeding history, and feeding patterns. Information was also collected on the prevalence of diarrhea and acute respiratory infection (ARI) in the two weeks prior to the survey and on relevant socio-demographic characteristics. For comparison, data are presented from Demographic and Health Surveys conducted in other sub-Saharan countries.

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

Figure 1: Infant and Child Mortality, Zambia Compared with Other Sub-Saharan Countries

Malnutrition compromises child health, making children susceptible to illness and death. Infectious diseases such as acute respiratory infections, diarrhea, and malaria account for the greatest proportion of infant and under-five mortality. The infant mortality rate (under-one rate) is a commonly used measure of infant health and is a sensitive indicator of the socioeconomic conditions of a country. The under-five mortality rate is another informative indicator of infant and child survival.

- **Zambia's under-one mortality rate (95 deaths per 1,000 births) indicates that over 9 percent of children born in Zambia die before their first birthday.** This rate is in the midrange of the sub-Saharan countries surveyed.
- **Zambia's under-five mortality rate (168 deaths per 1,000 births) indicates that about 17 percent of children born in Zambia die before their fifth birthday.** This rate places Zambia at the midrange of the sub-Saharan countries surveyed.

Figure 1

Infant and Child Mortality, Zambia Compared with Other Sub-Saharan Countries

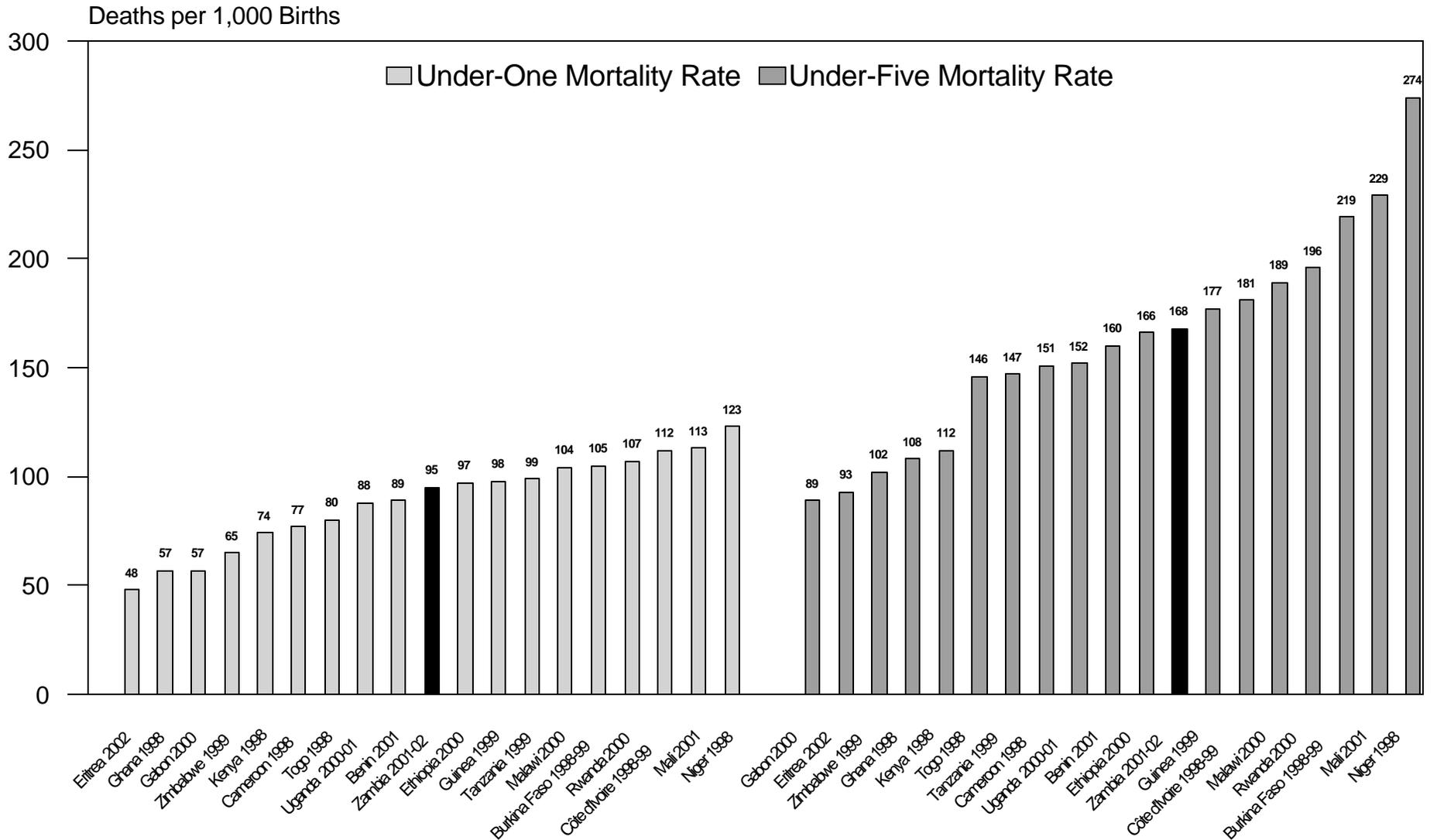


Figure 2: Contribution of Undernutrition to Under-Five Mortality, Zambia

Undernutrition is an important factor in the death of many young children. Even if a child is only mildly malnourished, the mortality risk is increased. In developing countries, under-five mortality is largely a result of infectious diseases and neonatal deaths. Respiratory infections, diarrhea, malaria, measles, and other infectious diseases take their toll on children.

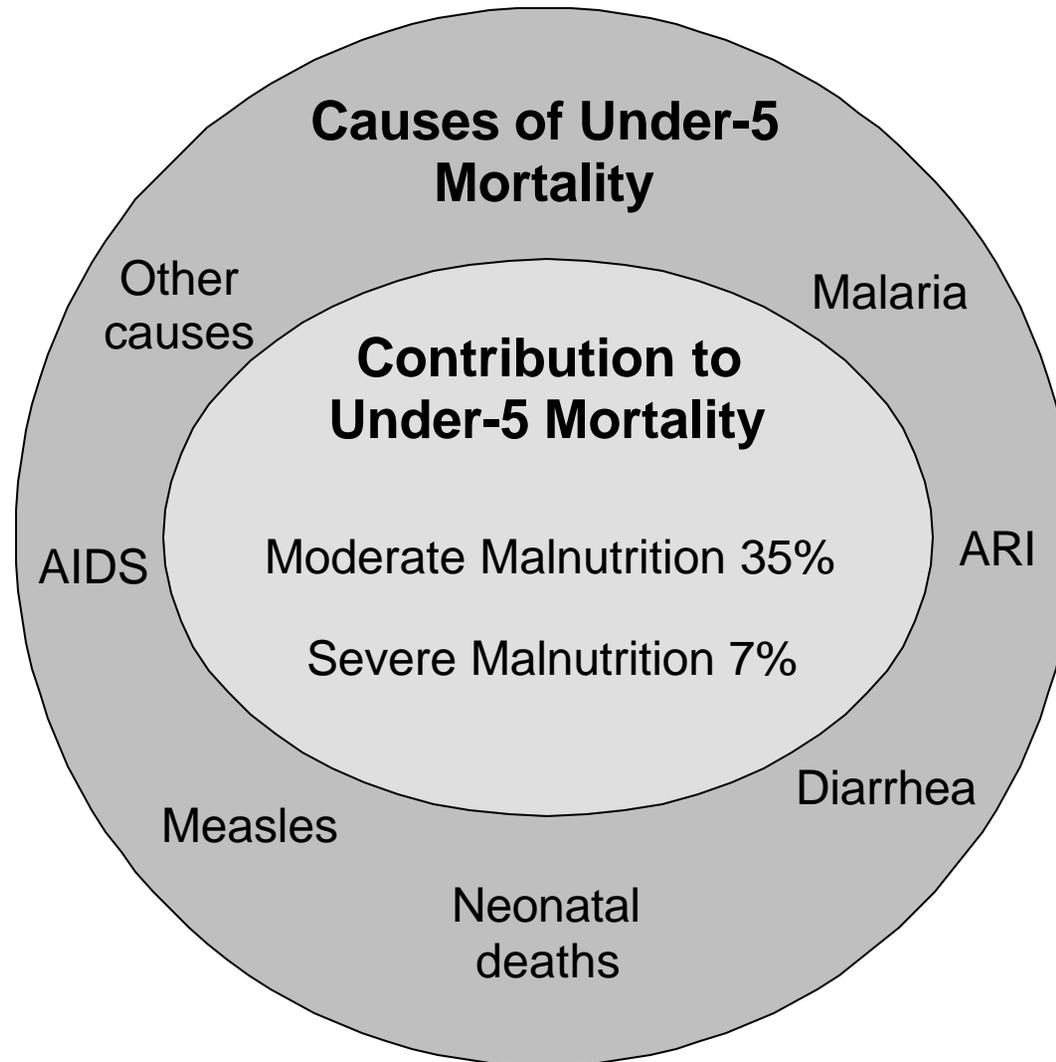
Formulas developed by Pelletier et al.¹ are used to quantify the contributions of moderate and severe malnutrition to under-five mortality.

In Zambia,

- **Forty-two percent of all deaths that occur before age five are related to malnutrition (severe and moderate malnutrition).**
- **Because of its extensive prevalence, moderate malnutrition (35 percent) contributes to more deaths than severe malnutrition (7 percent).**
- **Moderate malnutrition is implicated in 83 percent of deaths associated with malnutrition.**

¹ Pelletier, 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 2
Contribution of Undernutrition to Under-Five Mortality,
Zambia



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

Figure 3: Survival and Nutritional Status of Children, Zambia

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

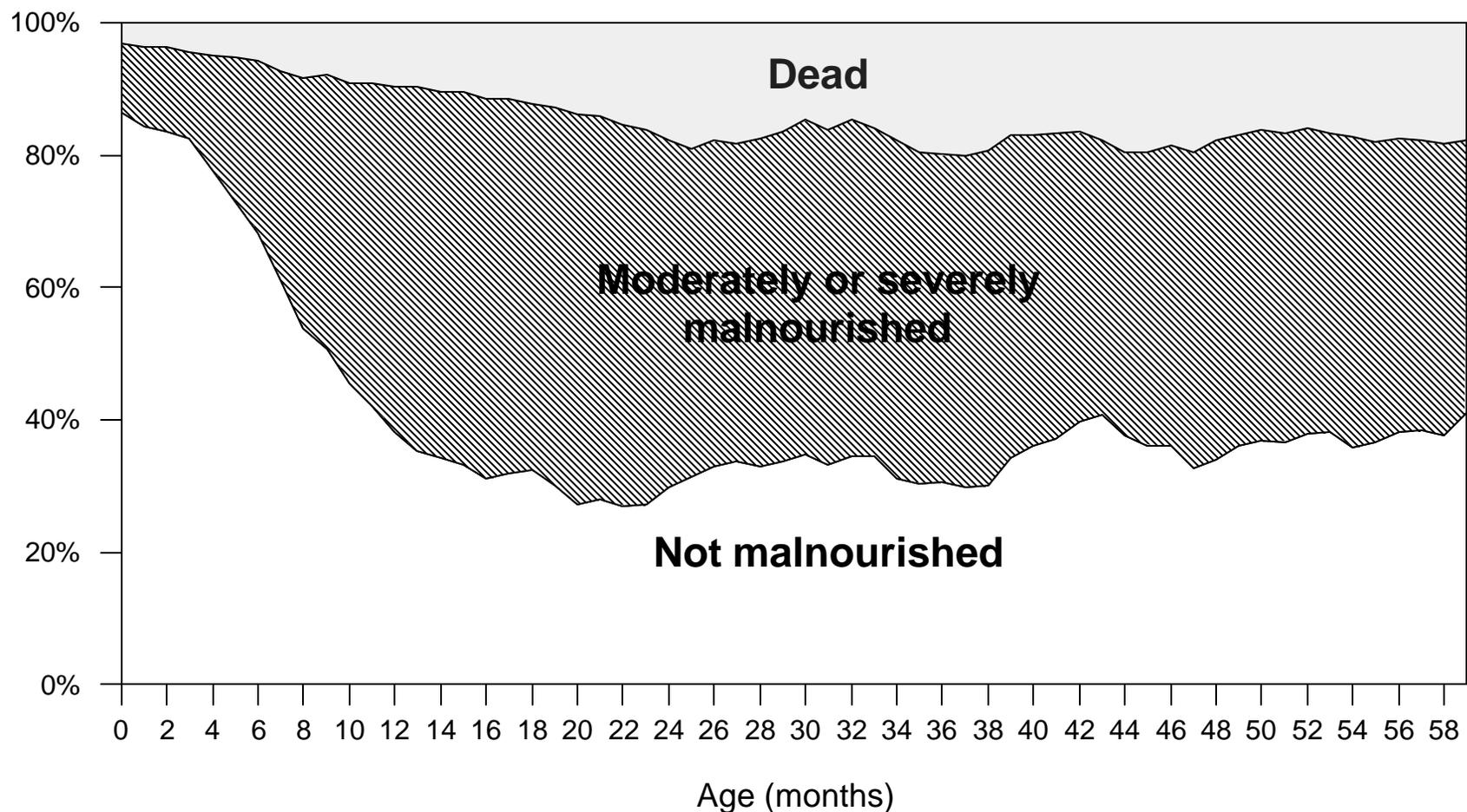
In Zambia,

- **Between birth and 22 months of age, the percentage of children who are alive and not malnourished drops rapidly from about 90 percent to 27 percent.** Thereafter, the rate fluctuates between 35 and 40 percent through 59 months.
- **Between birth and 20 months of age, the percentage of children who are moderately or severely malnourished¹ increases dramatically from 11 percent to 59 percent.** This percentage then declines to 42 percent at 43 months and ranges between 43 and 48 percent through 59 months.
- **From birth until 59 months, the percentage of children who have died increases gradually,** ranging from 3 percent at birth to 19 percent at 25 months. The rate continues to fluctuate between 15 and 20 percent through 59 months.

¹ A child with a Z-score below minus three standard deviations (-3 SD) on the reference standard is considered severely malnourished, while a child with a Z-score between -2 SD and -3 SD is considered moderately malnourished.

Figure 3

Survival and Nutritional Status of Children, Zambia



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

Malnutrition in Zambia

Figure 4: Malnutrition among Children under Five Years, Zambia

In Zambia,

- **Forty-seven percent of children age 0-59 months are chronically malnourished.** In other words, they are too short for their age, or *stunted*.¹ The proportion of children who are stunted is over 23 times the level expected in a healthy, well-nourished population.
- **Acute malnutrition, manifested by *wasting*,**² results in a child being too thin for his or her height. **It affects 5 percent of children,** which is 2.5 times the level expected in a healthy population.
- **Twenty-eight percent of children under five years are *underweight***³ for their age. This is 14 times the level expected in a healthy, well-nourished population
- **Thirteen percent of children under five are *overweight*.**⁴ This is about four-fifths of the level expected in a healthy, well-nourished population.

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

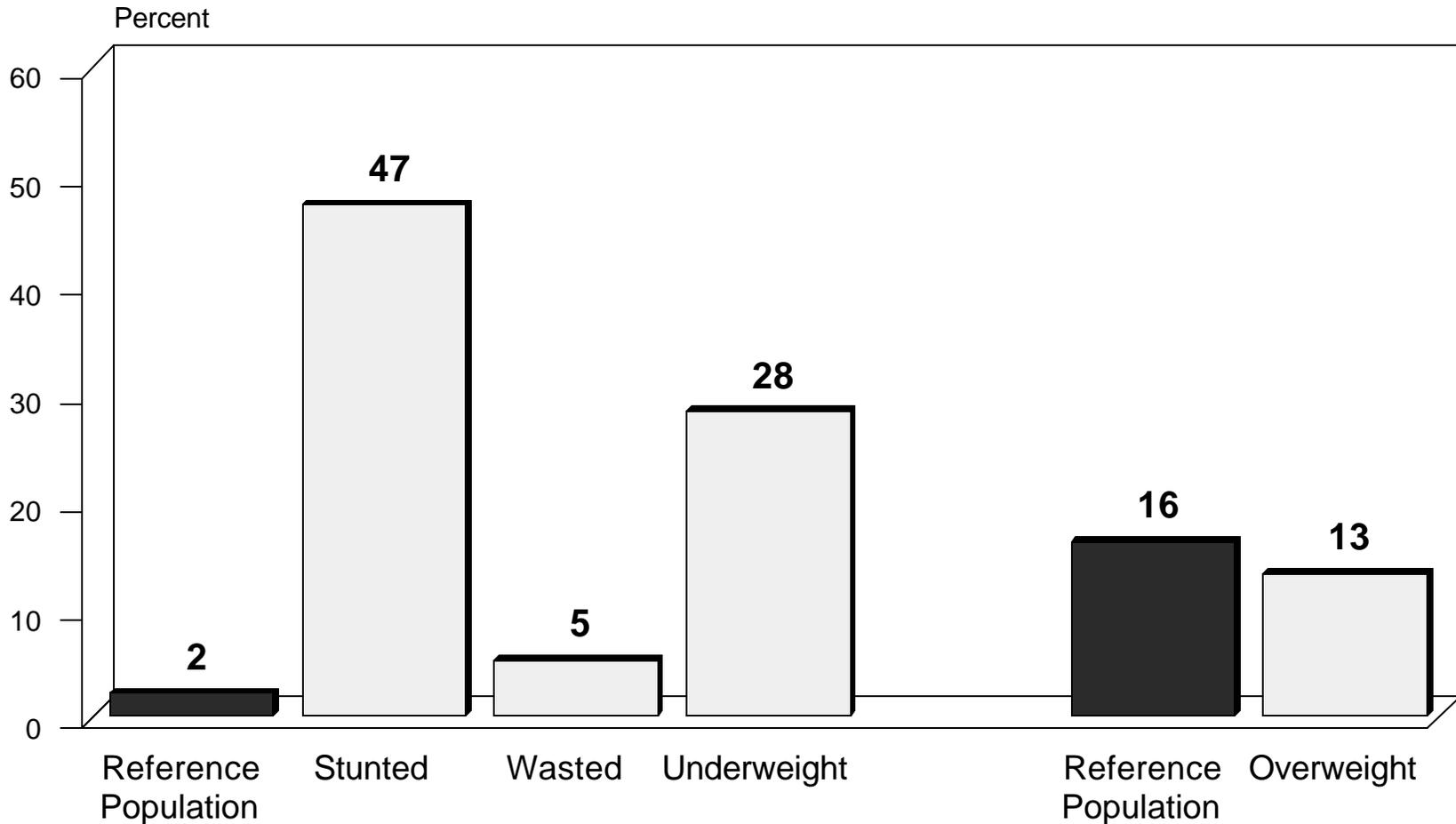
² A wasted child has a weight-for-height Z-score that is below -2 SD based on the NCHS/CDC/WHO reference population. Acute malnutrition is the result of a recent failure to receive adequate nutrition and may be affected by acute illness, especially diarrhea.

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.

⁴ An overweight child has a weight-for-height Z-score that is above 1 SD based on the NCHS/CDC/WHO reference population.

Figure 4

Malnutrition among Children under Five Years, Zambia



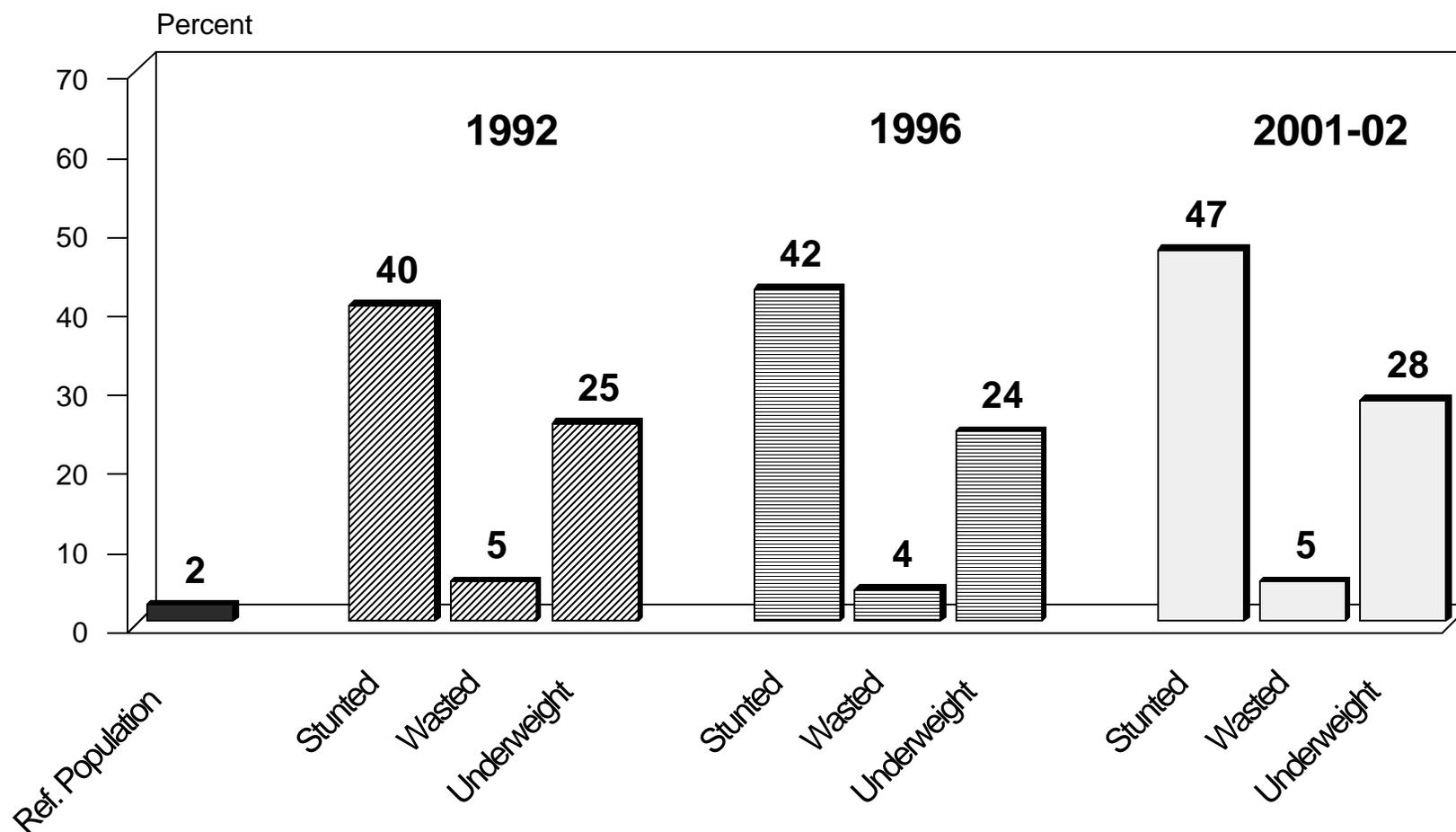
Note: *Stunting* reflects chronic malnutrition; *wasting* reflects acute malnutrition; *underweight* reflects chronic or acute malnutrition or a combination of both.

Figure 5: Changes in Undernutrition Rates among Children under Five Years, Zambia 1992, 1996, and 2001-02

- **The findings of the 2001-02 ZDHS suggest that chronic malnutrition rates in Zambia have increased since the 1992 and 1996 surveys, while acute malnutrition has remained about the same over the three survey periods.**
- In 1992 and 1996, stunting affected 40 percent and 42 percent of children under five, respectively, compared with 47 percent in 2001-02.
- Five percent of children were wasted in 1992, and 4 percent were wasted in 1996, compared with 5 percent in 2001-02.
- In 1992, 25 percent of children were underweight; in 1996, 24 percent were underweight; and in 2001-02, 28 percent were underweight.

Figure 5

Changes in Undernutrition Rates among Children under Five Years, Zambia 1992, 1996, and 2001-02



Note: *Stunting* reflects chronic malnutrition; *wasting* reflects acute malnutrition; *underweight* reflects chronic or acute malnutrition or a combination of both.

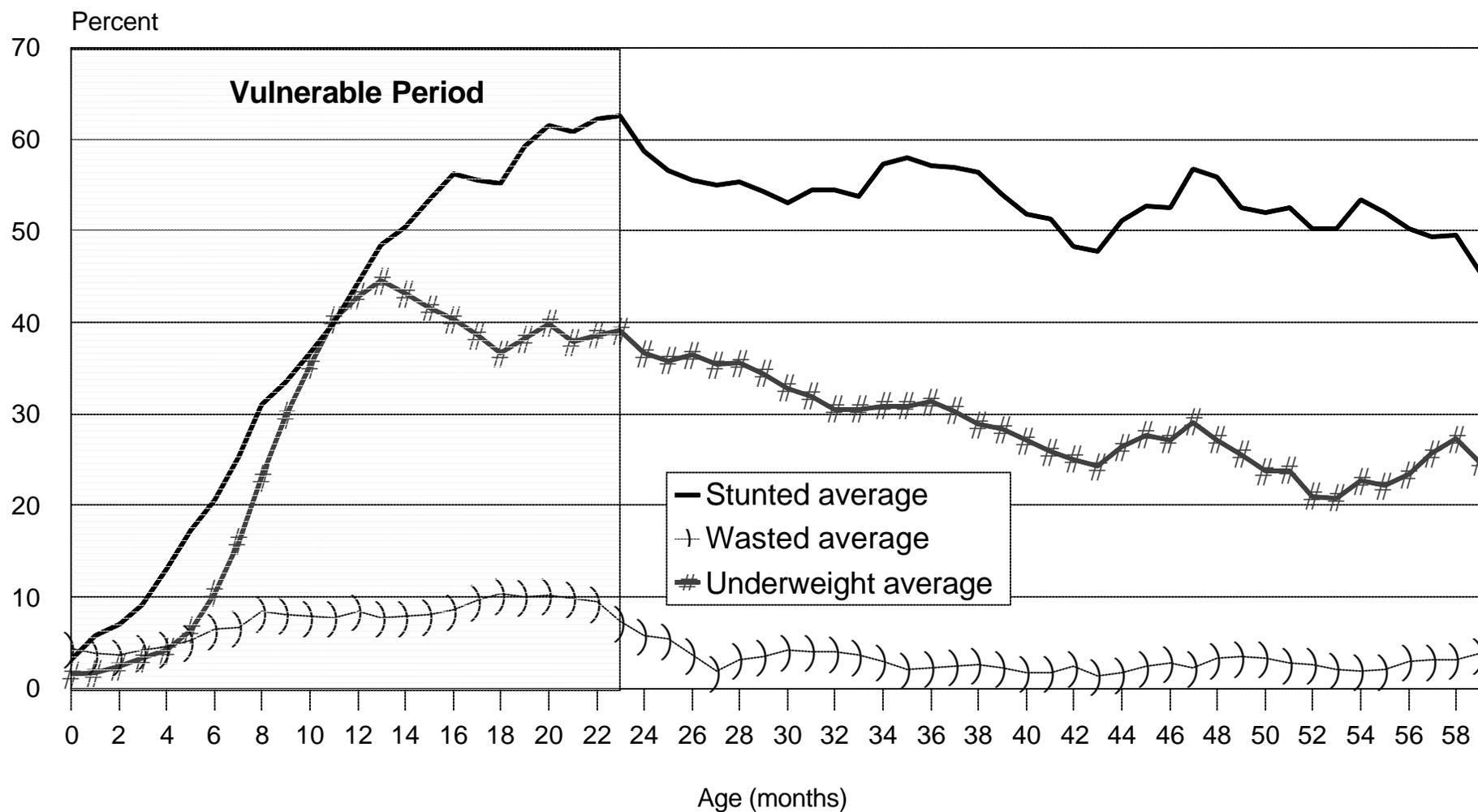
Figure 6: Stunting, Wasting, and Underweight by Age, Zambia

In Zambia, the time between zero and 23 months of age is a vulnerable period.

- **The proportion of children stunted rises sharply between zero and 23 months of age, peaking at 63 percent.** The proportion of children stunted then varies from 53 to 58 percent through age 40 months until it declines to 46 percent at 59 months.
- **The proportion of children wasted rises to 10 percent at 18 months and then declines to 2 percent at 27 months.** The proportion wasted then ranges between 1 and 4 percent through 59 months.
- **The proportion of children underweight rises sharply between zero and 13 months of age, when it reaches 45 percent.** The proportion underweight then declines to 21 percent by 53 months, after which it rises to 25 percent at 59 months.

Figure 6

Stunting, Wasting, and Underweight by Age, Zambia



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

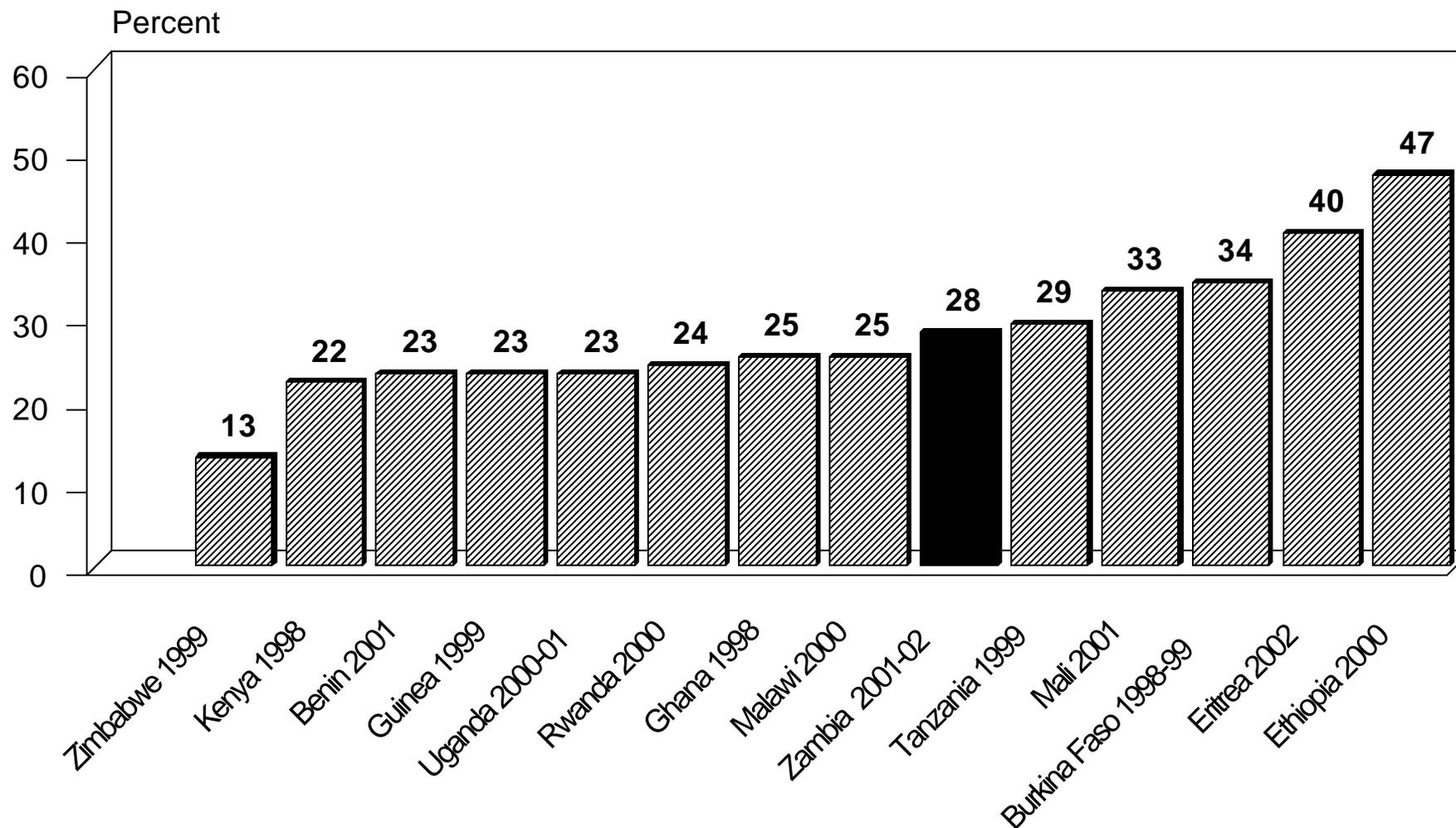
Figure 7: Underweight among Children under Five Years, Zambia Compared with Other Sub-Saharan Countries

Among the sub-Saharan countries surveyed,

- The percentage of children **under five years** who are *underweight* ranges from 13 to 47 percent. **With 28 percent of children under three years being underweight, Zambia is in the midrange of the sub-Saharan countries surveyed.** Underweight status is indicative of children who suffer from chronic or acute malnutrition, or both, and may be influenced by both short- and long-term determinants of malnutrition. Underweight is often used as a general indicator of the status of a population's health.

Figure 7

Underweight among Children under Five Years, Zambia Compared with Other Sub-Saharan Countries



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

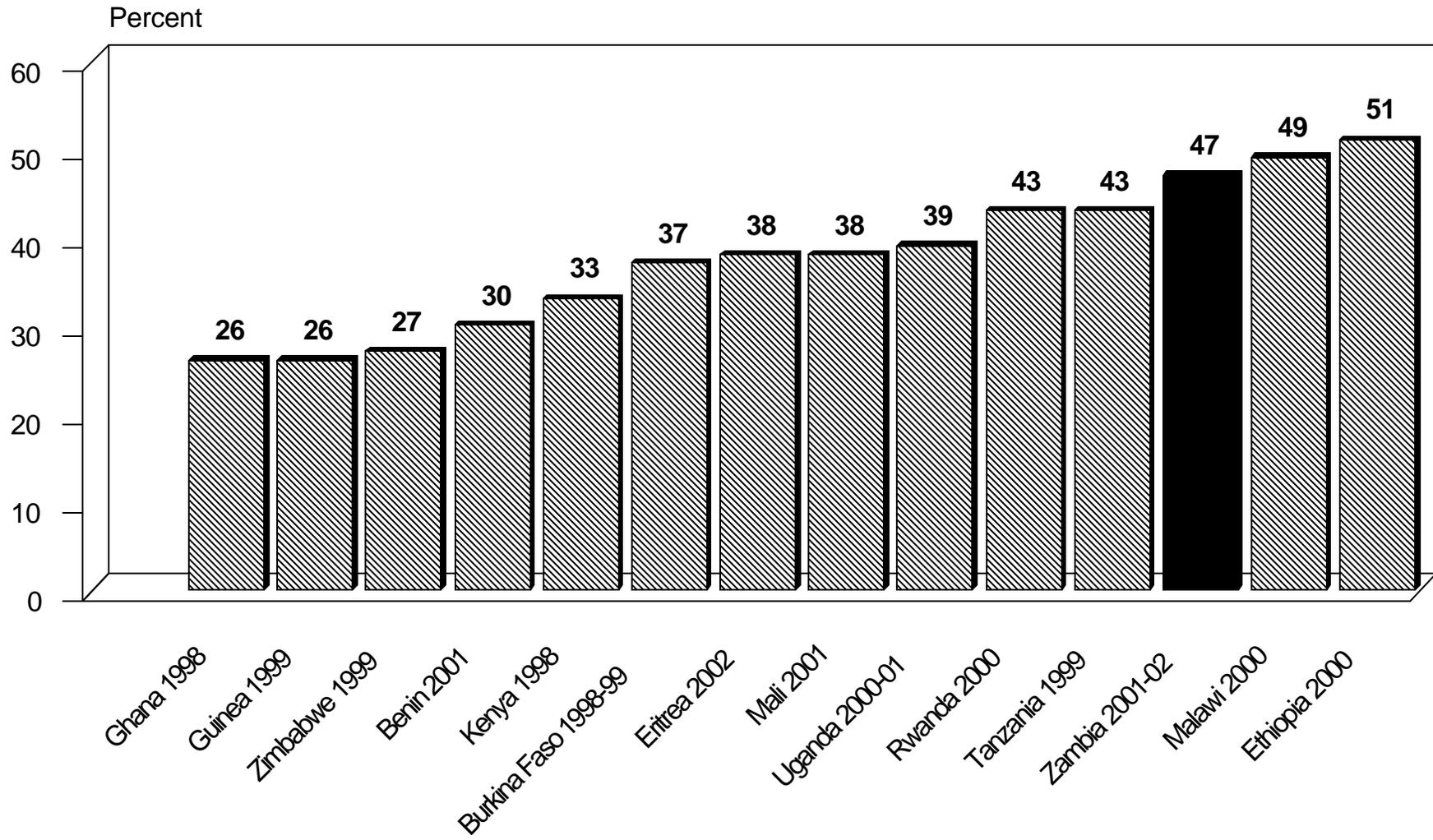
Figure 8: Stunting among Children under Five Years, Zambia Compared with Other Sub-Saharan Countries

Among the sub-Saharan countries surveyed,

- The percentage of children **under five years** who are *stunted* ranges from 26 to 51 percent. **At 47 percent, the proportion of children under three years who are stunted in Zambia is in the high end of the sub-Saharan countries surveyed.** 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 the season of data collection, epidemic illnesses, acute food shortages, and recent shifts in social or economic policies.

Figure 8

Stunting among Children under Five Years, Zambia Compared with Other Sub-Saharan Countries



Note: *Stunting* reflects chronic malnutrition.

Conceptual Framework for Nutritional Status

Nutrition is directly related to food intake and infectious diseases such as diarrhea, acute respiratory infections, malaria, and measles. Both food intake and infectious diseases reflect underlying social and economic conditions at the household, community, and national levels that are supported by political, economic, and ideological structures within a country.

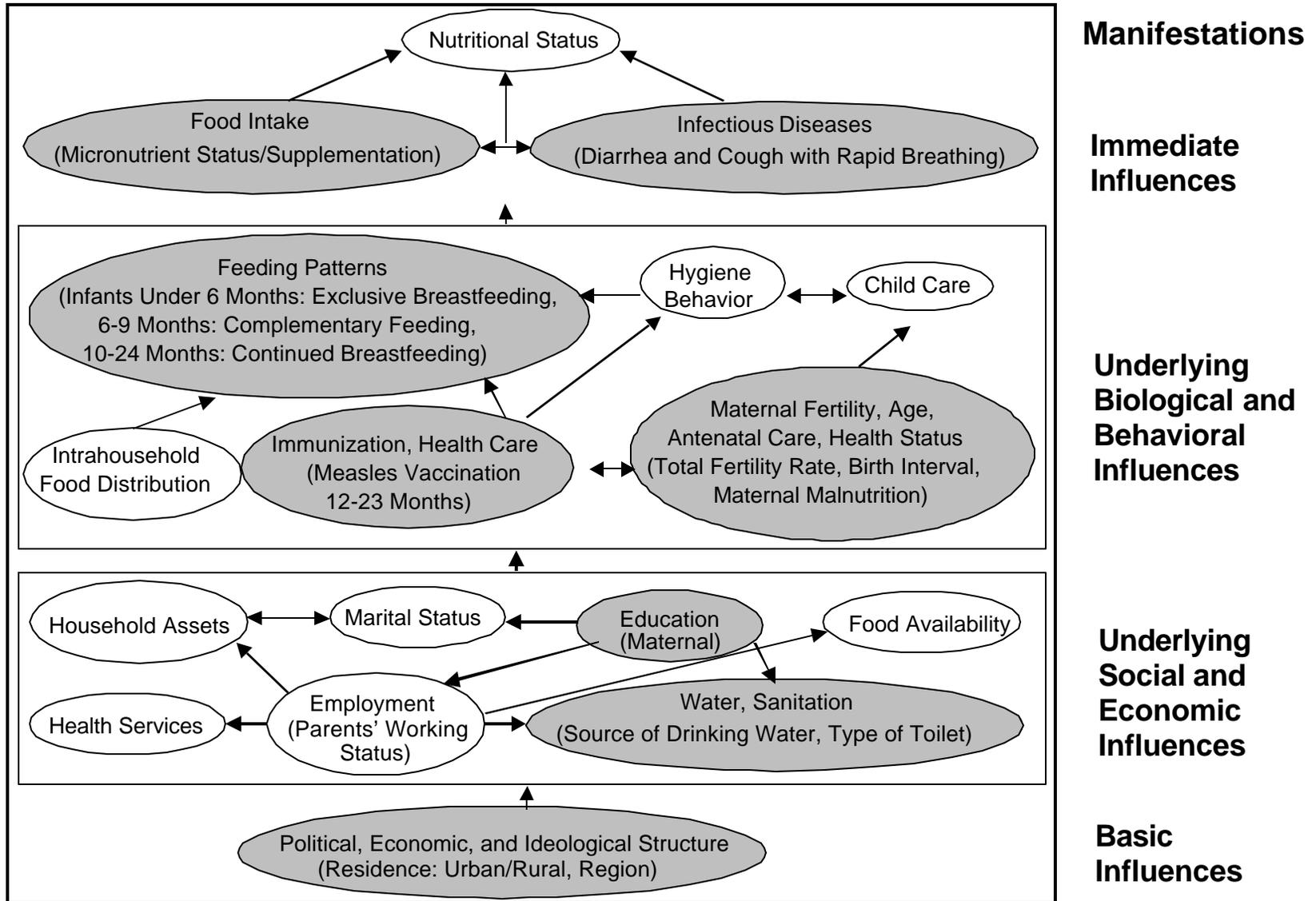
The following diagram is a conceptual framework for nutrition adapted from UNICEF.¹ It illustrates relationships among factors and their influences on children's nutritional status. Although political, socioeconomic, environmental, and cultural factors (at the national and community levels) and poverty (at the household level) affect the nutritional status of women and children, the only variables included in this chartbook are those that can be collected as part of a national household survey. The highlighted areas of the framework depict selected factors.

The factors are:

- **Immediate influences**, such as food intake (micronutrient status and supplementation) and infectious disease (diarrhea and respiratory infections).
- **Underlying biological and behavioral influences**, such as maternal fertility, measles vaccinations, and feeding patterns of children under two years.
- **Underlying social and economic influences**, such as maternal education, drinking water, and sanitation.
- **Basic influences**, such as area of residence.

¹ *State of the World's Children*, 1998

Conceptual Framework for Nutritional Status



Immediate Influences of Malnutrition

Figure 9: Children under Five Years Living in Households with Iodized Salt by Region, Zambia

Iodine deficiency is known to cause goiter, cretinism (a severe form of neurological defect), spontaneous abortion, premature birth, infertility, stillbirth, and increased child mortality. One of the most serious consequences for child development is mental retardation caused by iodine deficiency disorder (IDD), which puts at risk social investments in health and education. IDD is the single most common cause of preventable mental retardation and brain damage in the world. It decreases the production of hormones vital to growth and development. Children with IDD can grow up stunted, apathetic, mentally retarded, and incapable of normal movement, speech, or hearing. IDD in pregnant women may cause miscarriage, stillbirth, and mental retardation in infants.

The remedy for IDD is relatively simple. A teaspoon of iodine is all a person requires in a lifetime, but since iodine cannot be stored for long periods by the body, tiny amounts are needed regularly. In areas of endemic iodine deficiency, where soil and therefore crops and grazing animals do not provide sufficient dietary iodine to the population, food fortification and supplementation have proven to be highly successful and sustainable interventions. The fortification of salt or oil with iodine is the most common tool to prevent IDD. Iodized salt that is commercially packaged in plastic sacks and not stored properly can lose its concentration of iodine. Proper packaging and storage of iodized salt is essential to ensure that the population benefits from iodine fortification.

- **In Zambia, 97 percent of children under five years live in households that use salt containing iodine.** Use of iodized salt is lowest in the Western region (86 percent) but ranges from 94 to 99 percent in the rest of the regions.

Figure 9

Children under Five Years Living in Households with Iodized Salt by Region, Zambia

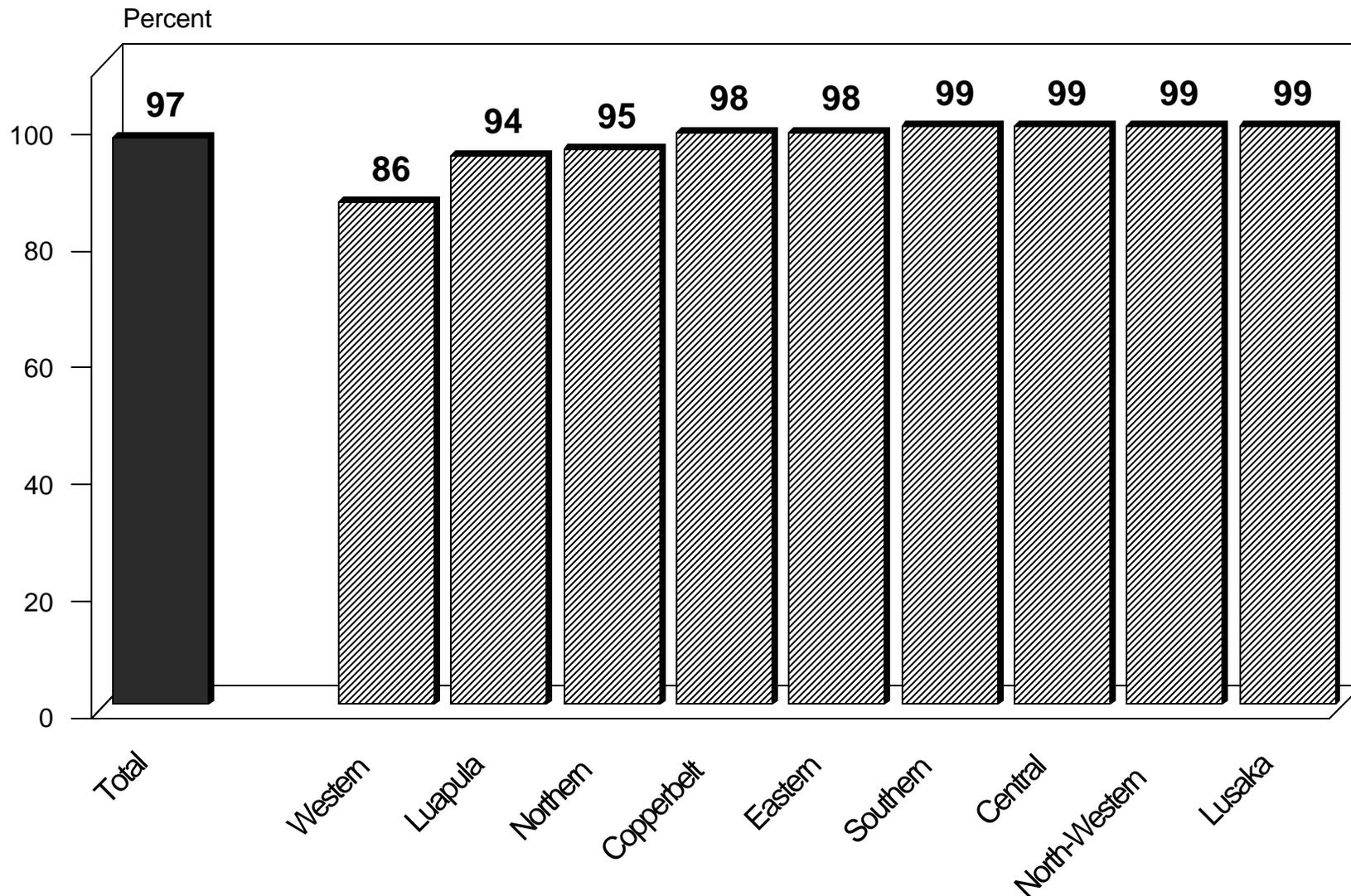


Figure 10: Vitamin A Supplementation among Mothers of Children under Five Years by Region, Zambia

Recent studies show that pregnant women who are vitamin A deficient are at a greater risk of dying during or shortly after delivery of the child. Pregnancy and lactation strain women's nutritional status and their vitamin A stores. For women who have just given birth, vitamin A supplementation helps to bring their level of vitamin A storage back to normal, aiding recovery and avoiding illness.

Vitamin A supplementation also benefits children who are breastfed. If mothers have vitamin A deficiency, their children can be born with low stores of vitamin A. Low birth weight babies are especially at risk. Additionally, infants often do not receive an adequate amount of vitamin A from breast milk when mothers are vitamin A deficient. Therefore, supplementation is important for postpartum women within the first eight weeks after childbirth.

In Zambia,

- **Twenty-eight percent of mothers received vitamin A supplements during the two months after delivery.**
- **Vitamin A supplementation of mothers varies by region.** Seventeen percent of mothers in the Northern region received vitamin A, compared with 38 percent of mothers in the Copperbelt region.

Figure 10

Vitamin A Supplementation among Mothers of Children under Five Years by Region, Zambia

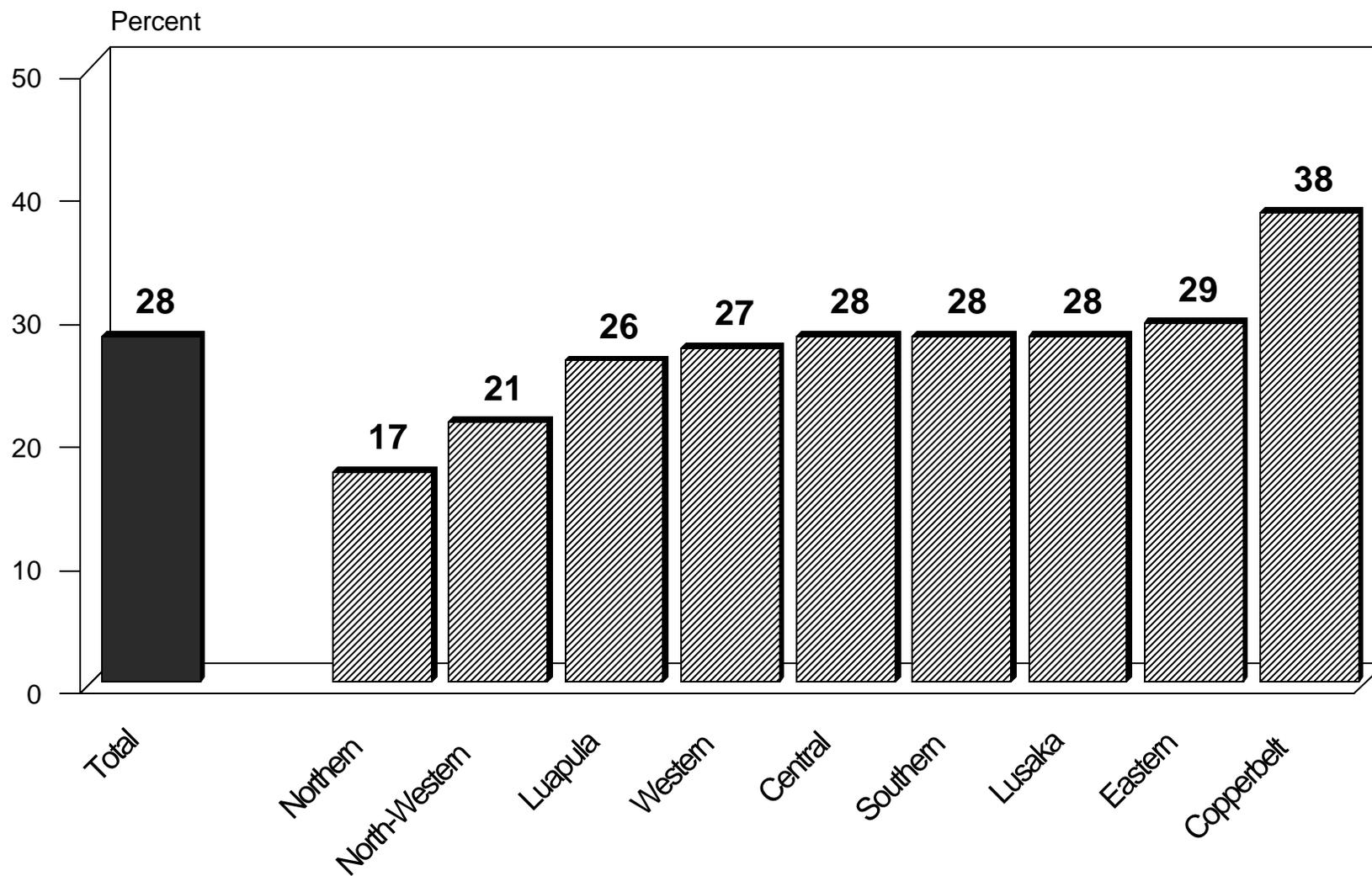


Figure 11: Vitamin A Supplementation among Children 6-59 Months in the Past Six Months by Region, Zambia

Vitamin A deficiency (VAD) is common in dry environments where fresh fruits and vegetables are not readily available. Vitamin A is found in breast milk, other milks, liver, eggs, fish, butter, red palm oil, mangos, papayas, carrots, pumpkins, and dark leafy greens. Unlike iron or folate, vitamin A is a fat-soluble vitamin, which means that consumption of oils or fats is necessary for its absorption into the body. The liver can store an adequate amount of the vitamin for four to six months. Periodic dosing (every four to six months) with vitamin A supplements is a rapid, low-cost method of ensuring that children at risk do not develop VAD. National Immunization Days for polio or measles vaccinations reach large numbers of children with vitamin A supplements as well.

In Zambia,

- **Sixty-seven percent of children 6-59 months received a vitamin A dose in the past six months.**
- **The rate of vitamin A supplementation for children varies throughout Zambia.** The rate of supplementation is lowest in the Eastern and Southern regions (52 and 53 percent, respectively) and highest in the Copperbelt region (83 percent).

Figure 11
Vitamin A Supplementation among Children 6-59 Months in
the Past Six Months by Region, Zambia

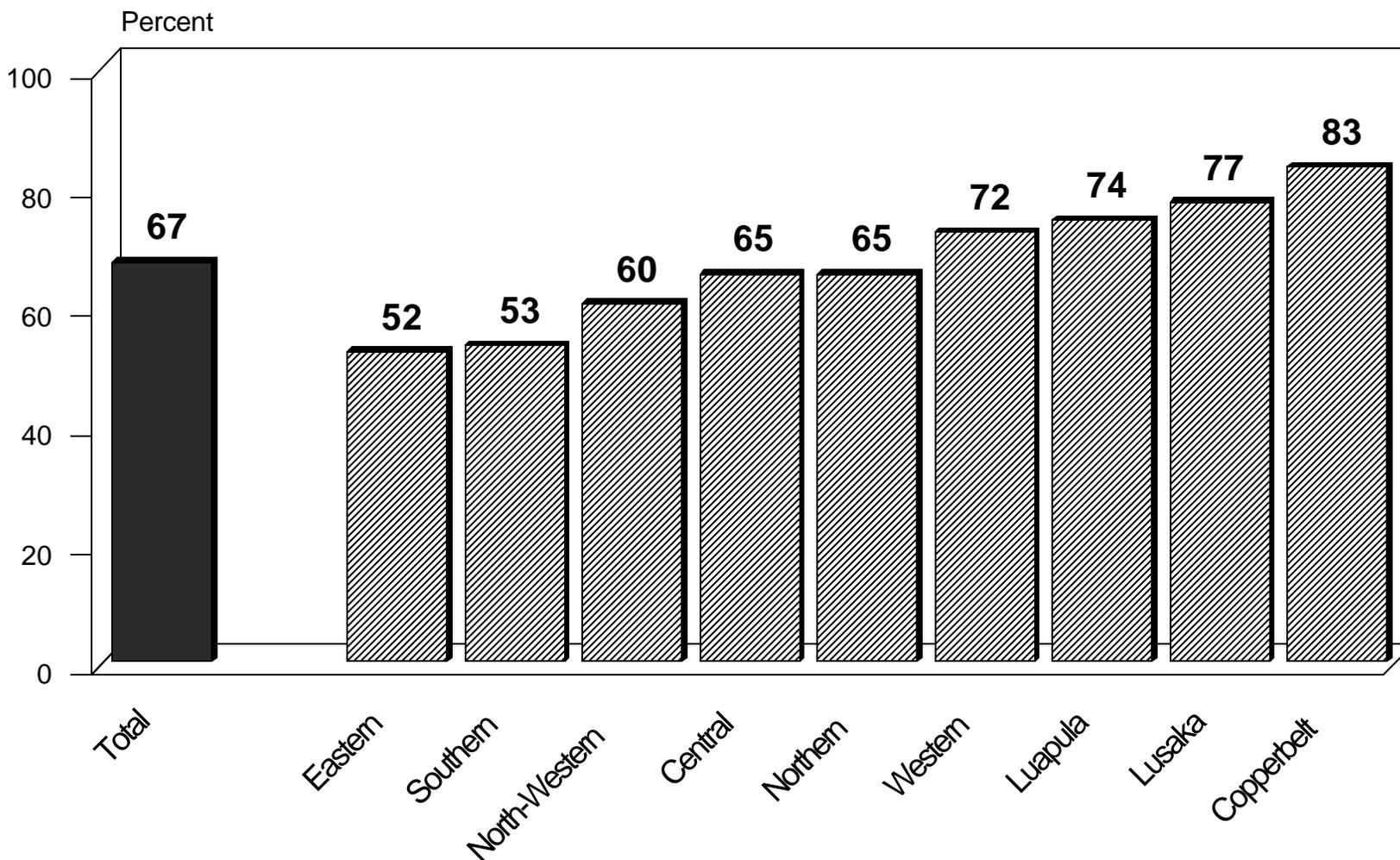


Figure 12: Iron Supplementation among Mothers of Children under Five Years, Zambia

Anemia is the lack of an adequate amount of hemoglobin in the blood. It can be caused by several different health conditions; iron and folate deficiencies are some of the most prevalent conditions related to anemia. Vitamin B₁₂ deficiency, protein deficiency, sickle cell disease, malaria, and parasite infection also cause anemia.

Iron-deficiency anemia is the most common form of nutritional deficiency worldwide. This type of nutritional deficiency develops slowly and does not manifest symptoms until anemia becomes severe. Diets that are heavily dependent on one grain or starch as the major staple often lack sufficient iron intake. Iron is found in meats, poultry, fish, grains, some cereals, and dark leafy greens (such as spinach). Foods rich in vitamin C increase absorption of iron into the blood. Tea, coffee, and whole-grain cereals can inhibit iron absorption. Anemia is common in children 6-24 months of age who consume a purely milk diet and in women during pregnancy and lactation. Iron-deficiency anemia is related to decreased cognitive development in children, decreased work capacity in adults, and limited chances of child survival. Severe cases are associated with the low birth weight of babies, perinatal mortality, and maternal mortality.

In Zambia,

- **Seventy-two percent of mothers received some iron supplementation during pregnancy.**
- **Of those women who received iron supplementation, 29 percent reported taking iron the recommended minimum number of days during their pregnancy (90 or more days).**

Figure 12

Iron Supplementation among Mothers of Children under Five Years, Zambia

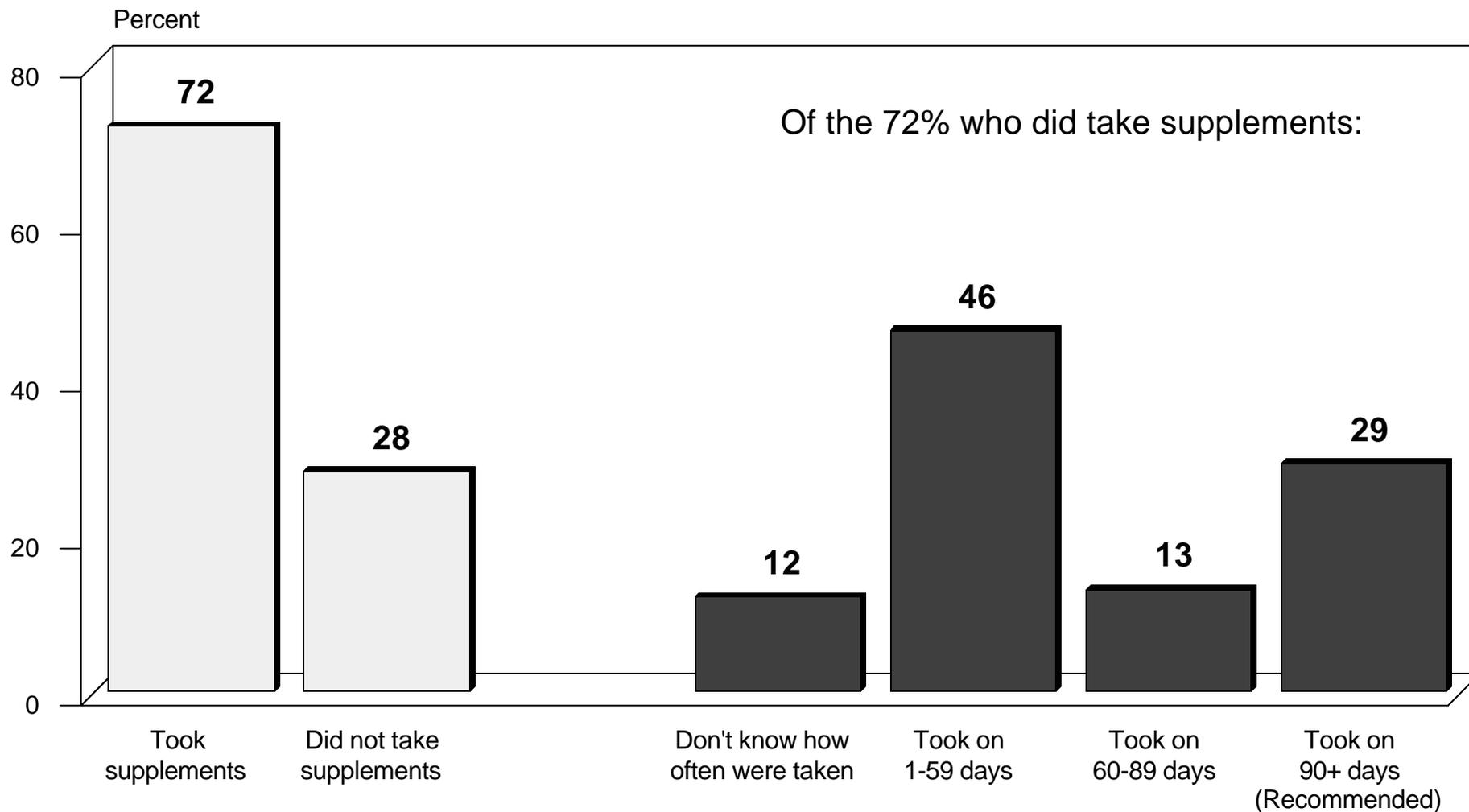


Figure 13: Diarrhea and Cough with Rapid Breathing among Children under Five Years Compared with Malnutrition Rates, Zambia

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

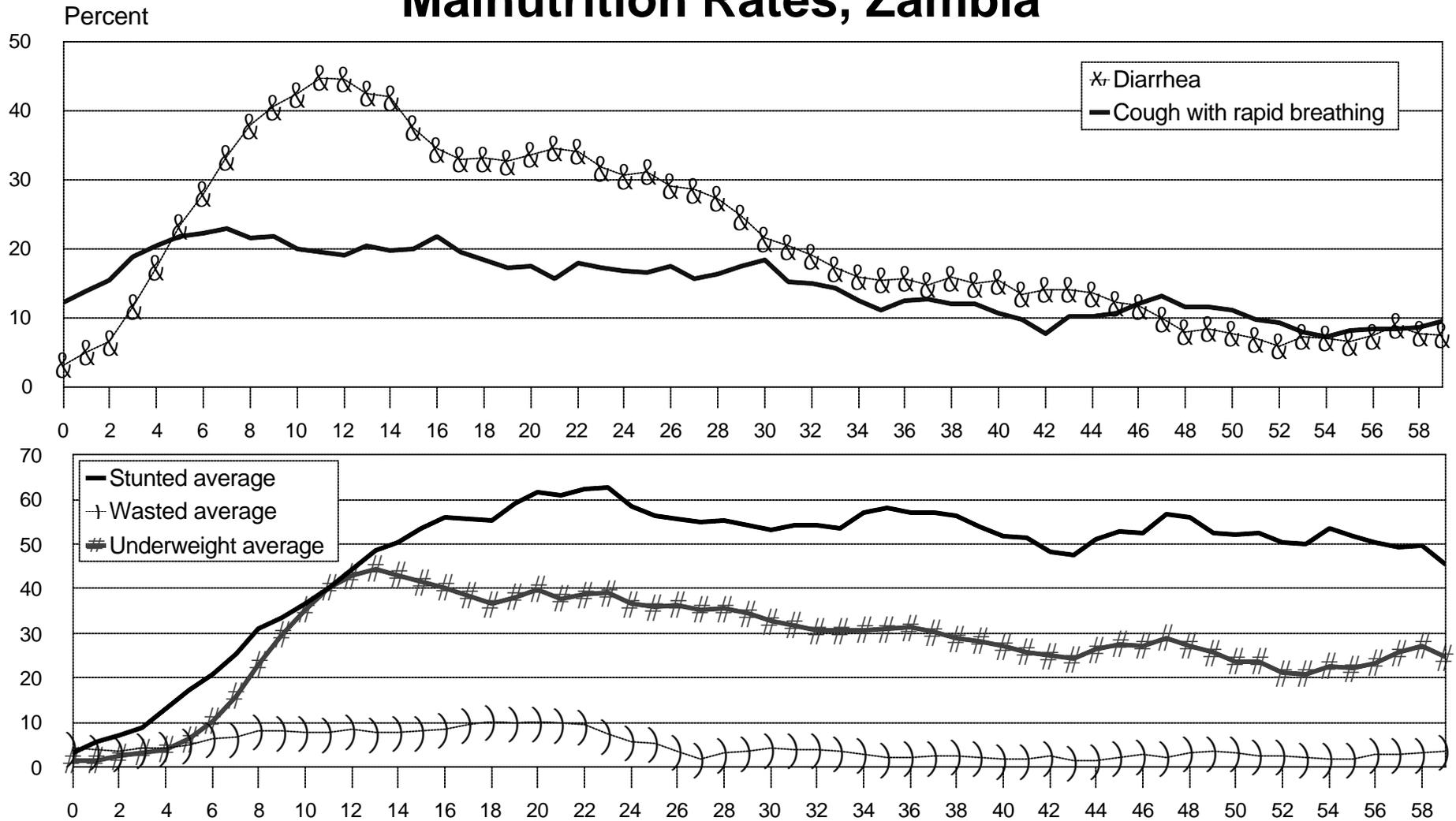
In Zambia,

- **Fifteen percent of children under five years of age experienced cough with rapid breathing in the two weeks preceding the survey.** Zambia's prevalence of cough with rapid breathing increases from 12 percent to 23 percent in the first 7 months and then gradually declines to 8 percent by 42 months of age, increases to 13 percent at 47 months, then decreases to 7 percent at 54 months.
- **Twenty-two percent of children under five years of age had diarrhea in the two weeks preceding the survey.** The prevalence of diarrhea increases rapidly from birth to 11 months, when it peaks at 45 percent. The rate then decreases steadily to 6 percent by 52 months, increasing slightly to 8 percent at 59 months.

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, when infants begin to crawl and move around, they tend to put objects in their mouth, again increasing the risk of pathogen contamination.

Figure 13

Diarrhea and Cough with Rapid Breathing among Children under Five Years Compared with Malnutrition Rates, Zambia



Note: Plotted values are smoothed by a five-month moving average.

Underlying Biological and Behavioral Influences of Malnutrition

Figure 14: Fertility and Birth Intervals, Zambia Compared with Other Sub-Saharan Countries

High fertility rates, especially when accompanied by short birth intervals, are detrimental to children's nutritional status. In most countries in sub-Saharan Africa, families have scarce 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 maternal health, thus influencing a mother's ability to provide adequate care for her children. The most widely used measure of current fertility is the total fertility rate, which is defined as the number of children a woman would have by the end of her childbearing years if she were to pass through those years bearing children at the currently observed age-specific rates.

Information on the length of birth intervals provides insight into birth spacing patterns. Research has shown that children born too soon after a previous birth are at increased risk of poor nutrition and health and increased risk of dying, particularly when that interval is less than 24 months. The odds of stunting and underweight have been shown to be higher when birth intervals are less than 36 months. Short birth intervals are associated with small birth size and low birth weight, both of which are precursors to poor nutritional status in early childhood.

- **At current fertility rates, a woman in Zambia will have an average of 5.9 children by the end of her childbearing years.** This rate puts Zambia in the upper third of the sub-Saharan countries surveyed between 1998 and 2002.
- **Zambia's mothers have a median birth interval of 33 months.** This interval is in the midrange of the countries surveyed.

Figure 14

Fertility and Birth Intervals, Zambia Compared with Other Sub-Saharan Countries

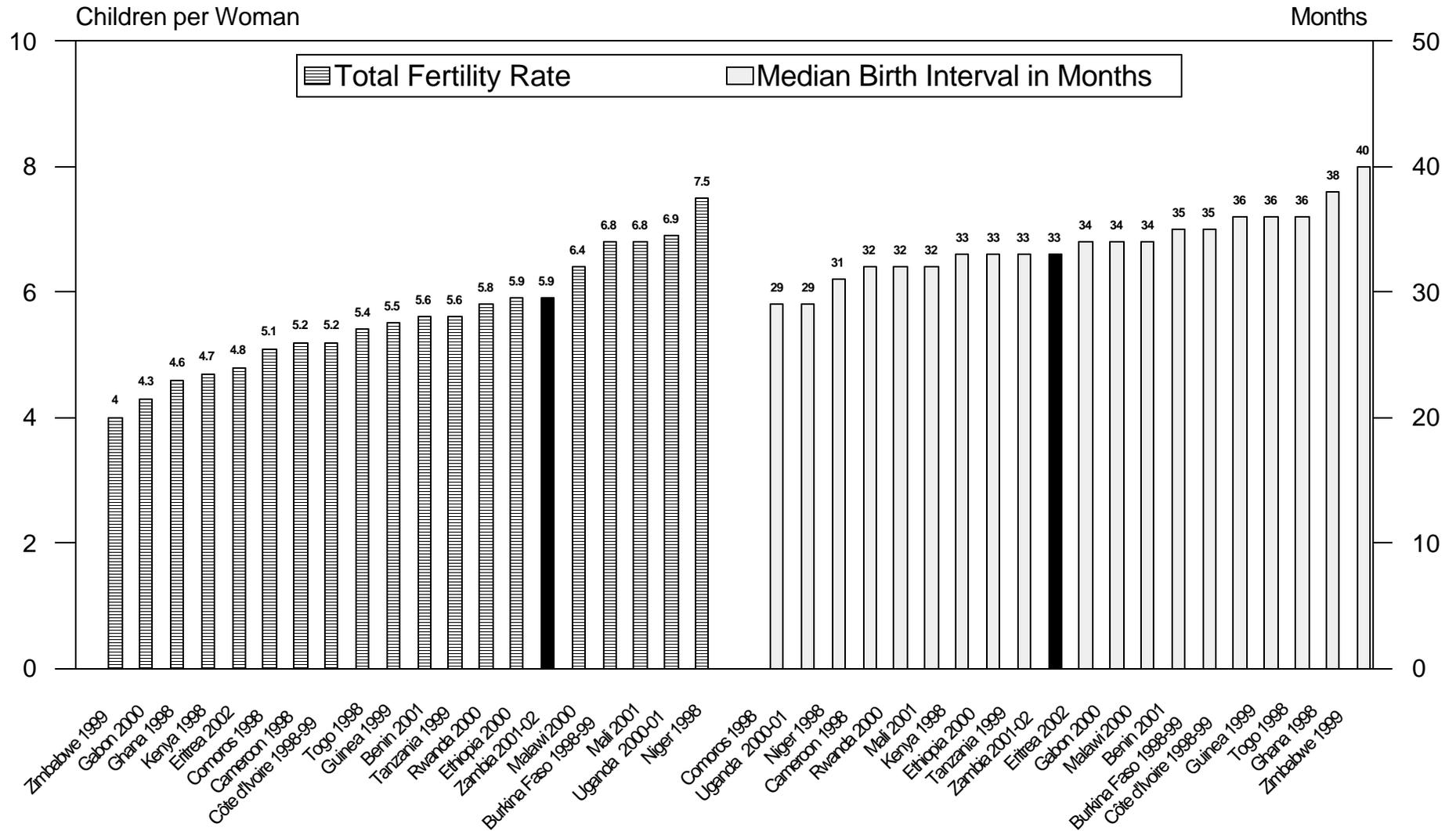


Figure 15: Undernutrition among Children Age 12-23 Months by Measles Vaccination Status, Zambia

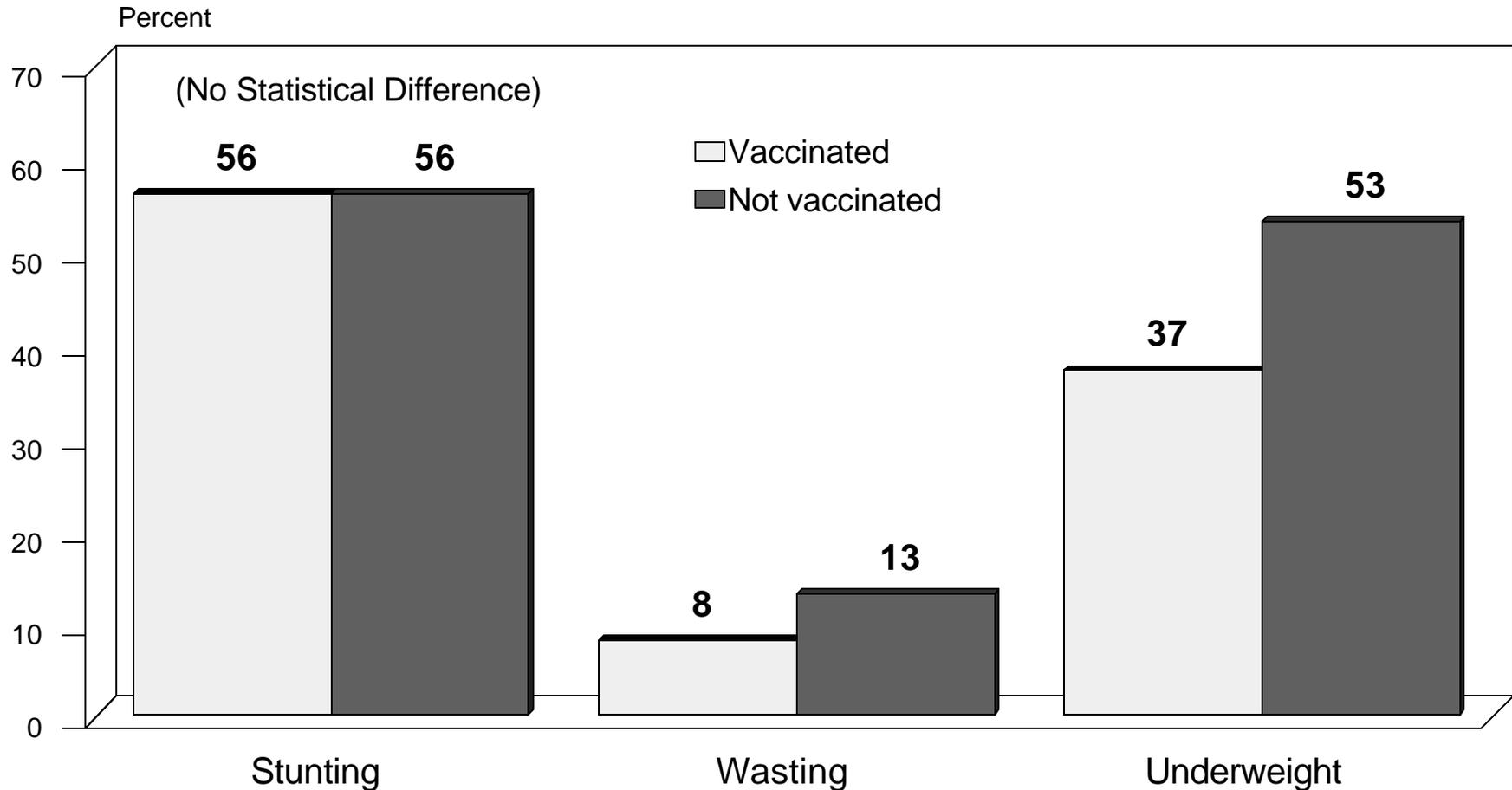
Measles is estimated to kill two million children a year, all in developing countries. It is one of the most common diseases during childhood in areas with low immunization coverage. Measles not only increases the risk of death but also is a direct cause of malnutrition. The occurrence of measles in poor environments is associated with faltering growth, vitamin A deficiency, and immune suppression. Although infants are not protected from measles by their mother's breast milk, they are protected by their mother's measles antibodies acquired while in the womb. These antibodies can last up to 15 months in infants, but due to malnutrition, last only eight or nine months in children in developing countries. Therefore, measles vaccination is an important child health strategy.

In Zambia,

- **Chronic malnutrition is not statistically related to measles vaccination status.**
- **Acute malnutrition is statistically related to measles vaccination status.** Wasting is higher among children who did not receive a measles vaccination (13 percent) than among those who did (8 percent).
- **Undernutrition is statistically related to measles vaccination status.** Underweight is higher among children who who did not receive a measles vaccination (53 percent) than among those who did (37 percent).

Figure 15

Undernutrition among Children Age 12-23 Months by Measles Vaccination Status, Zambia



Note: *Stunting* reflects chronic malnutrition; *wasting* reflects acute malnutrition; *underweight* reflects chronic or acute malnutrition or a combination of both.

Figure 16: Measles Vaccination Coverage among Children Age 12-23 Months, Zambia Compared with Other Sub-Saharan Countries

- The prevalence of measles vaccination ranges from 27 to 87 percent among the sub-Saharan countries surveyed.
- **In Zambia, 85 percent of children 12-23 months of age have been vaccinated against measles.** This level of coverage is one of the highest among the sub-Saharan countries surveyed.

Figure 16

Measles Vaccination Coverage among Children Age 12-23 Months, Zambia Compared with Other Sub-Saharan Countries

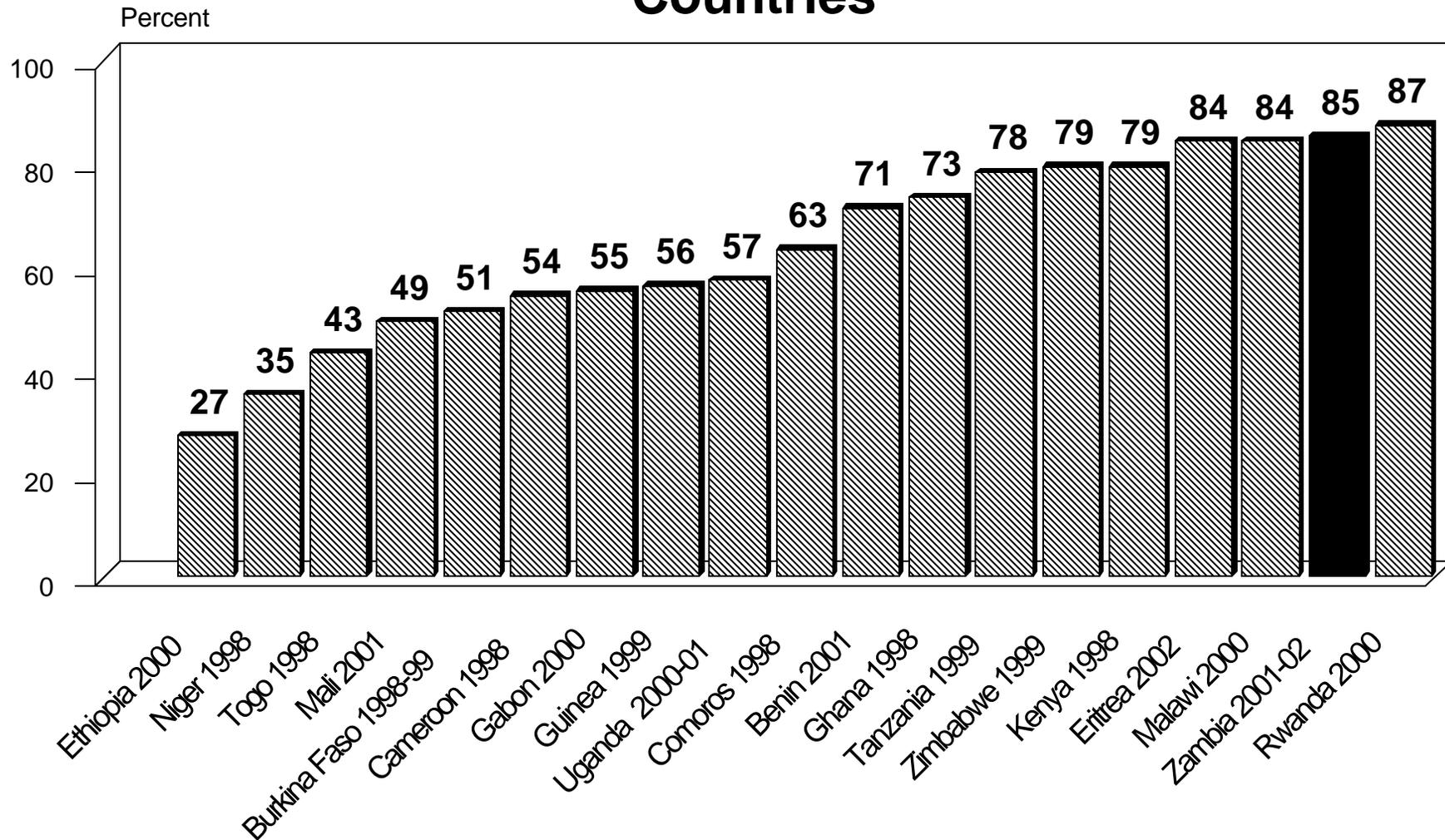


Figure 17: Feeding Practices for Infants under Six Months, Zambia

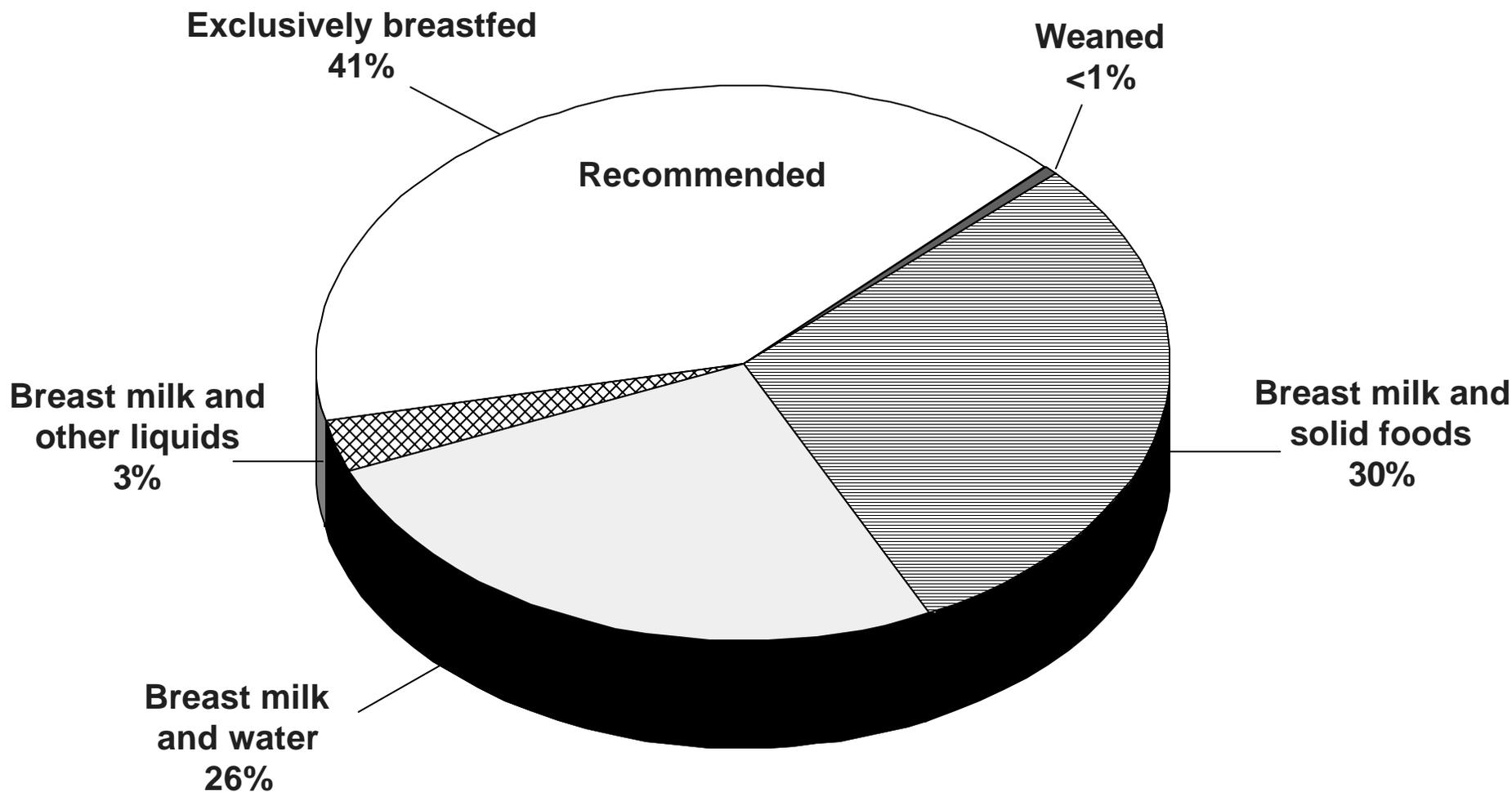
Improper feeding practices, in addition to diarrheal disease, are important determinants of malnutrition. WHO and UNICEF recommend that *all infants be breastfed exclusively from birth until six months of age*. In other words, infants should be fed only breast milk during the first six months of life.

In Zambia, the introduction of liquids, such as water, sugar water, and juice, formula, and solid foods, takes place earlier than the recommended age of about six 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 young infants liquids and solid foods increases their exposure to pathogens, thus putting them at greater risk of diarrheal disease.

- **In Zambia, 41 percent of children under the age of six months are exclusively breastfed, as is recommended by WHO and UNICEF.**
- **Thirty-three percent of infants under six months are given some form of liquid or solid food other than breast milk and/or water. Another 26 percent are given only breast milk and water.**
- **Less than 1 percent of infants under six months are fully weaned.**

Figure 17

Feeding Practices for Infants under Six Months, Zambia



Note: WHO and UNICEF recommend that all infants be breastfed exclusively up to six months of age.

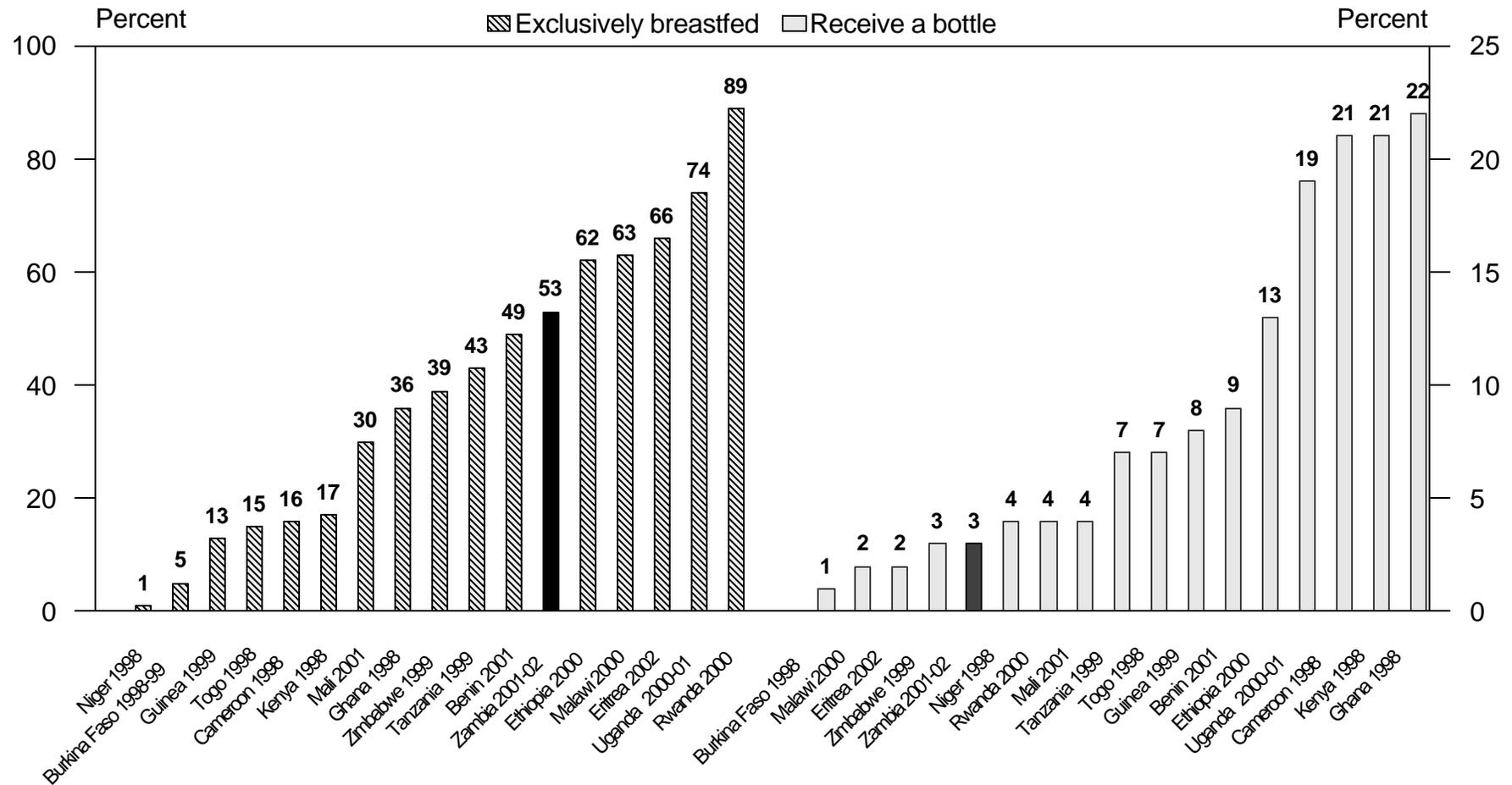
Figure 18: Infants under Four Months Who Are Exclusively Breastfed and Those Who Receive a Bottle, Zambia Compared with Other Sub-Saharan Countries

Not breastfeeding young infants exclusively, and introducing liquids and solid foods at too early an age increases the risk of diarrheal disease, an important cause of childhood mortality in Africa.

- In most of the sub-Saharan countries surveyed, relatively few mothers of infants under four months follow the recommended practice of breastfeeding exclusively. **In Zambia, 53 percent of these mothers breastfeed their young infants exclusively.** This puts Zambia in the midrange of the sub-Saharan countries surveyed and is a substantial increase from 1996 (26 percent).
- **Bottle-feeding is practiced by 3 percent of mothers of infants under four months in Zambia.** This rate puts Zambia in the lower one-third of sub-Saharan countries surveyed and is a slight decrease from 1996 (4 percent). **Bottle-feeding is not recommended** because improper sanitation and formula preparation with bottle-feeding can introduce pathogens to the infant, putting the child at a greater risk of illness and malnutrition.

Figure 18

Infants under Four Months Who Are Exclusively Breastfed and Those Who Receive a Bottle, Zambia Compared with Other Sub-Saharan Countries



Note: Information on feeding practices is based on the 24 hours before the survey. WHO and UNICEF recommend that all infants should receive nothing but breast milk up to six months of age.

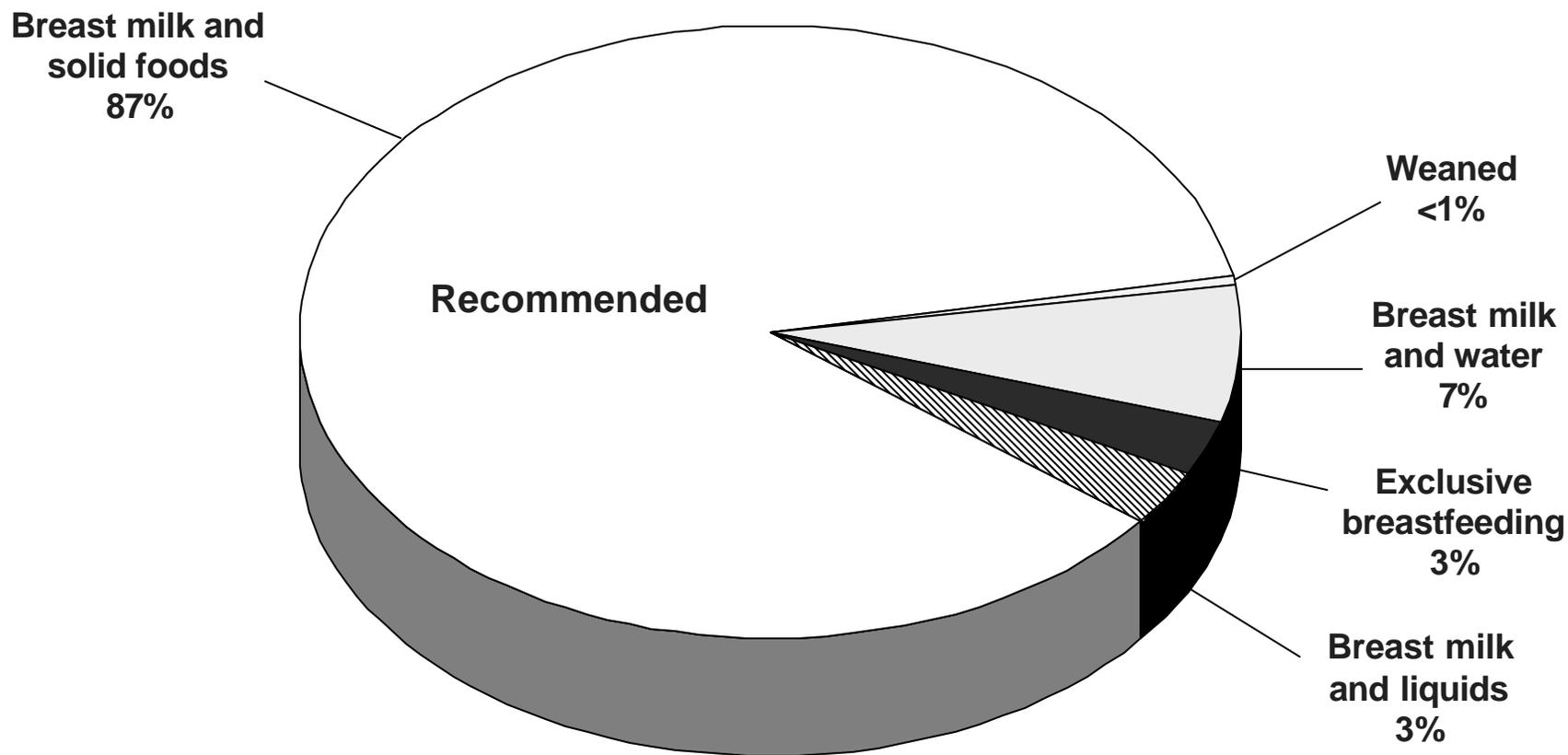
Figure 19: Feeding Practices for Infants Age 6-9 Months, Zambia

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

- **In Zambia, 87 percent of infants age 6-9 months are fed solid foods in addition to breast milk.** This means that most infants age 6-9 months are fed according to the recommended practice.
- **Thirteen percent of infants age 6-9 months are not fed solid foods in addition to breast milk, which puts these children at risk for malnutrition.**
- **Less than 1 percent of infants age 6-9 months are fully weaned** and are thus not receiving the additional nutritional and emotional support of breastfeeding.

Figure 19

Feeding Practices for Infants Age 6-9 Months, Zambia



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

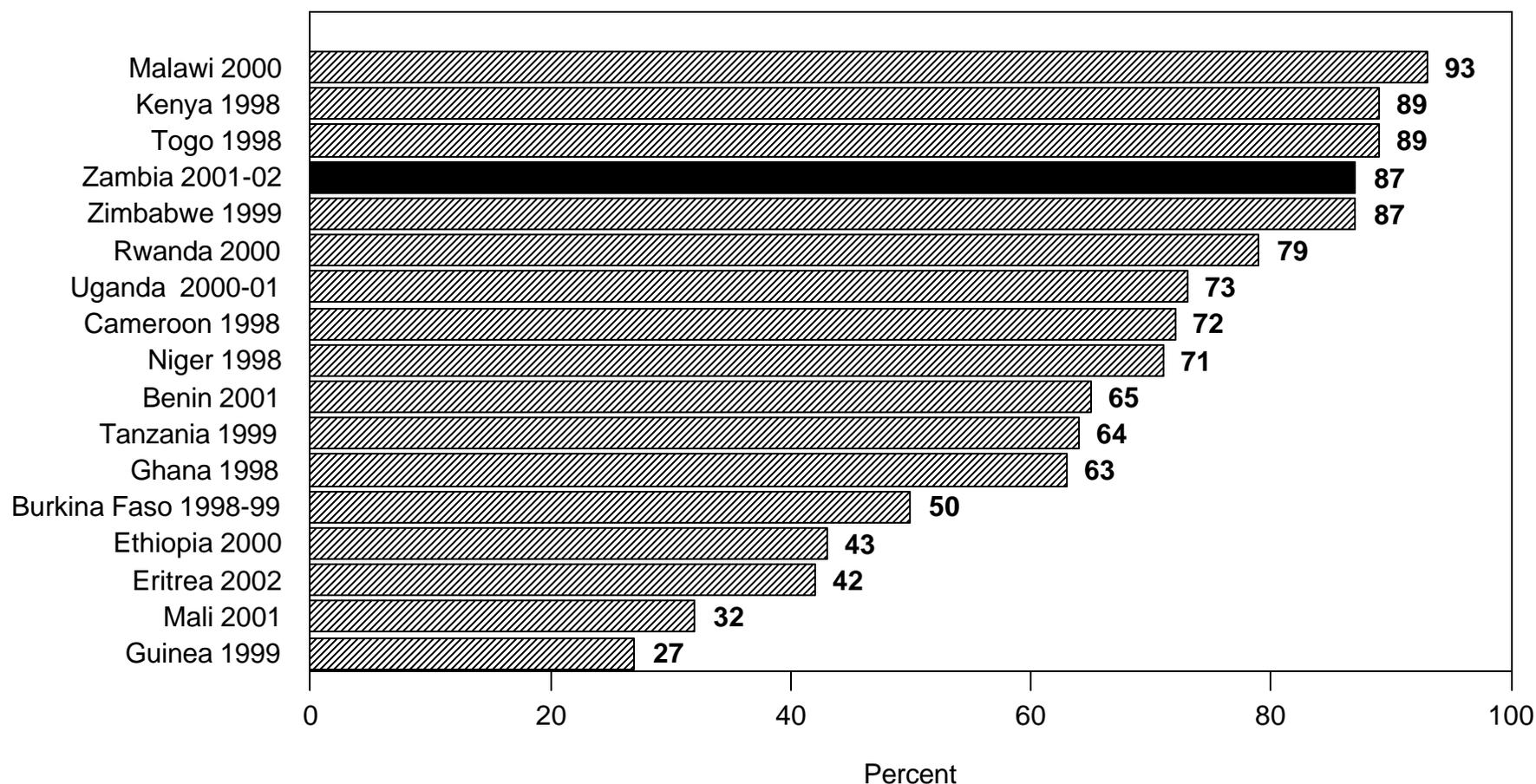
Figure 20: Infants Age 6-9 Months Receiving Solid Foods in Addition to Breast Milk, Zambia Compared with Other Sub-Saharan Countries

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

- The percentage of infants 6-9 months receiving solid food in addition to breast milk ranges from 27 to 93 percent among the sub-Saharan countries surveyed.
- In Zambia, **87 percent of infants age 6-9 months receive solid food in addition to breast milk.** This is one of the highest levels among the sub-Saharan countries surveyed.

Figure 20

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



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

Figure 21: Children 10-23 Months Who Continue to Be Breastfed, Zambia Compared with Other Sub-Saharan Countries

For older infants and toddlers, breast milk continues to be an important source of energy, protein, and micronutrients. Studies have shown that in some populations, breast milk is the most important source of vitamin A and fat among children over 12 months of age. Breastfeeding older infants also reduces their risk of infection, especially those that cause diarrhea.

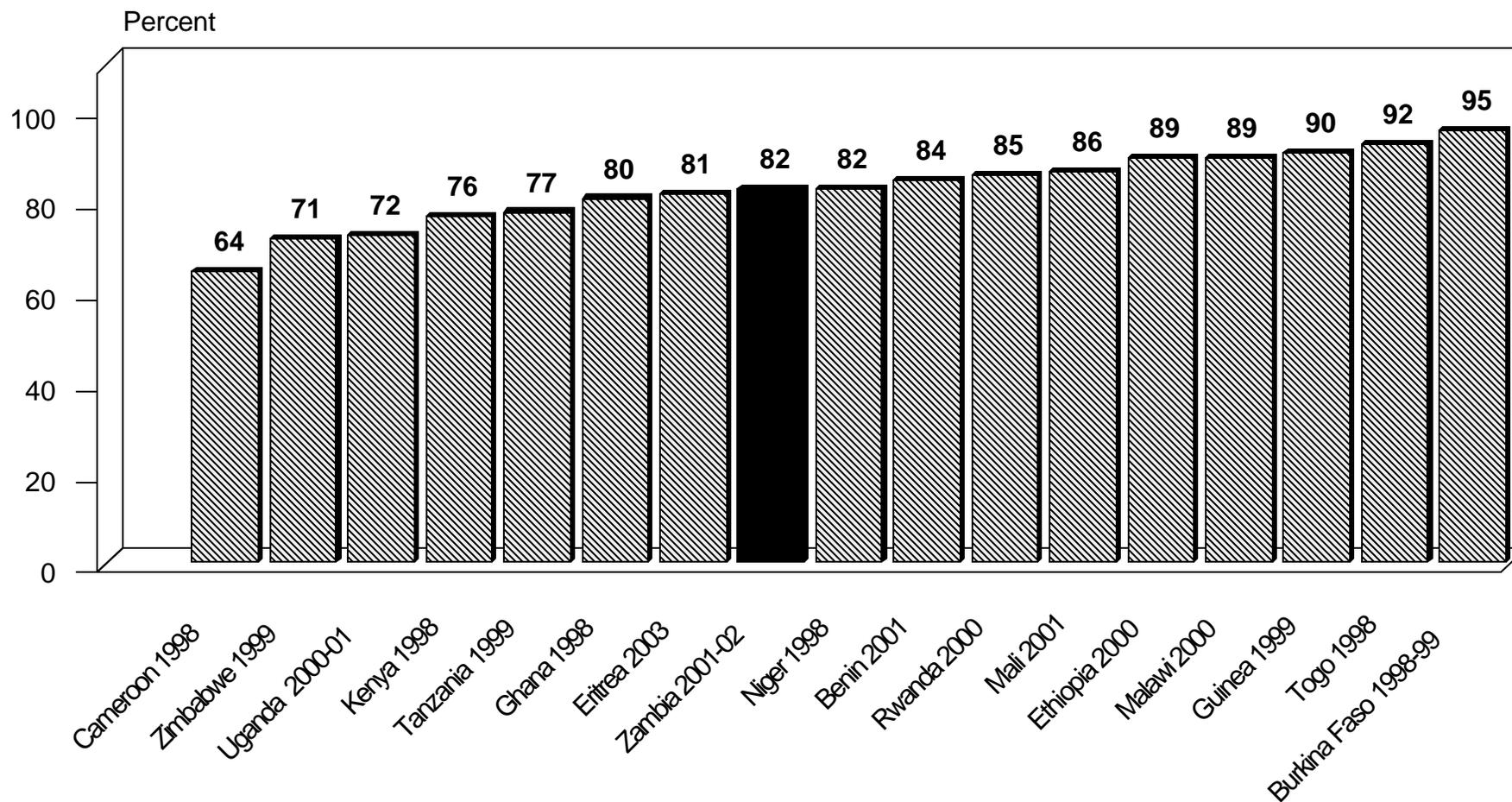
Additionally, breastfeeding up to 24 months can help reduce a woman's fertility, especially in areas where contraception is limited. Women who breastfeed for longer periods have lower fertility rates than women who breastfeed for shorter periods.

In Zambia,

- **Eighty-two percent of children age 10-23 months are still given breast milk.** This is in the midrange of the sub-Saharan countries surveyed.

Figure 21

Children 10-23 Months Who Continue to Be Breastfed, Zambia Compared with Other Sub-Saharan Countries



Note: Information on feeding practices is based on the 24 hours before the survey. WHO and UNICEF recommend that all children should continue to be breastfed up to 24 months of age.

Underlying Social and Economic Influences of Malnutrition

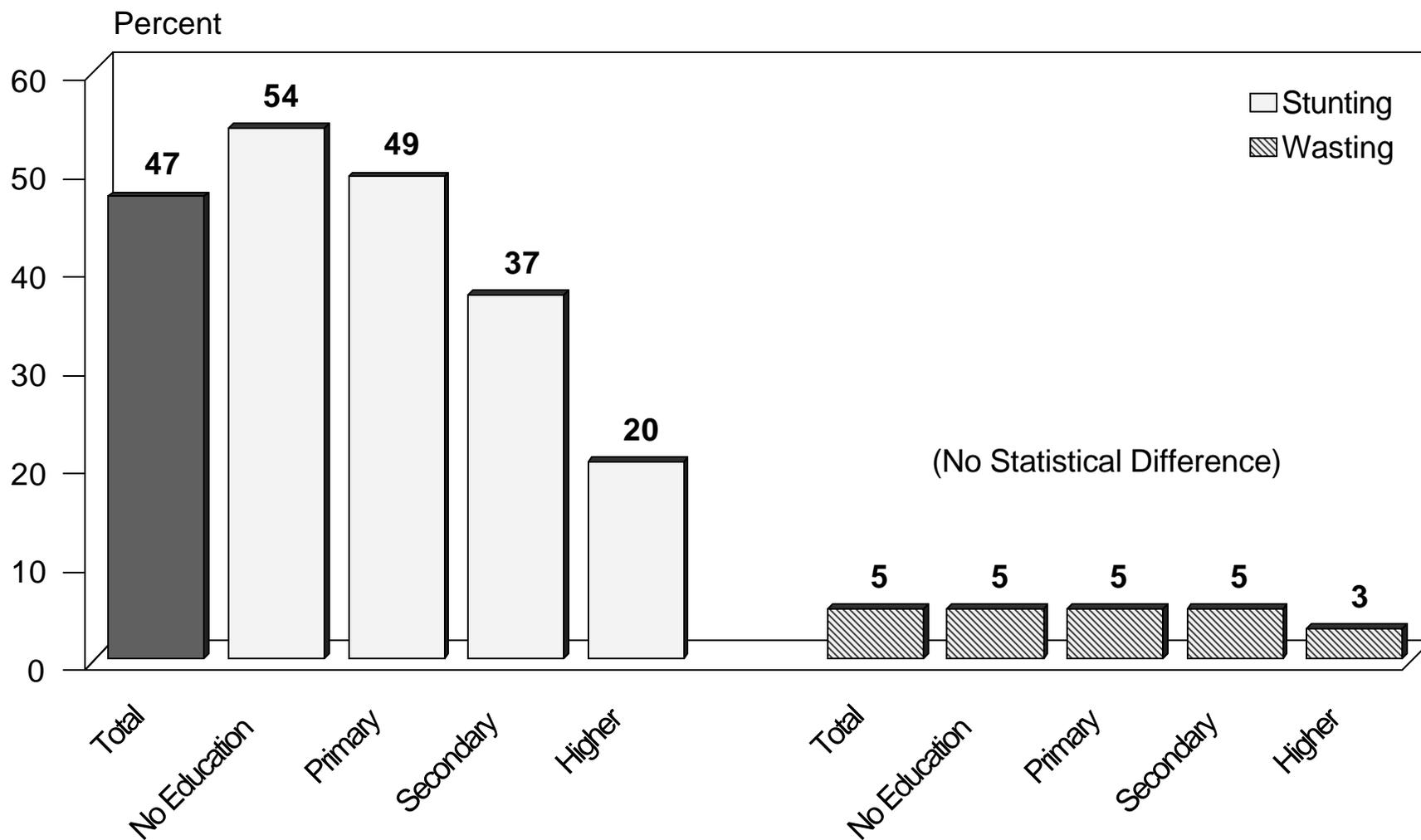
Figure 22: Stunting and Wasting among Children under Five Years by Mother's Education, Zambia

Maternal education is related to knowledge of good child care practices and to household wealth. In Zambia, 14 percent of the mothers of children under five years of age have never attended school, while 62 percent have at least some primary education, 22 percent have at least some secondary education, and 2 percent have some higher education. There are variations in school attendance, especially between urban and rural areas. In the rural areas, 19 percent of the mothers have never attended school, 67 percent have attended primary school, 13 percent have attended secondary school, and less than 1 percent have gone on to higher education. In contrast, 6 percent of mothers in the capital and large cities and 3 percent of the mothers in small cities and towns have never attended school, while 6 percent in the capital and large cities and 4.5 percent in small cities and towns have gone on to higher education. Mothers in the Copperbelt had the highest likelihood of receiving a secondary or higher education (43 percent), compared to 12 to 35 percent in the rest of Zambia's regions.

- Maternal education has an inverse relationship with stunting in Zambia. **As the level of maternal education increases, the level of stunting decreases.**
- The difference in the level of stunting between children of mothers with no education and those whose mothers have a primary education is 5 percent. The difference between children of mothers with no education and children of mothers with a secondary education is 17 percent, and the difference between children of mothers with no education and children of mothers with a higher education is 34 percent.
- There is no statistical difference between a child's wasting status and maternal education.

Figure 22

Stunting and Wasting among Children under Five Years by Mother's Education, Zambia



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

Figure 23: Stunting and Wasting among Children under Five Years by Source of Drinking Water, Zambia

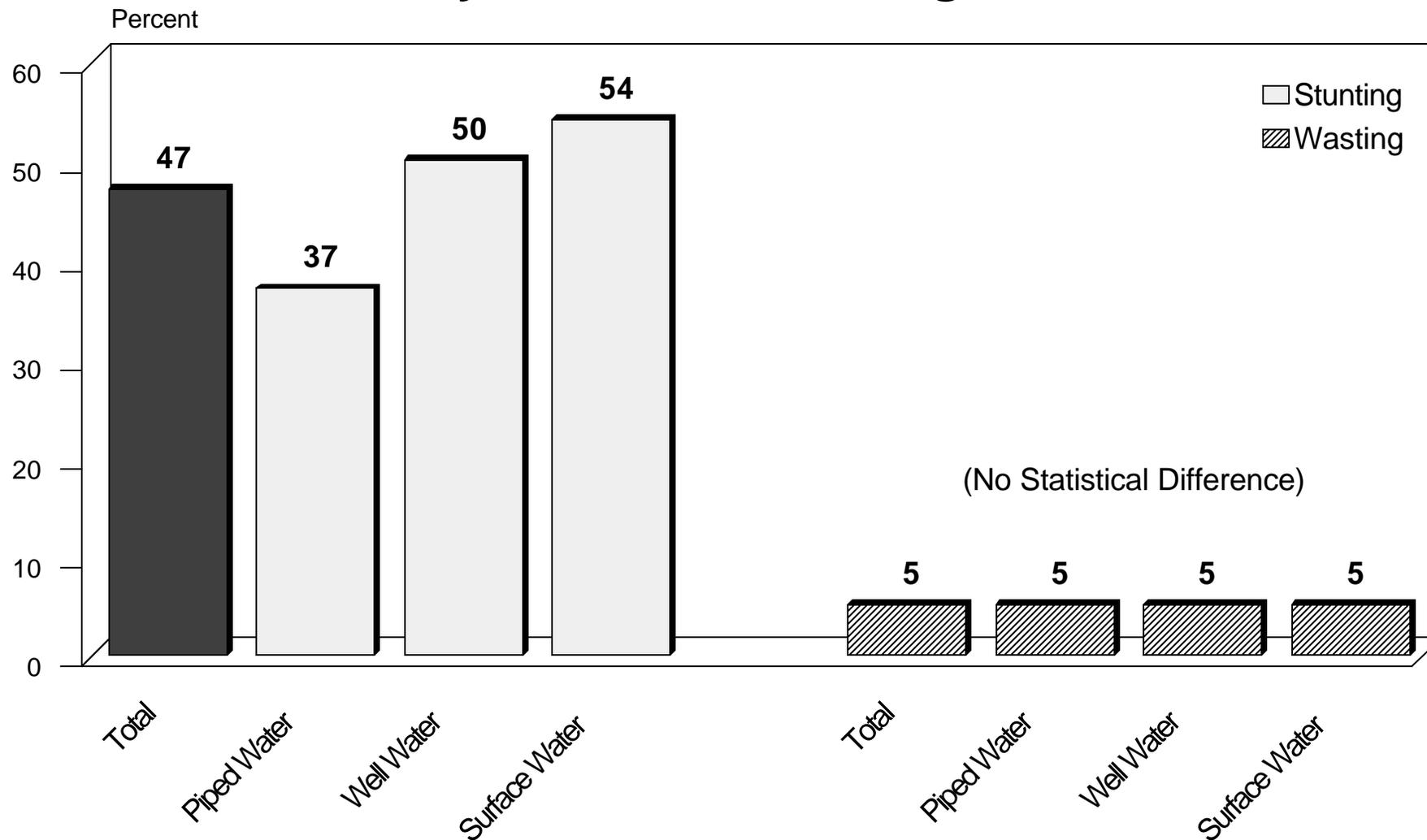
A household's source of drinking water is linked with its socioeconomic status. Poor households are more likely to obtain drinking water from contaminated sources such as surface water or open wells. Without an adequate supply of good-quality water, the risks of food contamination, diarrheal disease, and malnutrition rise. Infants and children from households that do not have a private tap are at greater risk of being malnourished than those from households with this amenity. Among the households surveyed with children under five years, 32 percent use piped water, 48 percent obtain their drinking water from a well, and 20 percent use surface water.

In Zambia,

- **Children whose drinking water is well water or surface water are more likely to be stunted (50 percent and 54 percent, respectively) than children with access to piped water (37 percent).**
- There is no statistical relationship between source of drinking water and wasting.

Figure 23

Stunting and Wasting among Children under Five Years by Source of Drinking Water, Zambia



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

Figure 24: Stunting and Wasting among Children under Five Years by Type of Toilet, Zambia

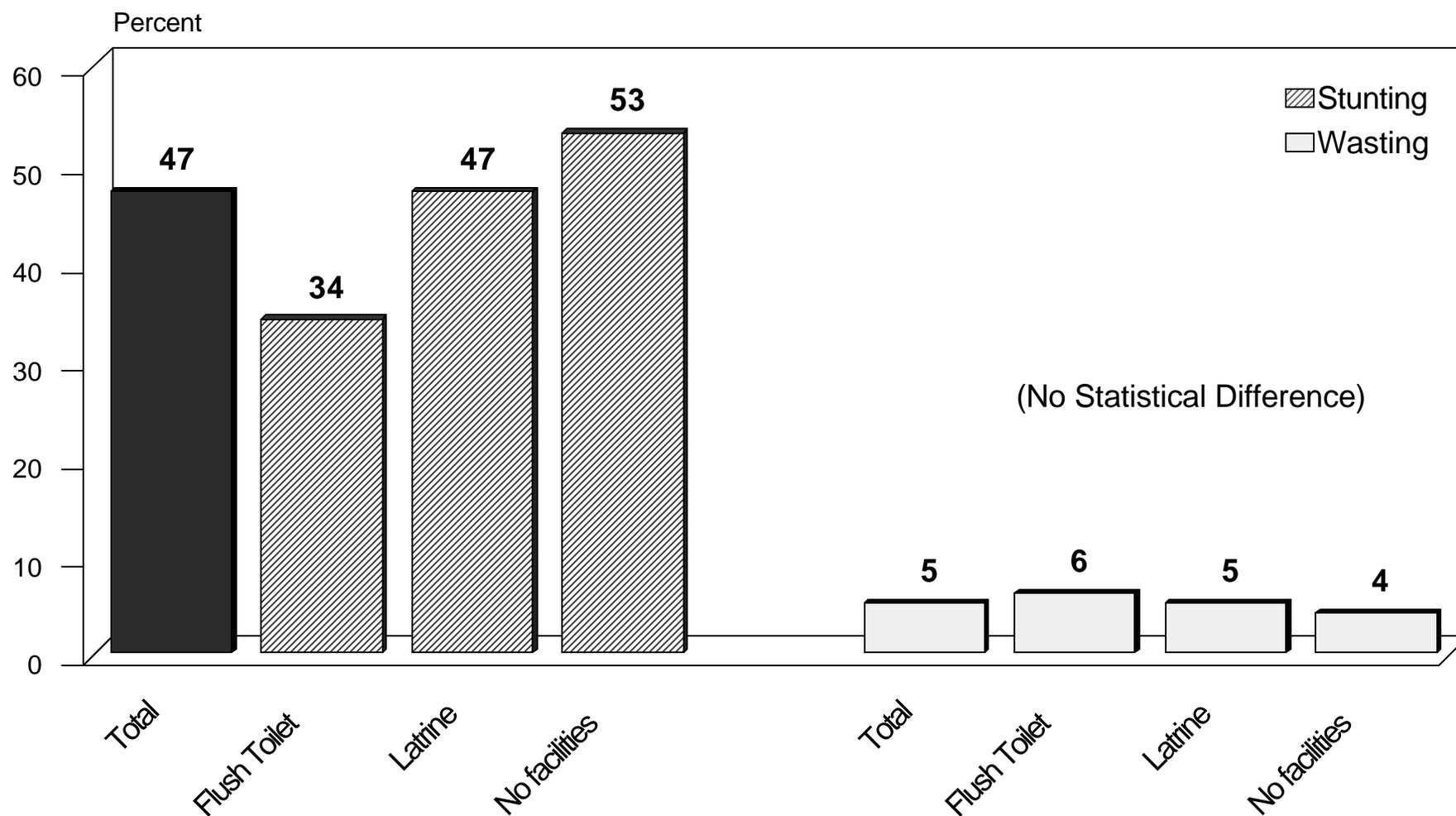
The type of toilet used by a household reflects its wealth, and poor households are less likely to have adequate toilet facilities. Inadequate sanitation facilities result in an increased risk of diarrheal disease, which contributes to malnutrition. Infants and children from households that do not have ready access to a flush toilet are at greater risk of being malnourished than children from households with this amenity. In Zambia, 55 percent of households have access to a latrine, 30 percent have no facilities, and 15 percent of surveyed households have access to a flush toilet.

In Zambia,

- Children who have no access to toilet facilities or those who have access to a latrine are more likely to be stunted (47 percent and 53 percent, respectively) than children with access to a flush toilet (34 percent).
- There is no statistical relationship between type of toilet and wasting.

Figure 24

Stunting and Wasting among Children under Five Years by Type of Toilet, Zambia



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

Basic Influences

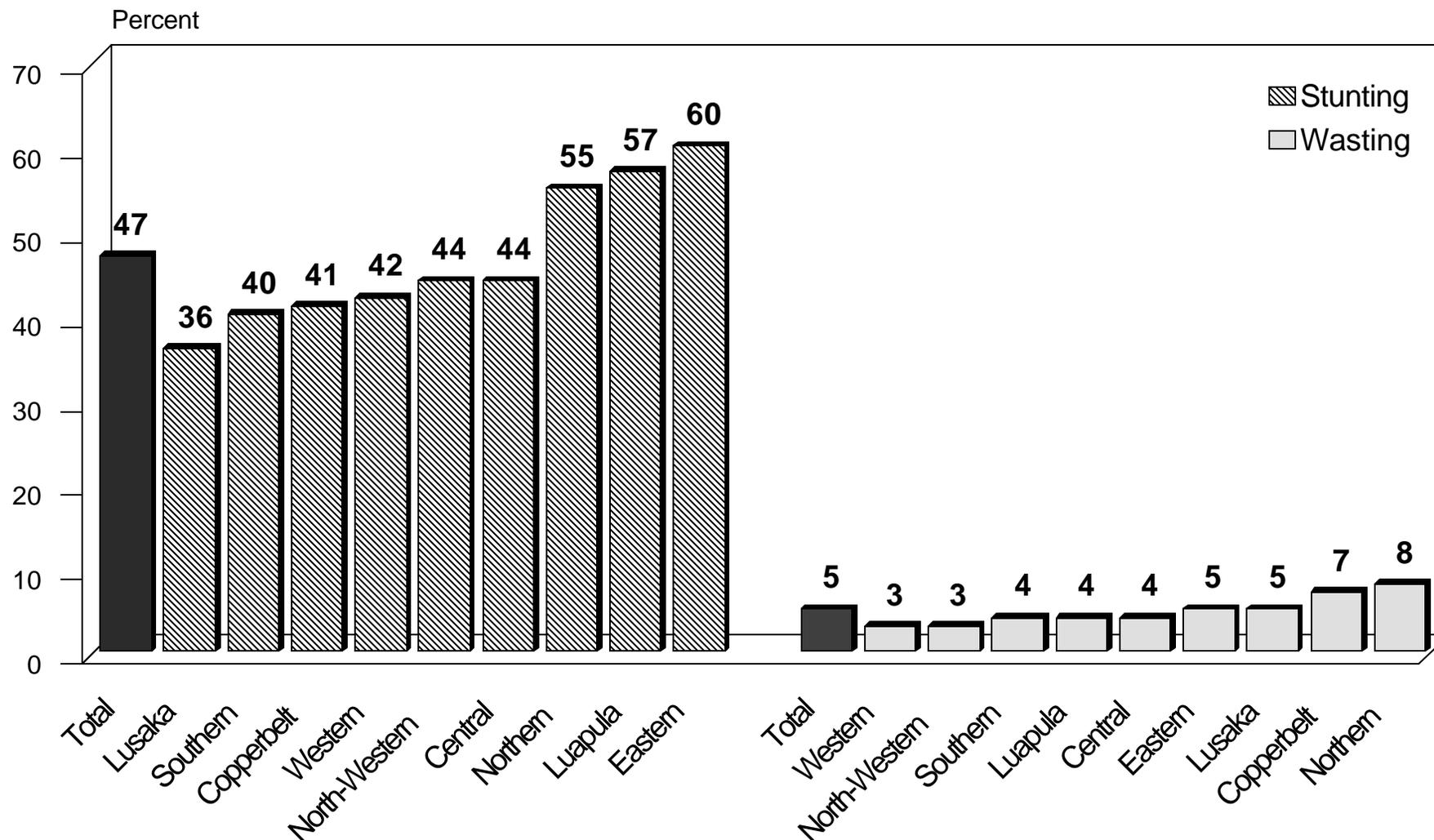
Figure 25: Stunting and Wasting among Children under Five Years by Region, Zambia

In Zambia,

- **Stunting ranges from 36 to 60 percent among children in the nine regions.** Stunting rates are lowest in Lusaka (36 percent) and highest in the Eastern region (60 percent).
- **Wasting ranges from 3 to 8 percent among children in the nine regions.** Wasting rates are lowest in the Western region (3 percent) and highest in the Northern region (8 percent).

Figure 25

Stunting and Wasting among Children under Five Years by Region, Zambia



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

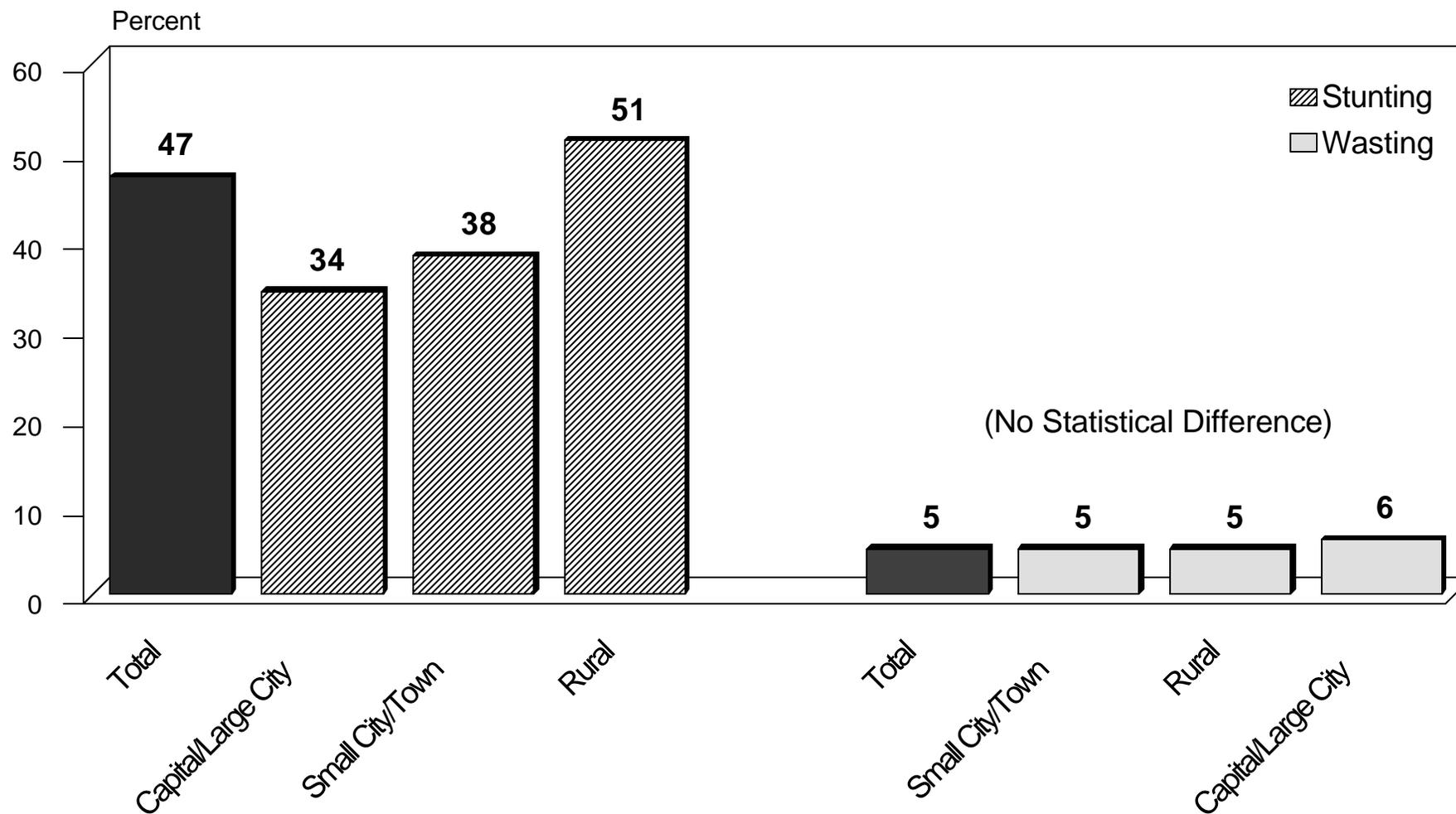
Figure 26: Stunting and Wasting among Children under Five Years by Urban-Rural Residence, Zambia

In Zambia,

- **Fifty-one percent of rural children are stunted.** In the capital and other large cities, 34 percent of children are affected by chronic malnutrition, and in other urban areas (small cities or towns), the rate of stunting is 38 percent.
- There is no statistical relationship urban-rural status and wasting.

Figure 26

Stunting and Wasting among Children under Five Years by Urban-Rural Residence, Zambia



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

Maternal Nutritional Status

Figure 27: Malnutrition among Mothers of Children under Five Years by Region, Zambia

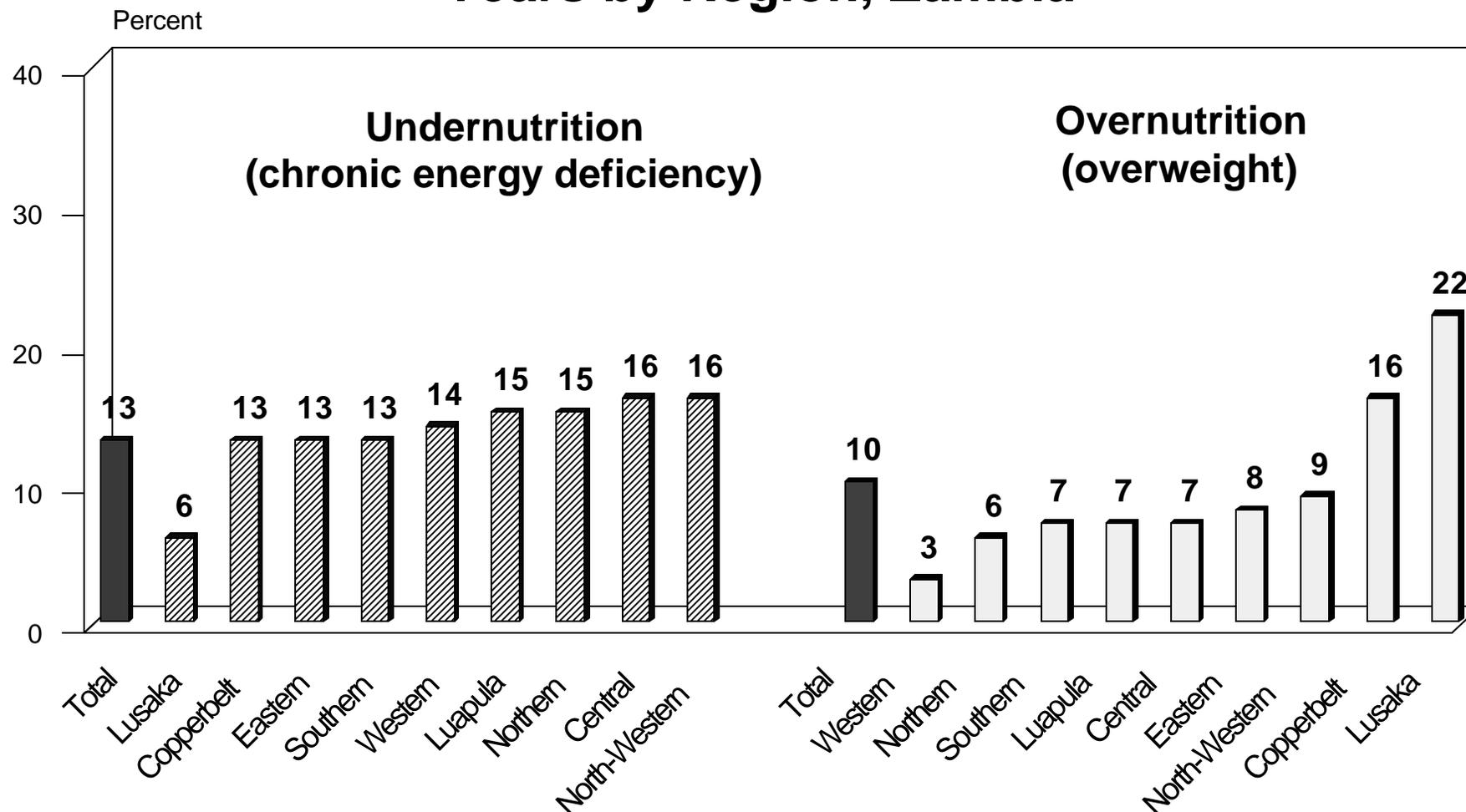
Besides being of concern in its own right, a mother's nutritional status affects her ability to carry, deliver, and care for her children successfully. There are generally accepted standards that can be applied for indicators of malnutrition among adult women.

Malnutrition in women can be assessed by 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, $BMI = \text{kg}/\text{m}^2$. When the BMI is below the suggested cutoff point of 18.5, this indicates chronic energy deficiency or undernutrition for nonpregnant, nonlactating women. When the BMI is above 25, women are considered overweight.

- **Thirteen percent of mothers of children under age five in Zambia are undernourished.** The highest levels of maternal undernutrition are in the Central and North-Western regions (16 percent). The lowest level is in Lusaka (6 percent).
- **Ten percent of mothers of children under five are overweight.** The highest level of maternal overnutrition is in Lusaka (22 percent). The lowest level is in the Western region (3 percent).

Figure 27

Malnutrition among Mothers of Children under Five Years by Region, Zambia



Note: Maternal undernutrition is the percentage of mothers whose BMI (kg/m^2) is less than 18.5. Maternal overnutrition is the percentage of mothers whose BMI is greater than 25.

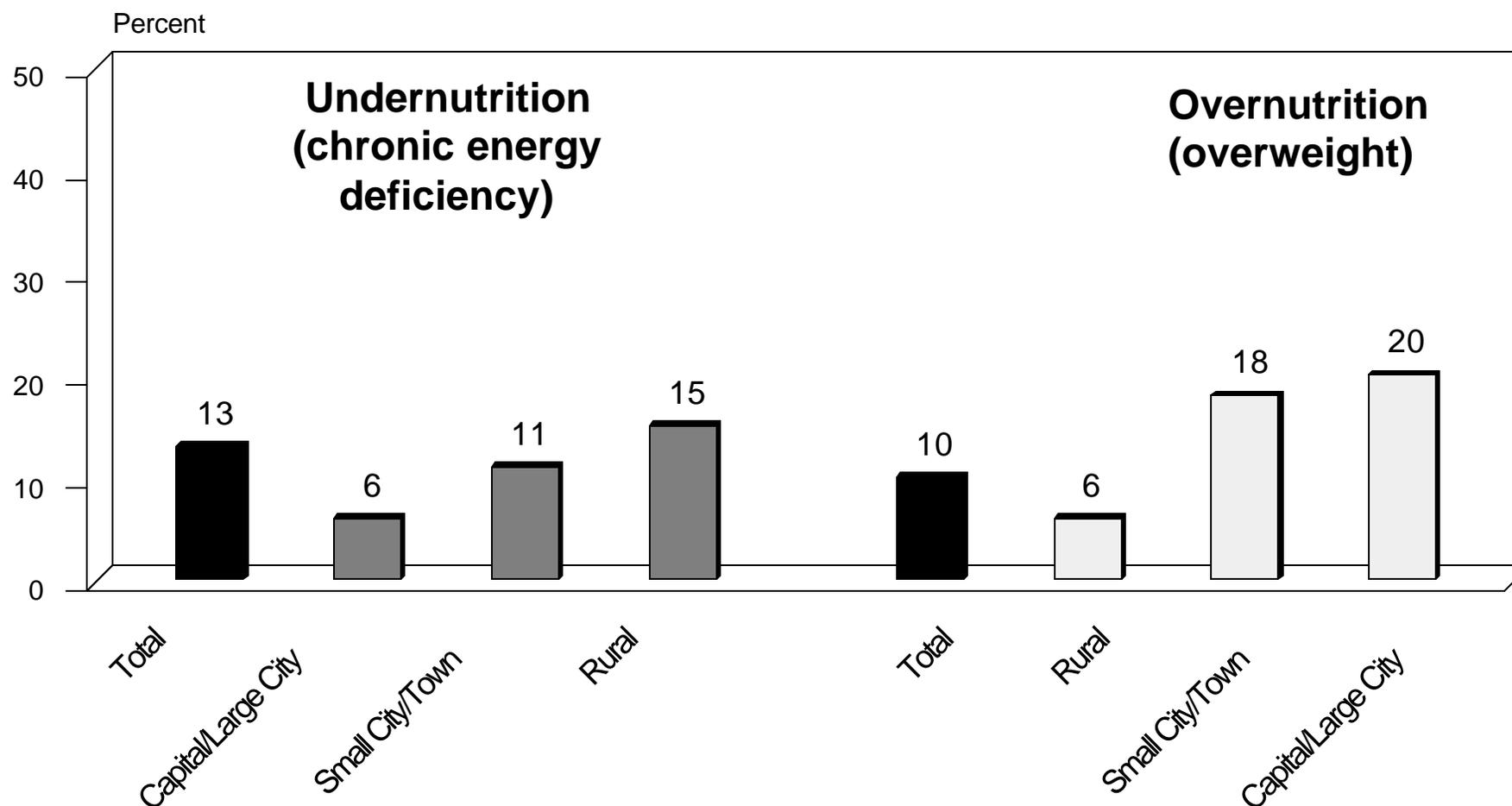
Figure 28: Malnutrition among Mothers of Children under Five Years by Residence, Zambia

In Zambia,

- **The undernutrition rate (chronic energy deficiency) for mothers of children under five is 6 percent in the capital and other large cities, 11 percent in small cities and towns, and 15 percent in rural areas.**
- **The overnutrition rate (overweight) for mothers of children under five is lowest in rural areas (6 percent) and highest in the capital and other large cities (20 percent).**

Figure 28

Malnutrition among Mothers of Children under Five Years, by Residence, Zambia



Note: Maternal undernutrition is the percentage of mothers whose BMI (kg/m^2) is less than 18.5. Maternal overnutrition is the percentage of mothers whose BMI is greater than 25.

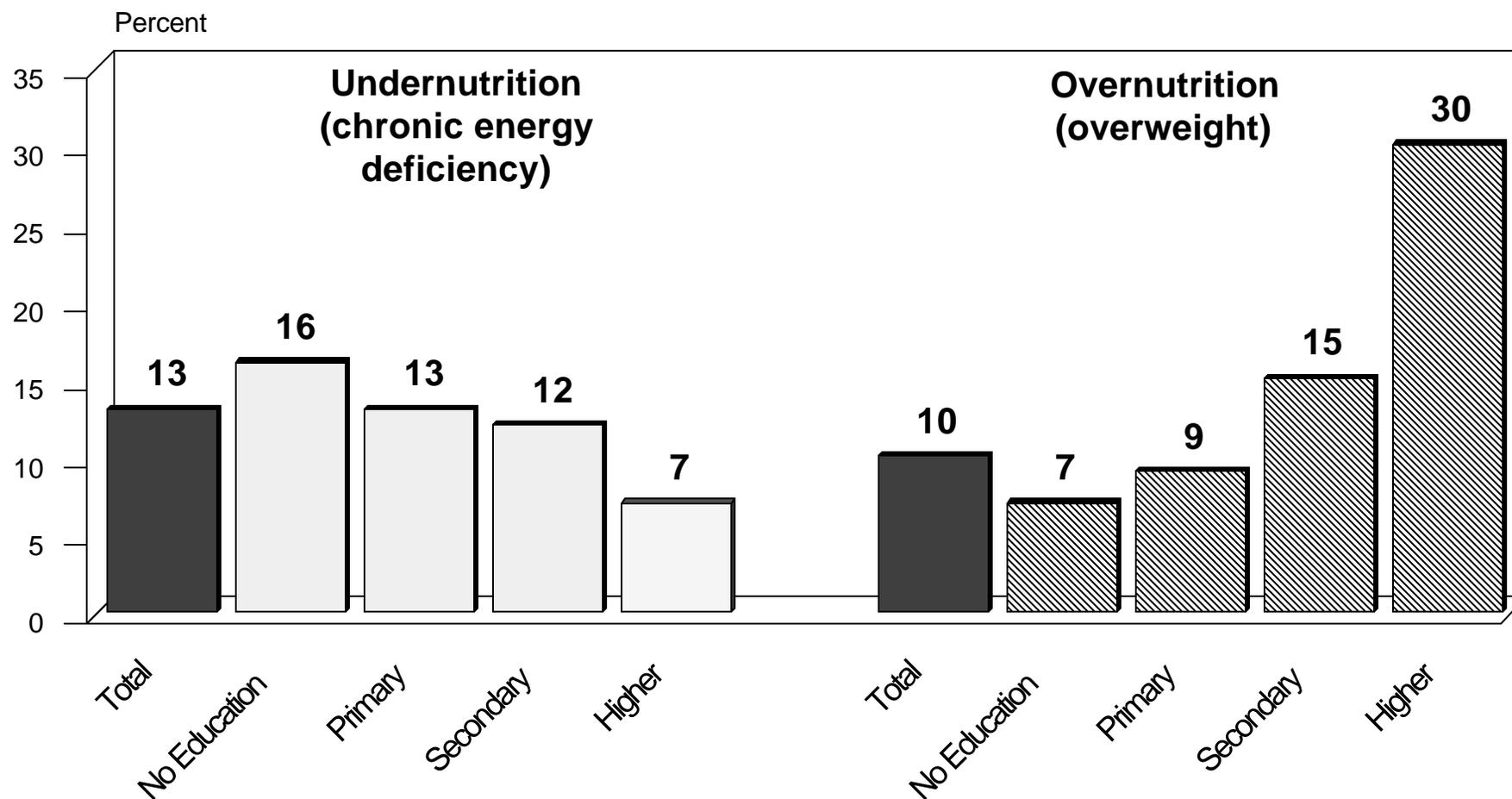
Figure 29: Malnutrition among Mothers of Children under Five Years by Education, Zambia

In Zambia,

- **The rate of maternal undernutrition is highest among women with no education (16 percent) and lowest among those with a higher education (7 percent).**
- **The rate of maternal overnutrition is highest among women with a higher education (30 percent) and lowest among those with no education (7 percent).**

Figure 29

Malnutrition among Mothers of Children under Five Years, by Education, Zambia



Note: Maternal undernutrition is the percentage of mothers whose BMI (kg/m^2) is less than 18.5. Maternal overnutrition is the percentage of mothers whose BMI is greater than 25.

Figure 30: Malnutrition among Mothers of Children under Three Years, Zambia Compared with Other Sub-Saharan Countries

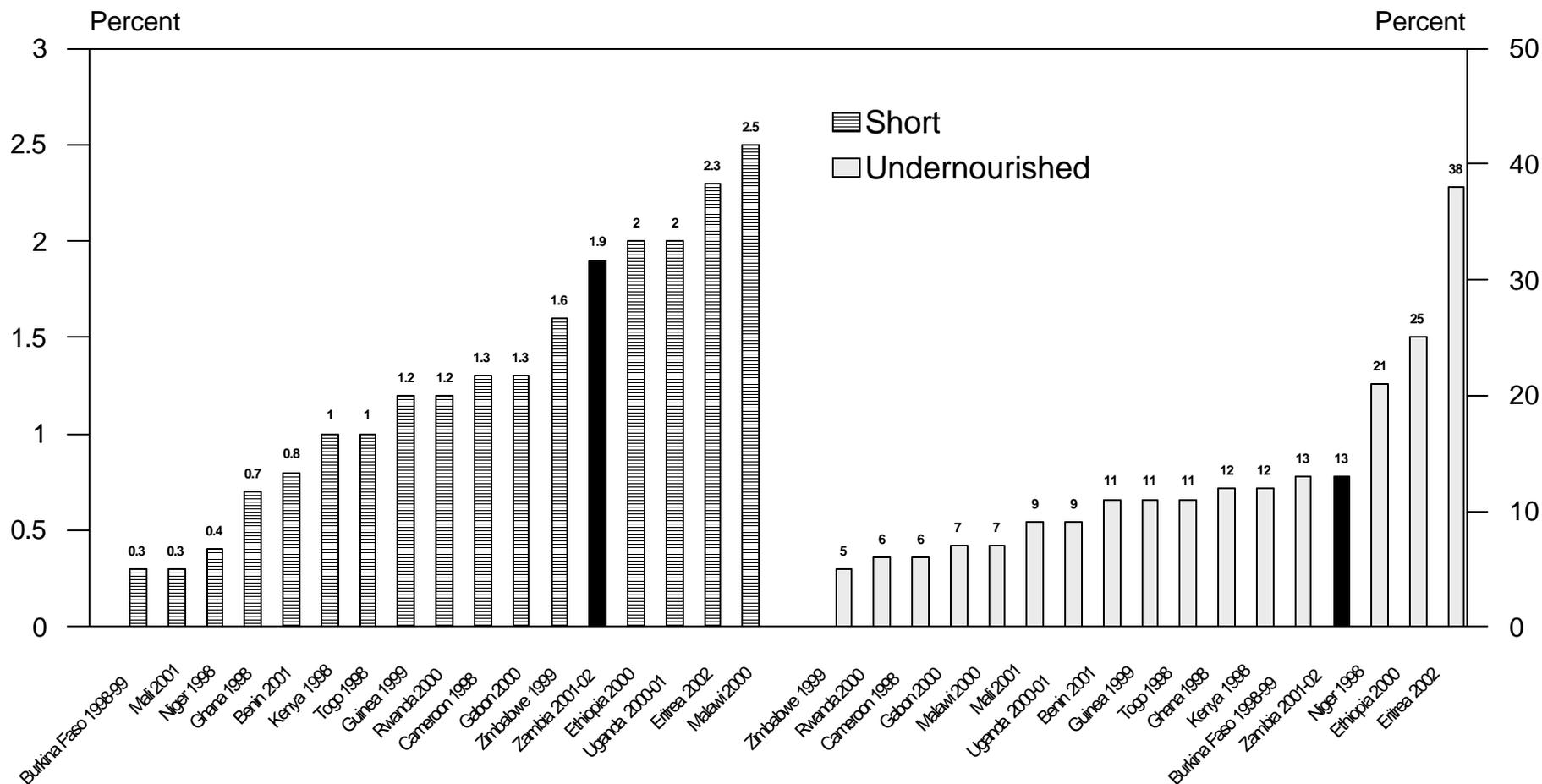
Malnutrition among mothers is likely to have a major impact on their ability to care for themselves and their children. Women less than 145 centimeters in height are considered too short. Mothers who are too short (a condition largely due to stunting during childhood and adolescence) may have difficulty 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 assessed by using the body mass index is also presented. Pregnant women are not included in the malnourished analysis, due to weight considerations.

In Zambia,

- **Two percent of mothers of children under three are too short (<145 cm).** This proportion puts Zambia in the upper third of the sub-Saharan countries surveyed.
- **Thirteen percent of mothers of children under three are undernourished (BMI<18.5).** This proportion puts Zambia in the upper third of the sub-Saharan countries surveyed.

Figure 30

Malnutrition among Mothers of Children under Three Years, Mali Compared with Other Sub-Saharan Countries



Note: *Short* is the percentage of mothers under 145 cm; *undernourished* is the percentage of mothers whose BMI (kg/m²) is less than 18.5. Pregnant women and those who are less than two months postpartum are excluded from BMI calculation.

Appendices

Appendix 1
Stunting, Wasting, Underweight, and Overweight Rates by Background Characteristics
Zambia 2001-2002

Background characteristic	Stunted	Wasted	Underweight	Overweight	Background characteristic	Stunted	Wasted	Underweight	Overweight
Child's age in months					Region				
0-5	8.7	3.6	2.9	30.0	Central	44.0	4.4	26.9	11.5
6-11	32.0	8.9	25.9	21.2	Copperbelt	41.3	6.5	29.3	13.6
12-17	51.2	7.6	41.2	10.0	Eastern	59.7	5.0	32.1	16.6
18-23	60.9	10.0	38.3	9.3	Luapula	57.2	4.0	33.1	10.4
24-29	55.3	3.0	35.9	5.3	Lusaka	35.8	5.4	21.3	12.5
30-35	54.9	4.3	32.3	10.8	Northern	54.5	7.5	33.2	16.3
36-47	52.8	2.1	27.2	12.0	North-Western	44.0	3.0	26.8	9.6
48-59	51.1	2.9	23.7	8.7	Southern	40.1	3.8	24.5	9.2
	p<0.000 n=5,219	p<0.000 n=5,216	p<0.000 n=5,219	p<0.000 n=5,217	Western	42.2	2.5	23.5	12.5
						p<0.000 n=5,215	p=0.001 n=5,215	p<0.000 n=5,216	p<0.000 n=5,217
Gender of child					Urban-rural residence				
Female	45.4	4.2	27.7	13.4	Capital or large city	34.0	6.2	22.3	13.1
Male	48.2	5.8	28.6	12.5	Small city or town	38.5	4.6	24.4	13.5
	p=0.040 n=5,215	p=0.006 n=5,217	NS n=5,217	NS n=5,217	Rural	51.1	5.0	30.2	12.8
						p<0.000 n=5,217	NS n=5,217	p<0.000 n=5,215	NS n=5,216
Overall	46.8	5.0	28.2	13.0	Overall	46.8	5.0	28.2	13.0

Note: Level of significance is determined using the chi-square test.

NS=Not significant at $p \leq 0.05$

Appendix 2

WHO/CDC/NCHS International Reference Population Compared with the Distribution of Malnutrition in Zambia

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 one standard deviation of the mean for children of that age or height and a height within one standard deviation of the mean for children of that age. About 14 percent of children will be between one and two standard deviations above the mean; these children are considered relatively tall or overweight for their age or relatively overweight for their height. Another 14 percent will be between one and two 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 obese for their age or obese for their height; that is, they are more than two standard deviations above the mean. Another 2 percent will fall more than two standard deviations below the mean and be considered moderately or severely malnourished. These children are very short (stunted), very underweight for their age, or very thin for their height (wasted). 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 and Prevention.

Appendix 2 includes four curves: height-for-age, weight-for-height, and weight-for-age graphed against the normal curve. The height-for-age, weight-for-height, and weight-for-age curves are far to the left of the standard curve, indicating that there are a large number of malnourished children. The implication is that interventions are necessary to address widespread malnutrition in order to improve child health, which will result in a shift in the curves closer to the reference standard.

Appendix 2

WHO/CDC/NCHS International Reference Population Compared with the Distribution of Malnutrition in Zambia

