

Rwanda 2000

Nutrition of Young Children and Mothers



l'Office National de la Population



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ORC Macro

AFRICA NUTRITION CHARTBOOKS

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

Findings from the 2000 Rwanda Demographic and Health Survey

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Introduction

Malnutrition¹ is one of the most important health and welfare problems among infants and young children in Rwanda. 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 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 2000 Rwanda Demographic and Health Survey (RDHS 2000), a nationally representative survey of 10,206 households, requested by the Rwandan Ministry of Health and conducted by the National Population Office (ONAPO). ORC Macro provided technical assistance through its MEASURE *DHS+* program. Financial Assistance was provided by the U.S. Agency for International Development (USAID), the United Nations Population Fund (UNFPA), and the United Nations Children's Fund (UNICEF).

Of the 8,188 children age 0-59 months who were part of the study, 6,490 are alive and have complete anthropometric data and are therefore included in the nutrition analyses. Unless otherwise noted, all analyses include only children who reside with their mother. 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 sociodemographic 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, Rwanda 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.

- **Rwanda's under-one mortality rate (107 deaths per 1,000 births) indicates that more than 10 percent of children born in Rwanda will die before their first birthday.** This rate is in the upper fourth among sub-Saharan countries surveyed.
- **Rwanda's under-five mortality rate (196 deaths per 1,000 births) indicates that almost 20 percent of children born in Rwanda will die before their fifth birthday.** Again, this rate places Rwanda in the upper fourth among sub-Saharan countries surveyed.

Figure 1

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

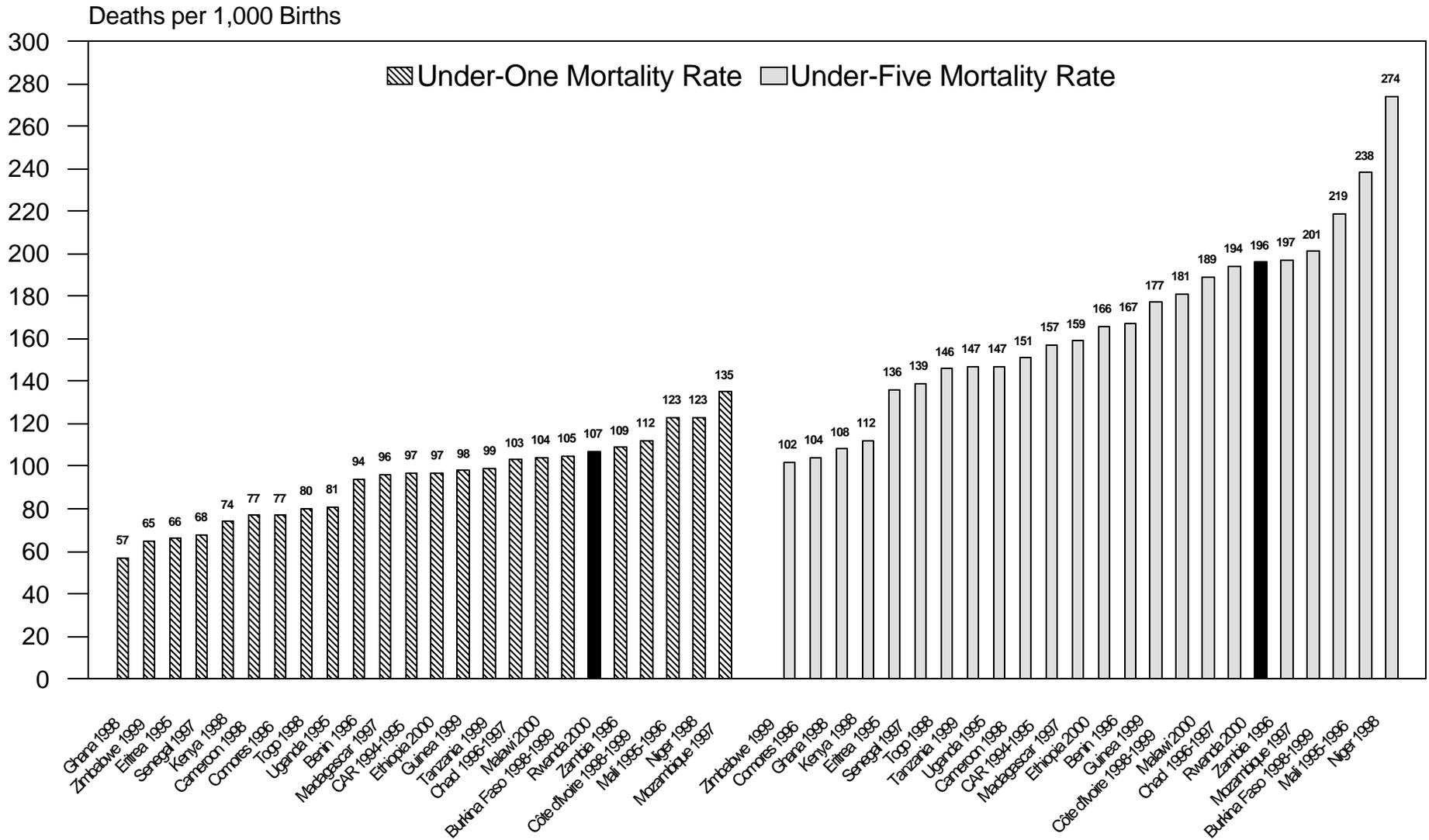


Figure 2: Contribution of Undernutrition to Under-Five Mortality, Rwanda

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. Under-five mortality is largely a result of infectious diseases and neonatal deaths in developing countries. 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 Rwanda,

- **Thirty-seven percent of all deaths that occur before age five are related to malnutrition (severe and moderate malnutrition).**
- **Because of its extensive prevalence, moderate malnutrition (31 percent) contributes to more deaths than severe malnutrition (6 percent).**
- **Moderate malnutrition is implicated in 84 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, Rwanda

How undernutrition contributes to death

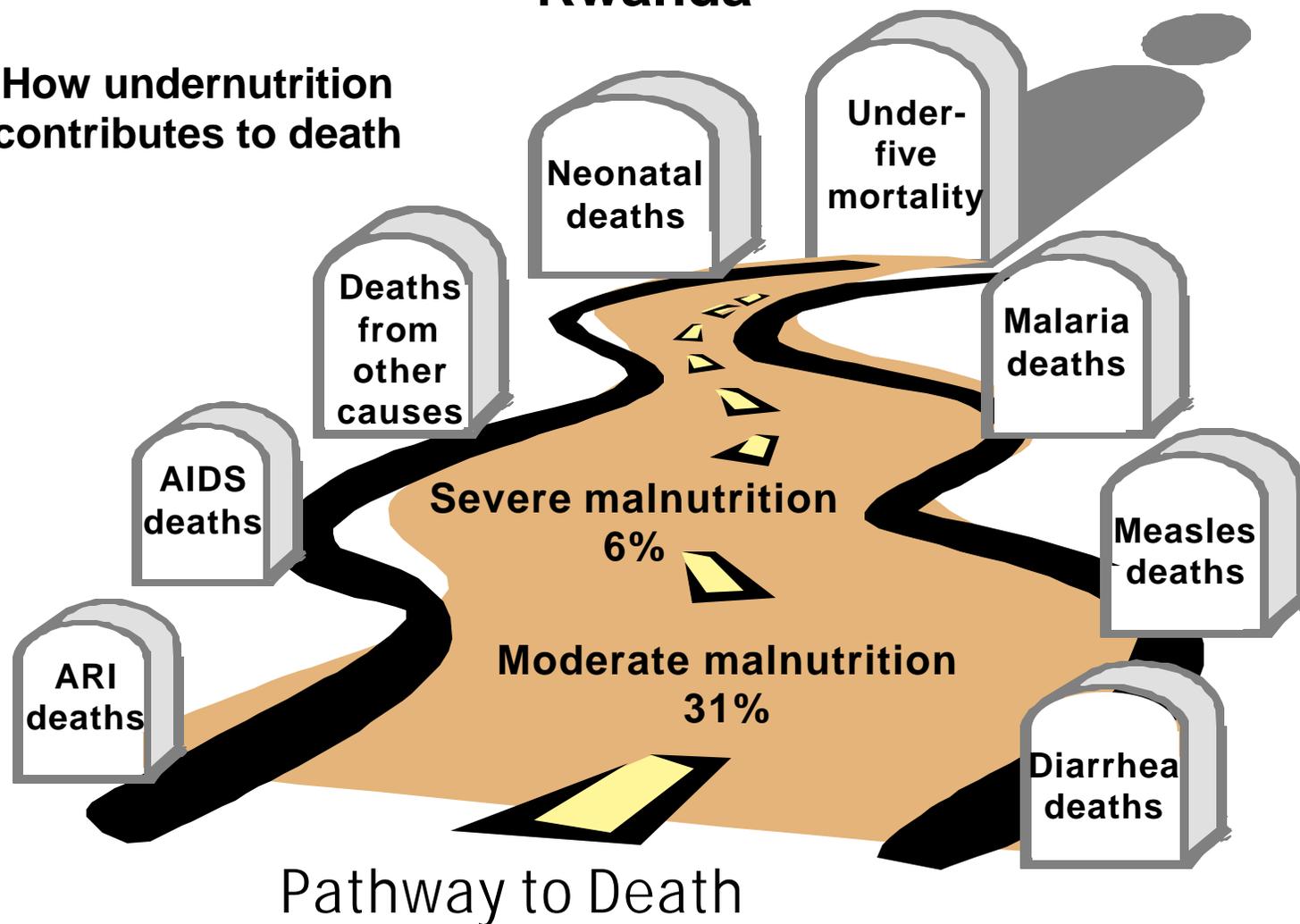


Figure 3: Survival and Nutritional Status of Children, Rwanda

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.

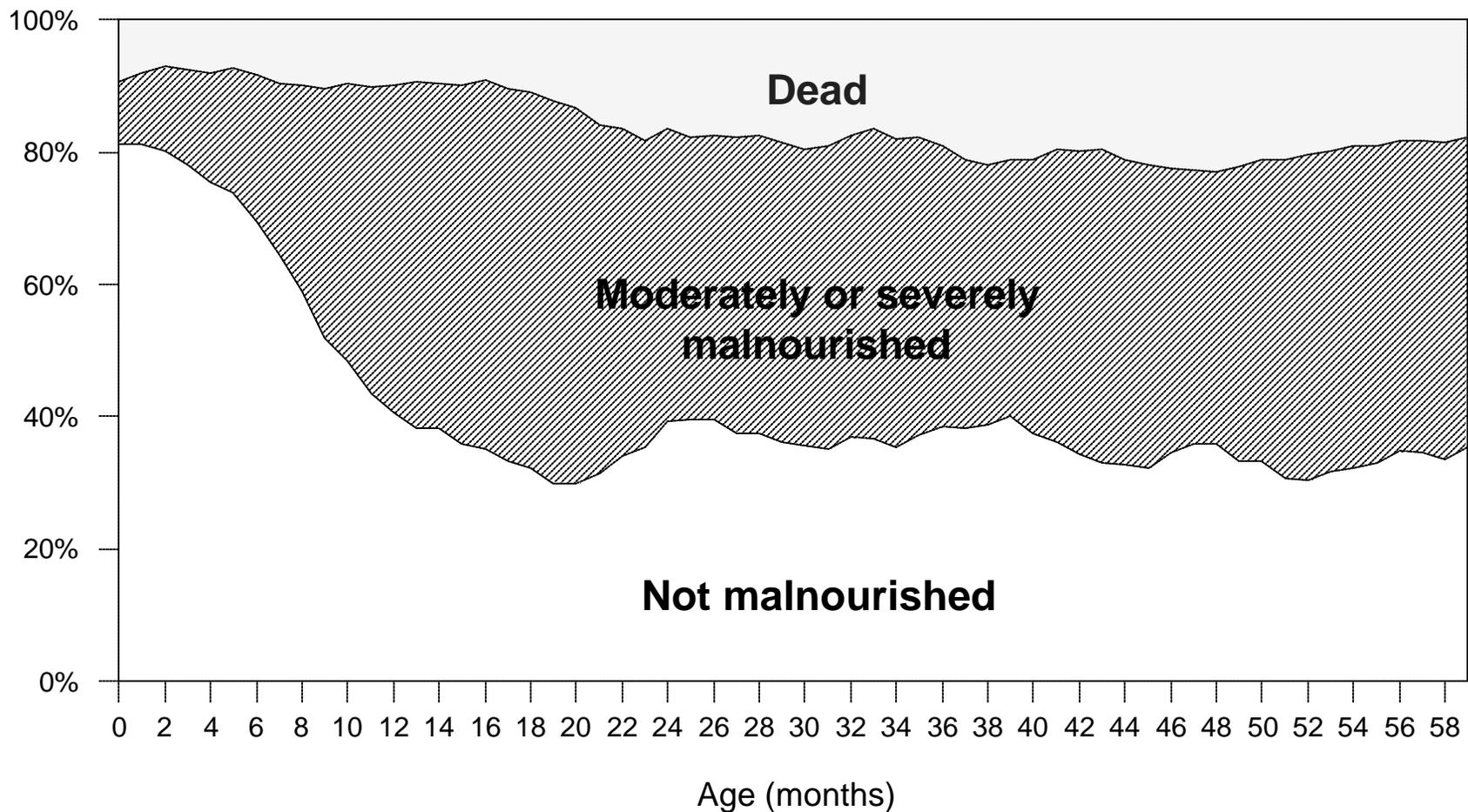
In Rwanda,

- **Between birth and 19 months of age, the percentage of children who are alive and not malnourished drops rapidly from about 82 percent to 30 percent.** Thereafter, the rate remains stable between 30 and 40 percent through 59 months.
- **Between birth and 19 months of age, the percentage of children who are moderately or severely malnourished¹ increases dramatically from 10 percent to 58 percent.** This percentage subsequently levels off and remains stable between 40 and 50 percent through 59 months.
- **From birth until 59 months, the percentage of children who have died increases gradually, ranging from 10 percent at birth to a peak of 23 percent at age 48 months.**

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

Figure 3

Survival and Nutritional Status of Children, Rwanda



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 Rwanda

Figure 4: Malnutrition among Children under Five Years, Rwanda

In Rwanda,

- **Forty-three 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 more than 20 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 7 percent of children,** which is 3 ½ times the level expected in a healthy population.
- **Twenty-four percent of children under five years are *underweight***³ for their age. This is more than 12 times the level expected in a healthy, well-nourished population.
- **Fifteen percent of children under five are *overweight*.**⁴ This is slightly less than 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, Rwanda



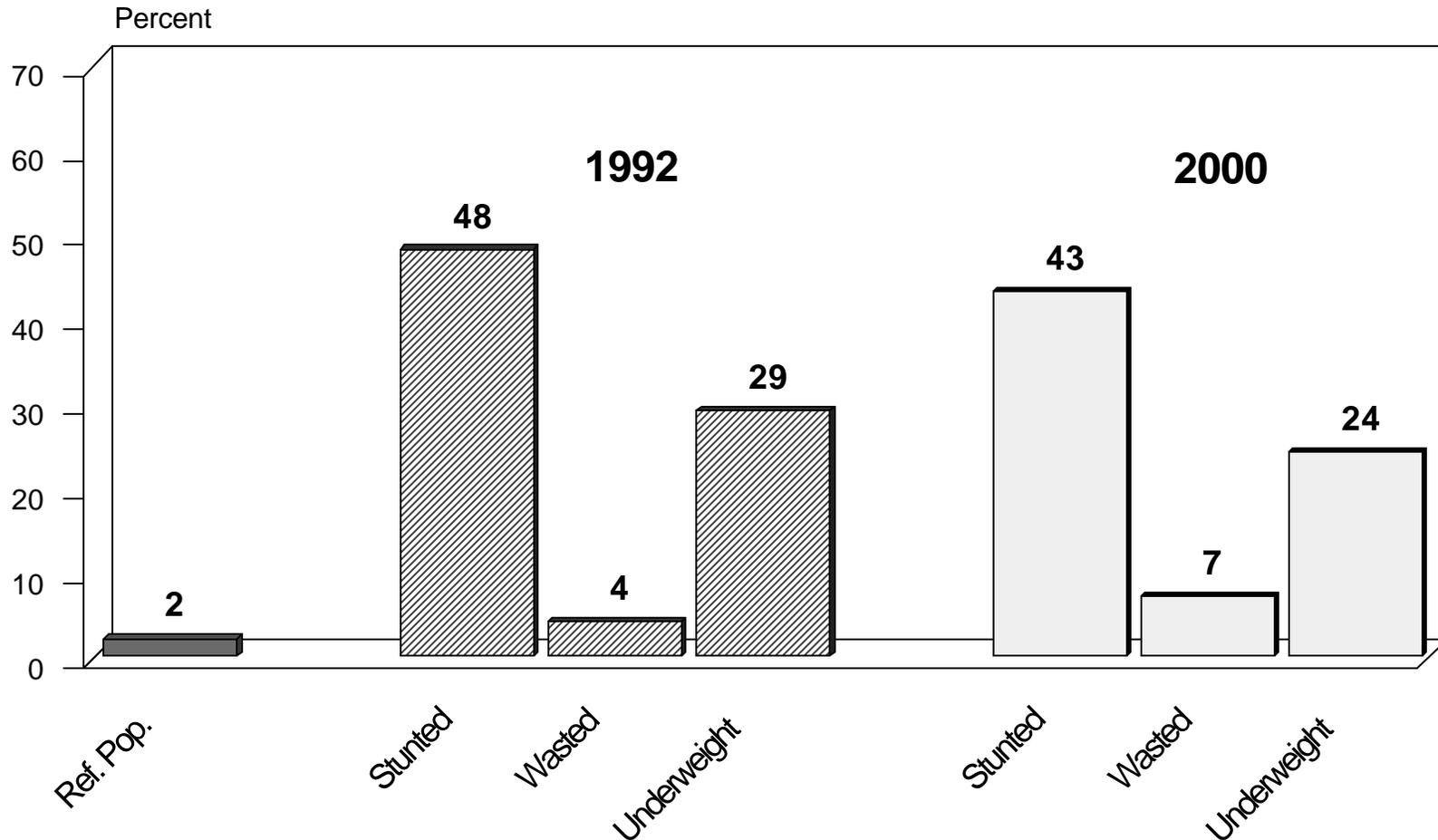
Note: *Stunting* reflects chronic malnutrition; *wasting* reflects acute malnutrition; *underweight* reflects chronic or acute malnutrition or a combination of both.

Figure 5: Changes in Undernutrition Rates among Children under Five Years, Rwanda 1992 and 2000

- **The findings of the 2000 RDHS suggest that chronic malnutrition rates in Rwanda have declined since the 1992 survey, while acute malnutrition rates have increased.**
- In 1992, stunting affected 48 percent of children under five, compared with 43 percent in 2000. Four percent of children were wasted in 1992 compared with 7 percent in 2000. In 1992, 29 percent of children were underweight, while in 2000, the rate was 24 percent.

Figure 5

Changes in Undernutrition Rates among Children under Five Years, Rwanda 1992 and 2000



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

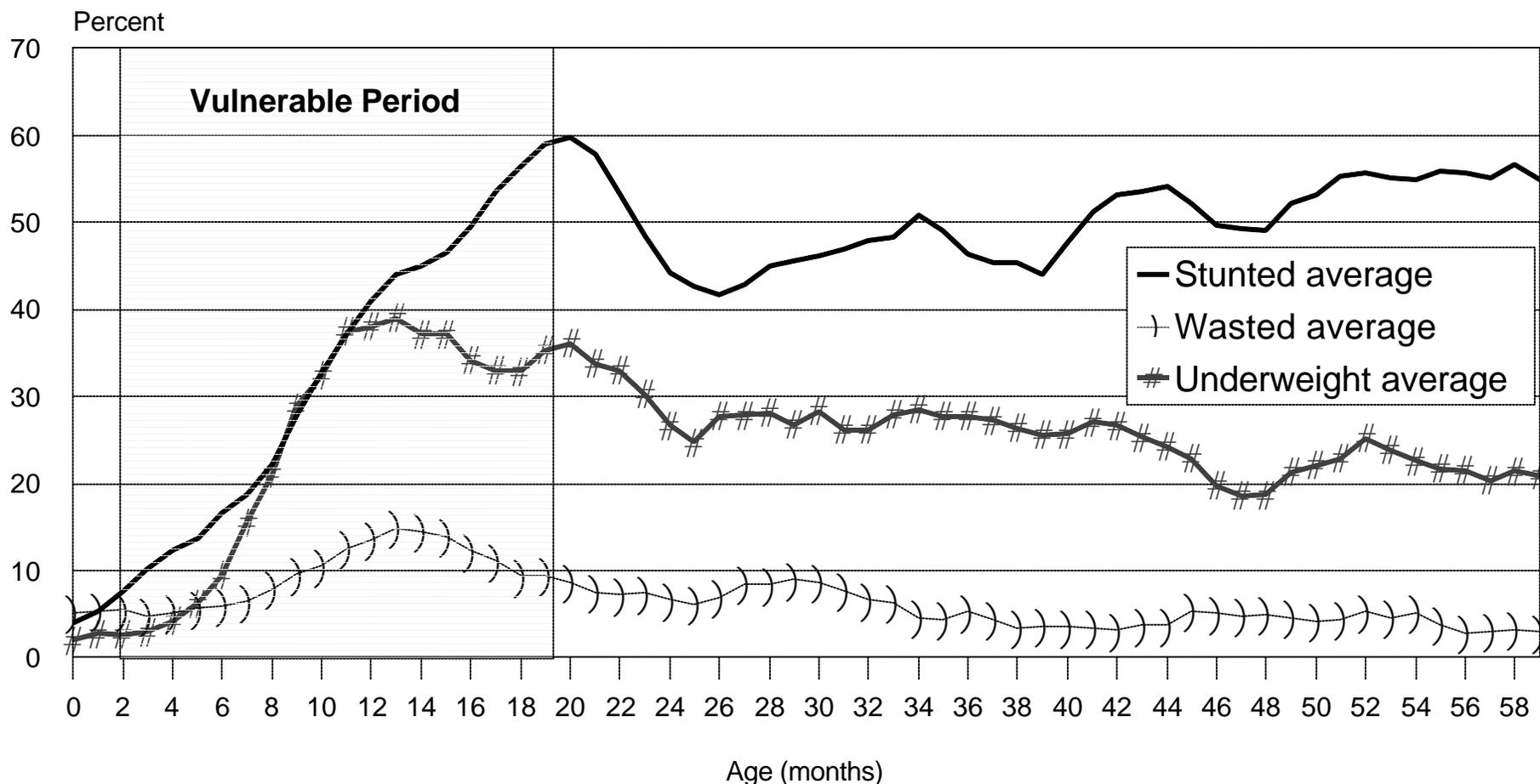
Figure 6: Stunting, Wasting, and Underweight by Age, Rwanda

In Rwanda, the time between two months and 20 months of age is a vulnerable period.

- **The proportion of children stunted rises sharply from zero to 20 months of age, peaking at 60 percent.** The proportion of children stunted then declines to 42 percent by 26 months of age and then rises and falls, ranging between a low of 44 percent at age 39 months to a high of 56 percent at age 58 months.
- **The proportion of children wasted rises to 15 percent at 13 months and then declines to 6 percent at 23 months.** The proportion then remains fairly constant, ranging between 8 percent and 3 percent.
- **The proportion of children underweight sharply rises from four to 13 months of age, when it reaches 40 percent.** The proportion then steadily declines to 19 percent by 47 months. Then the proportion rises again to between 20 and 25 percent until age 59 months.

Figure 6

Stunting, Wasting, and Underweight by Age, Rwanda



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: Undernutrition among Children under Five Years Who Do Not Reside with Their Mother, Rwanda

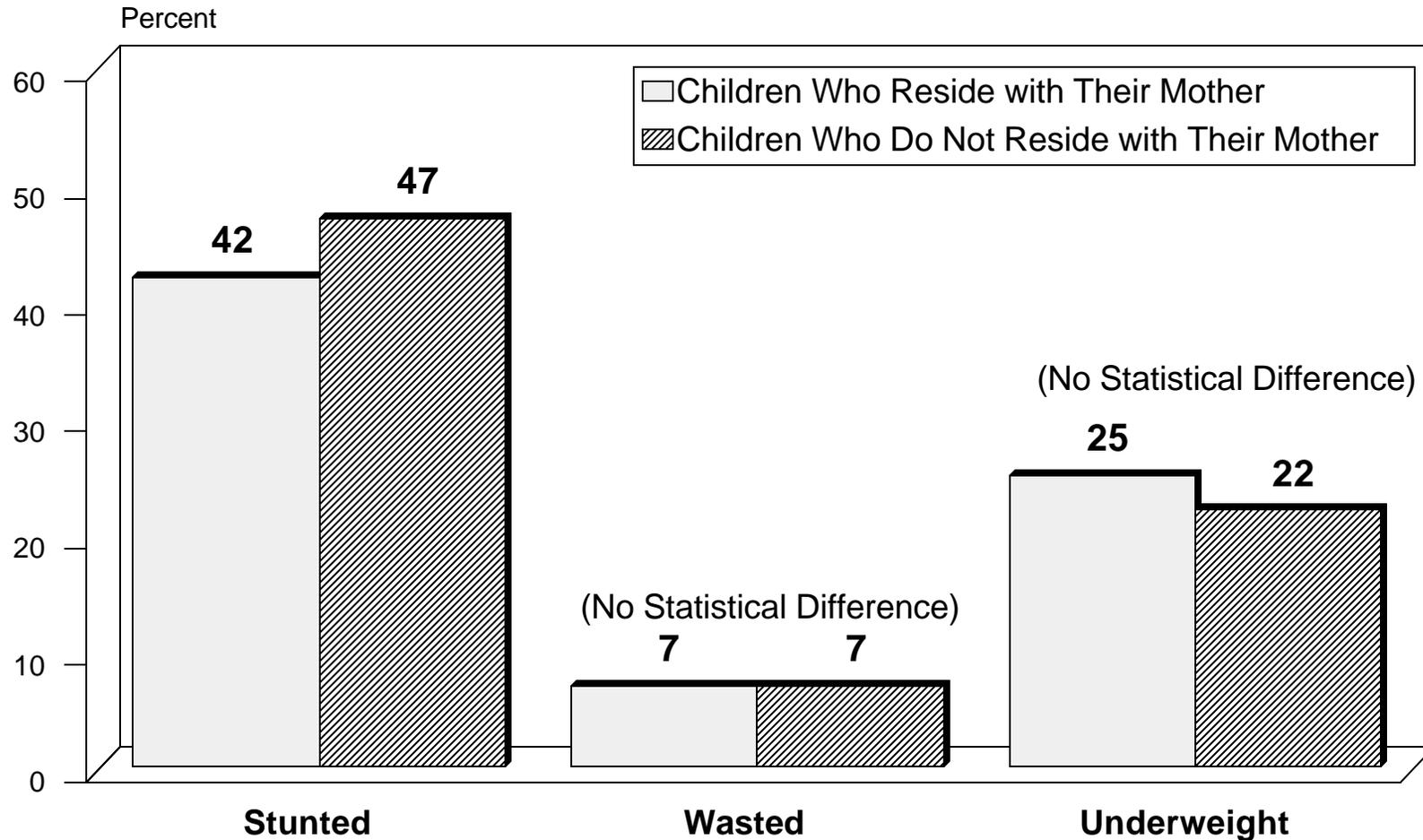
Previously, anthropometric data from DHS surveys excluded children whose mother did not live in the household or was not present to be interviewed. Currently, all children in the household are measured despite their mother's residence status. In the RDHS, 348 children under five years did not reside with their mother.

In Rwanda,

- **Forty-seven percent of children age 0-59 months who do not reside with their mother are stunted, compared with 42 percent of children who do live with their mother.**
- **There is no statistical difference in either rates of wasting or of underweight between children who reside with their mother and those who do not.**

Figure 7

Undernutrition among Children under Five Years Who Do Not Reside with Their Mother, Rwanda



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

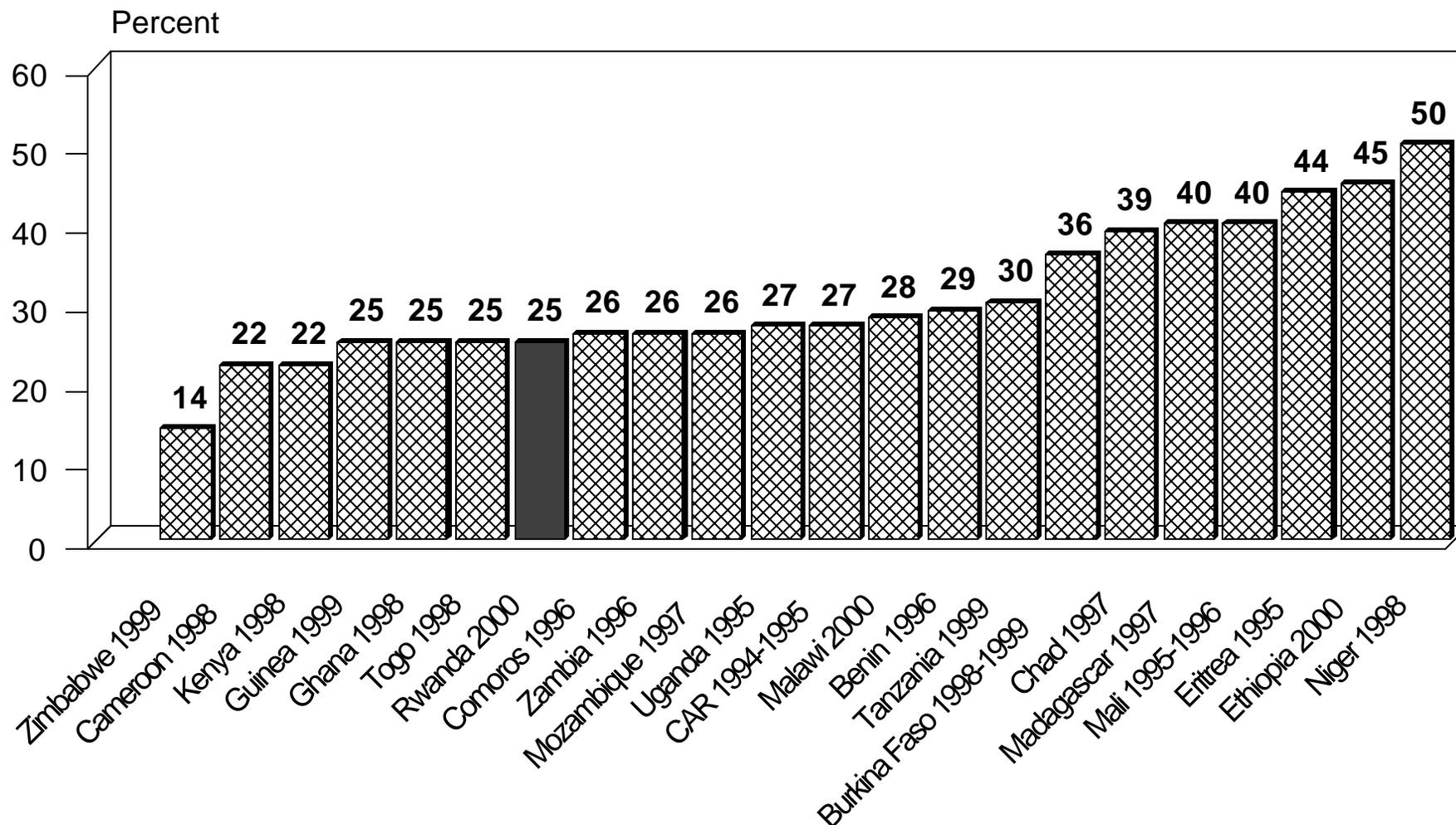
Figure 8: Underweight among Children under Three Years, Rwanda Compared with Other Sub-Saharan Countries

Among the sub-Saharan countries surveyed,

- The percentage of children **under three years** who are *underweight* ranges from 14 to 50 percent. **With 25 percent of children under three years being underweight, Rwanda is in the lower quartile of 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 a population's health status.

Figure 8

Underweight among Children under Three Years, Rwanda Compared with Other Sub-Saharan Countries



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

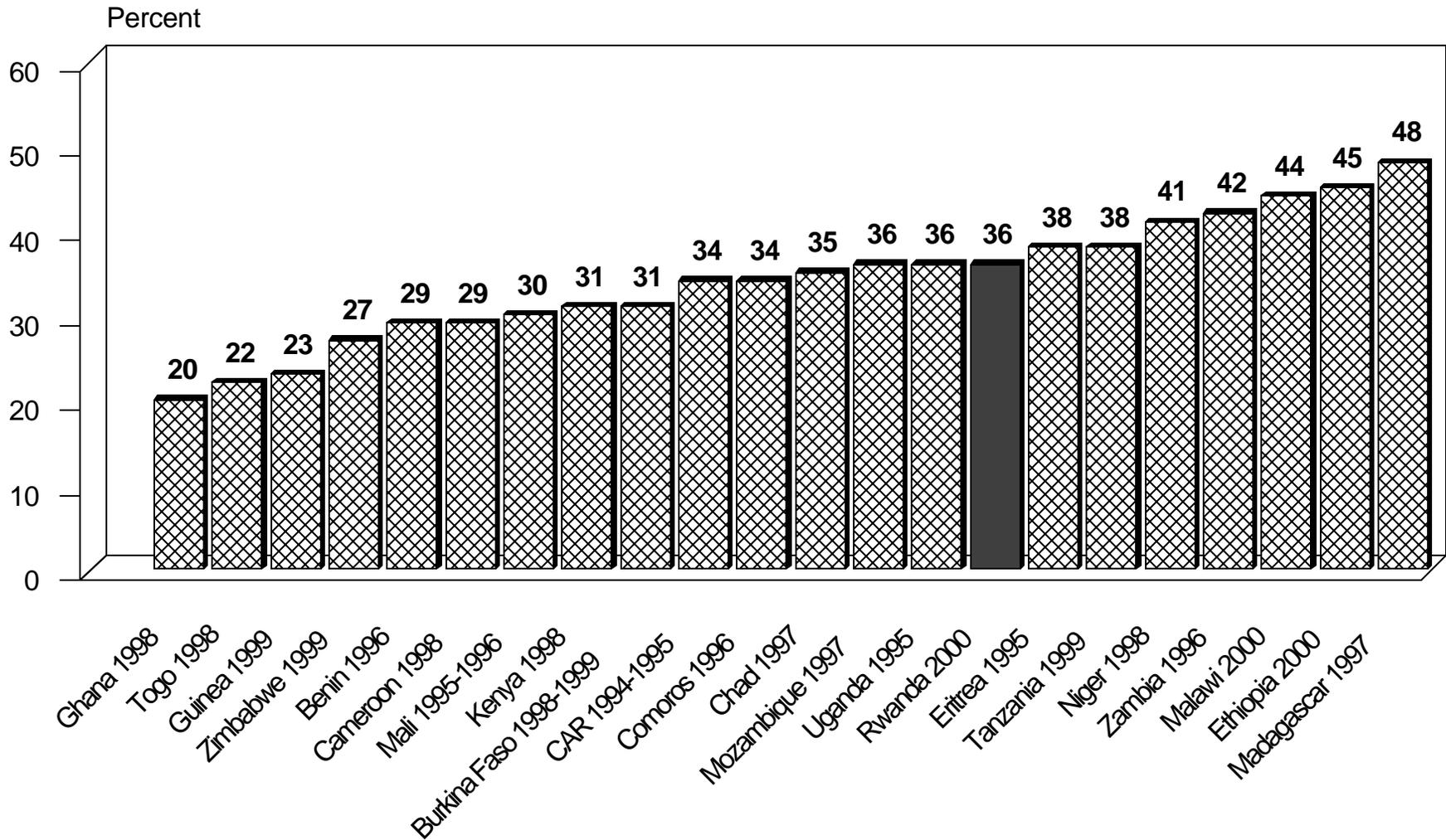
Figure 9: Stunting among Children under Three Years, Rwanda Compared with Other Sub-Saharan Countries

Among the sub-Saharan countries surveyed,

- The percentage of children **under three years** who are *stunted* ranges from 20 to 48 percent. **At 36 percent, the proportion of children under three years who are stunted in Rwanda is in the third quartile among 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 season of data collection, epidemic illnesses, acute food shortages, and recent shifts in social or economic policies.

Figure 9

Stunting among Children under Three Years, Rwanda 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 infection, 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.

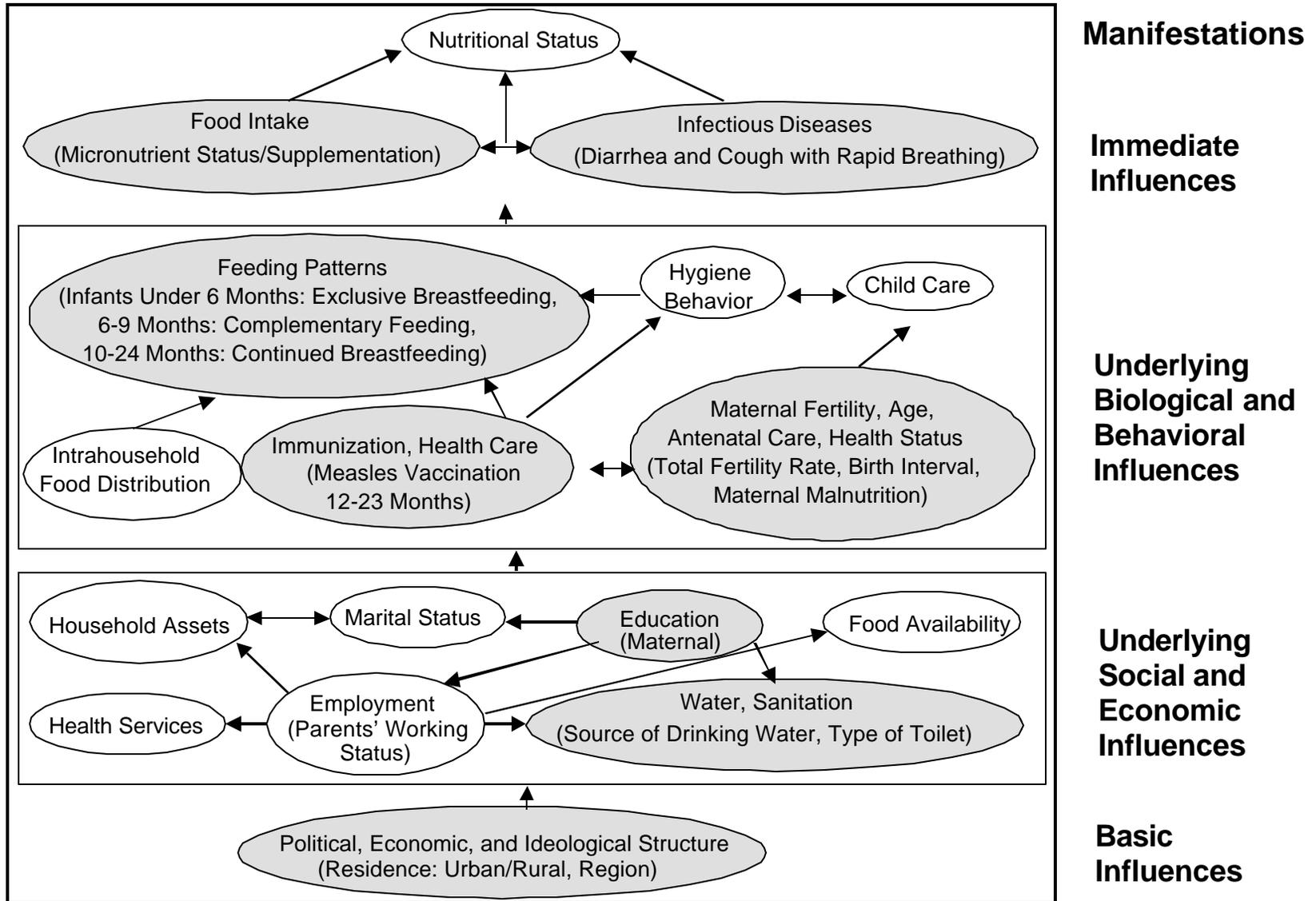
The following diagram is a conceptual framework for nutrition adapted from UNICEF.¹ It reflects relationships among factors and their influences on children's nutritional status. Although political, socioeconomic, environmental, and cultural factors (at the national and community levels) and poverty (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.

These factors are

- **Immediate influences**, such as food intake (micronutrient status and supplementation) and infectious diseases (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 Bellamy, C. 1998. *State of the World's Children 1998*. New York: UNICEF

Conceptual Framework for Nutritional Status



Immediate Influences of Malnutrition

Figure 10: Use of Iodized Salt among Households with Children under Five Years by Region, Rwanda

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 to child development is mental retardation caused by iodine deficiency disorder (IDD), which puts at stake 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. 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 Rwanda, 92 percent of households with children under five years use salt that has an adequate level of iodine to prevent IDD (≥ 15 ppm).** Iodization of salt is lowest in the Butare and Gikongoro regions and is highest in Umutara.

Figure 10

Use of Iodized Salt among Households with Children under Five Years by Region, Rwanda

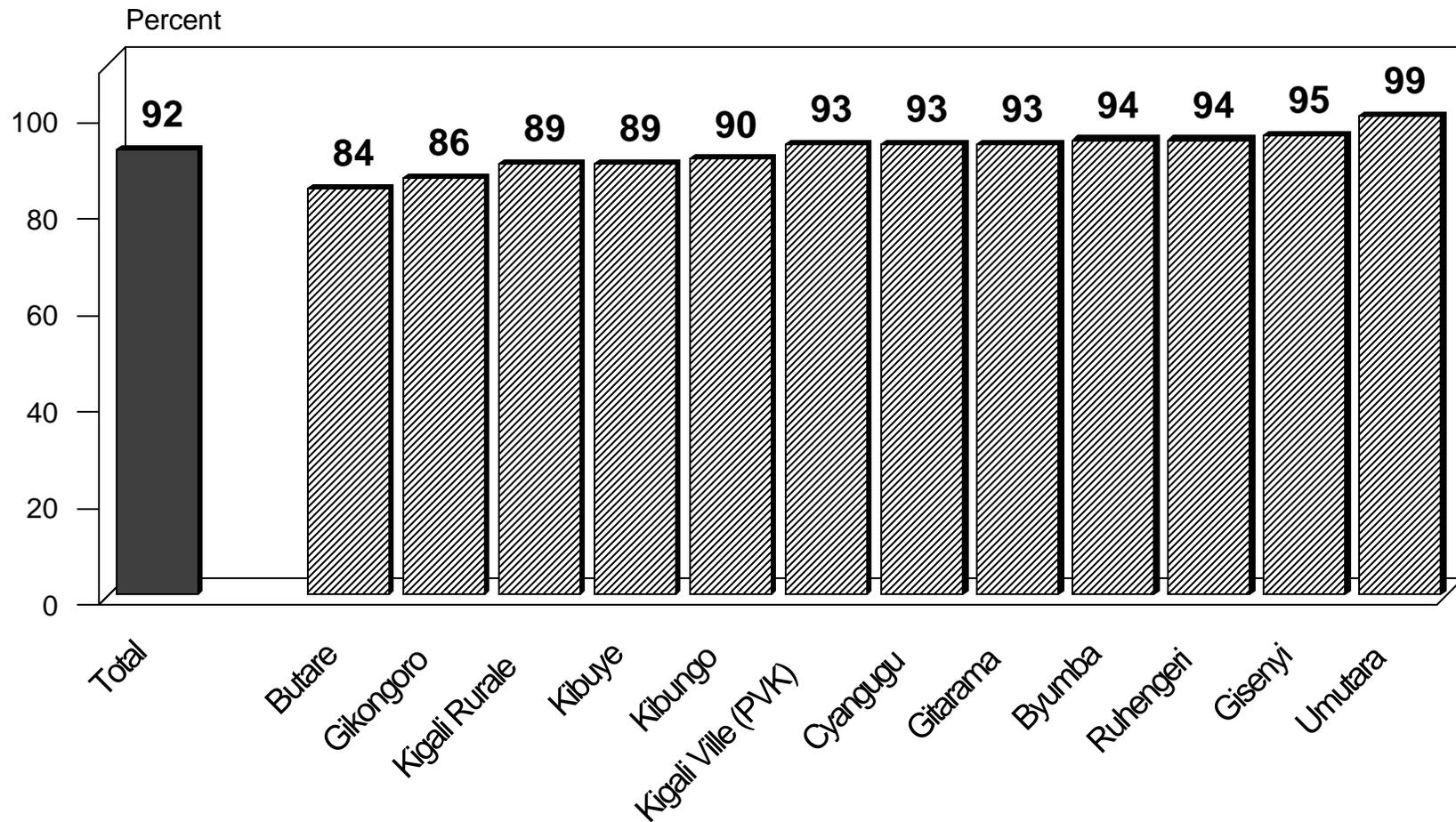


Figure 11: Night Blindness among Mothers of Children under Five Years, Rwanda

Globally, vitamin A deficiency (VAD) is the leading cause of childhood blindness. The damage to vision (xerophthalmia) is only one of the harmful outcomes of VAD. Vitamin A is crucial for rapid growth and recovery from illness or infection. Children who are vitamin A deficient have reduced immunity and are less likely to recuperate from common childhood illnesses, such as diarrhea, ARI, and measles, and are twice as likely to die as children who are not vitamin A deficient.

A mother's vitamin A status during pregnancy can be an indicator of the vitamin A status of her child. One sign of VAD in women during pregnancy is night blindness.

- **In Rwanda, 7 percent of all women who had given birth in the previous five years reported having some form of night blindness during their last pregnancy.**
- **However, only 4 percent of women reported having trouble with their vision during the night but not during the day during their last pregnancy.** Although this figure corrects for women with vision problems, in general, it may slightly underestimate the rate of night blindness.

Figure 11

Night Blindness among Mothers of Children under Five Years, Rwanda

Seven percent of all women had reported some form of night blindness during their last pregnancy.

Four percent of women had trouble with their vision during the night but not during the day during their last pregnancy.



Figure 12: Vitamin A Supplementation among Mothers of Children under Five Years by Region, Rwanda

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 Rwanda,

- **Fourteen percent of mothers received vitamin A supplements within two months after delivery.**
- **Vitamin A supplementation of mothers varies by region.** Only 9 percent of mothers in Kigali Rurale received vitamin A, while 18 percent of mothers in Butare and Gikongoro did.

Figure 12

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

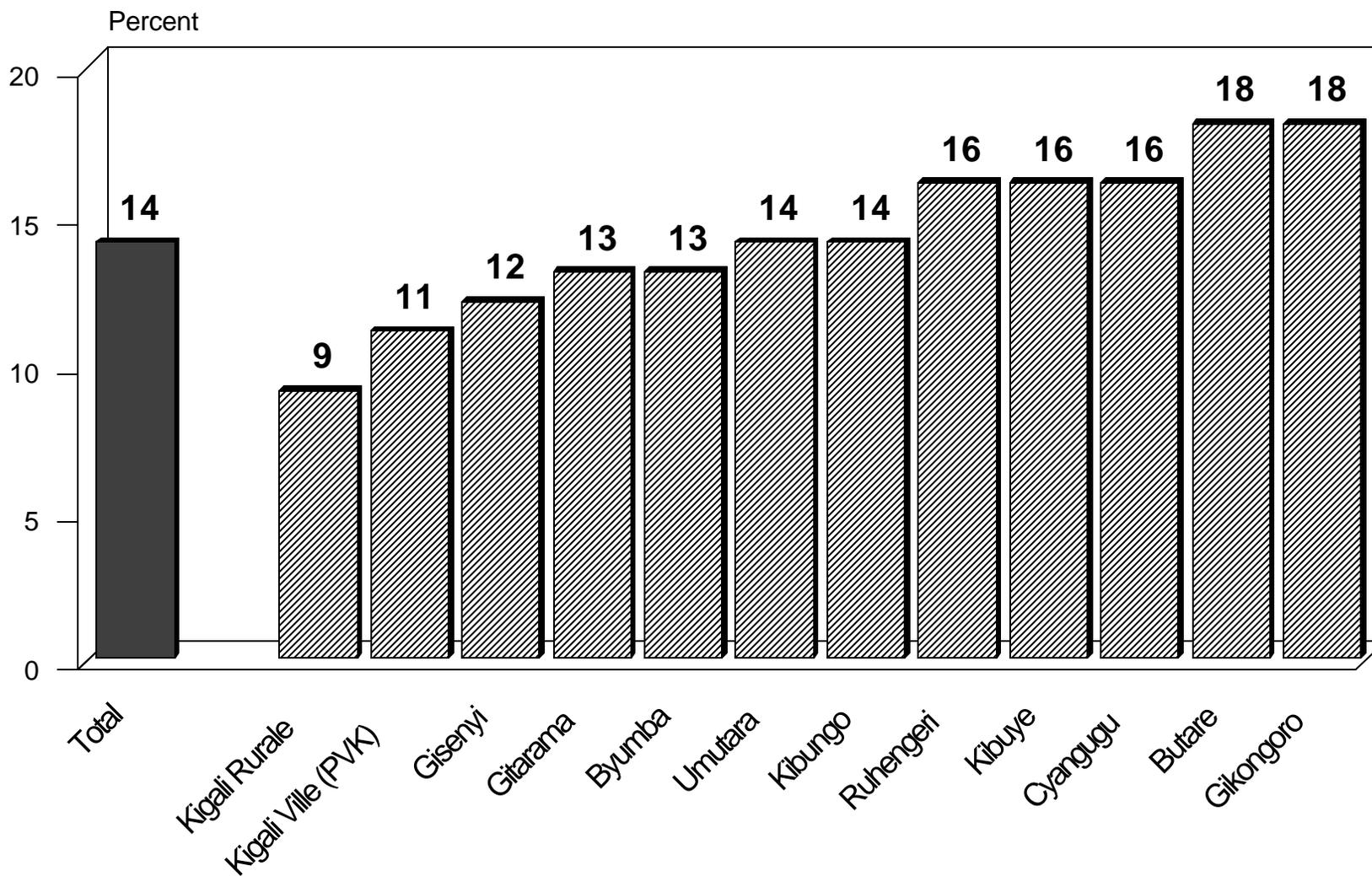


Figure 13: Vitamin A Supplementation among Children under Five Years by Region, Rwanda

Vitamin A deficiency 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, pumpkin, and dark leafy greens. Unlike iron or folate, vitamin A is a fat-soluble vitamin, which means that consumption of oils or fats are 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 children at risk do not develop VAD. National Immunization Days for polio or measles vaccinations are ideal for reaching a large number of children with vitamin A supplements.

In Rwanda,

- **Sixty-nine percent of children under five received a vitamin A dose in the last six months.**
- **The rate of vitamin A supplementation of children varies throughout Rwanda.** The rates of supplementation were lowest in Kigali Rurale and Kigali Ville (42 and 48 percent) and highest in Gisenyi, Ruhengeri, Cyangugu, Kibuye, and Butare.

Figure 13

Vitamin A Supplementation among Children under Five Years by Region, Rwanda

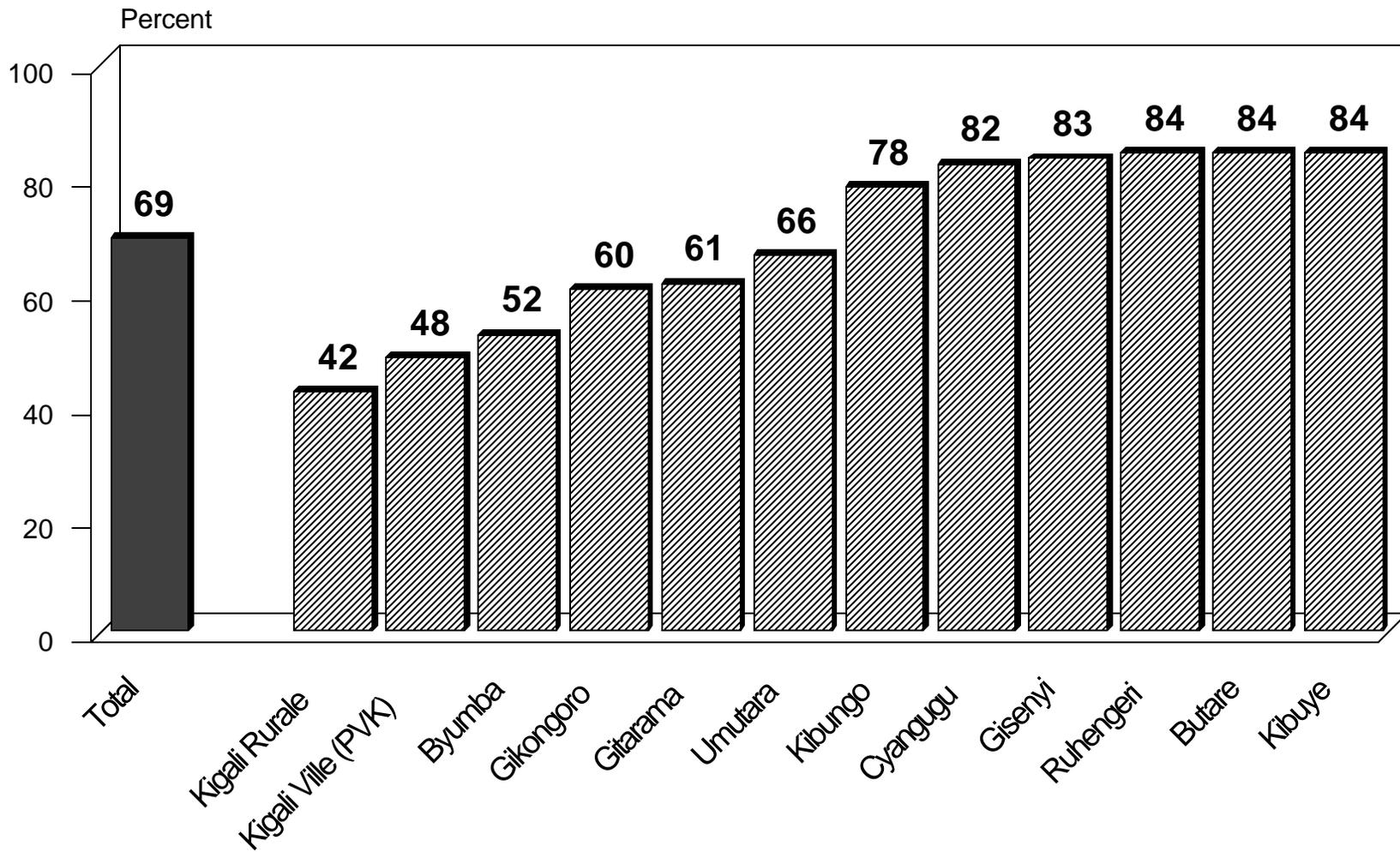


Figure 14: Iron Supplementation among Mothers of Children under Five Years, Rwanda

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 purely a 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 Rwanda,

- **Only 22 percent of mothers received some iron supplementation.**
- **Of those women who received iron supplementation, only 1 percent reported taking the recommended dosage during their pregnancy (90 or more pills).**

Figure 14

Iron Supplementation among Mothers of Children under Five Years, Rwanda

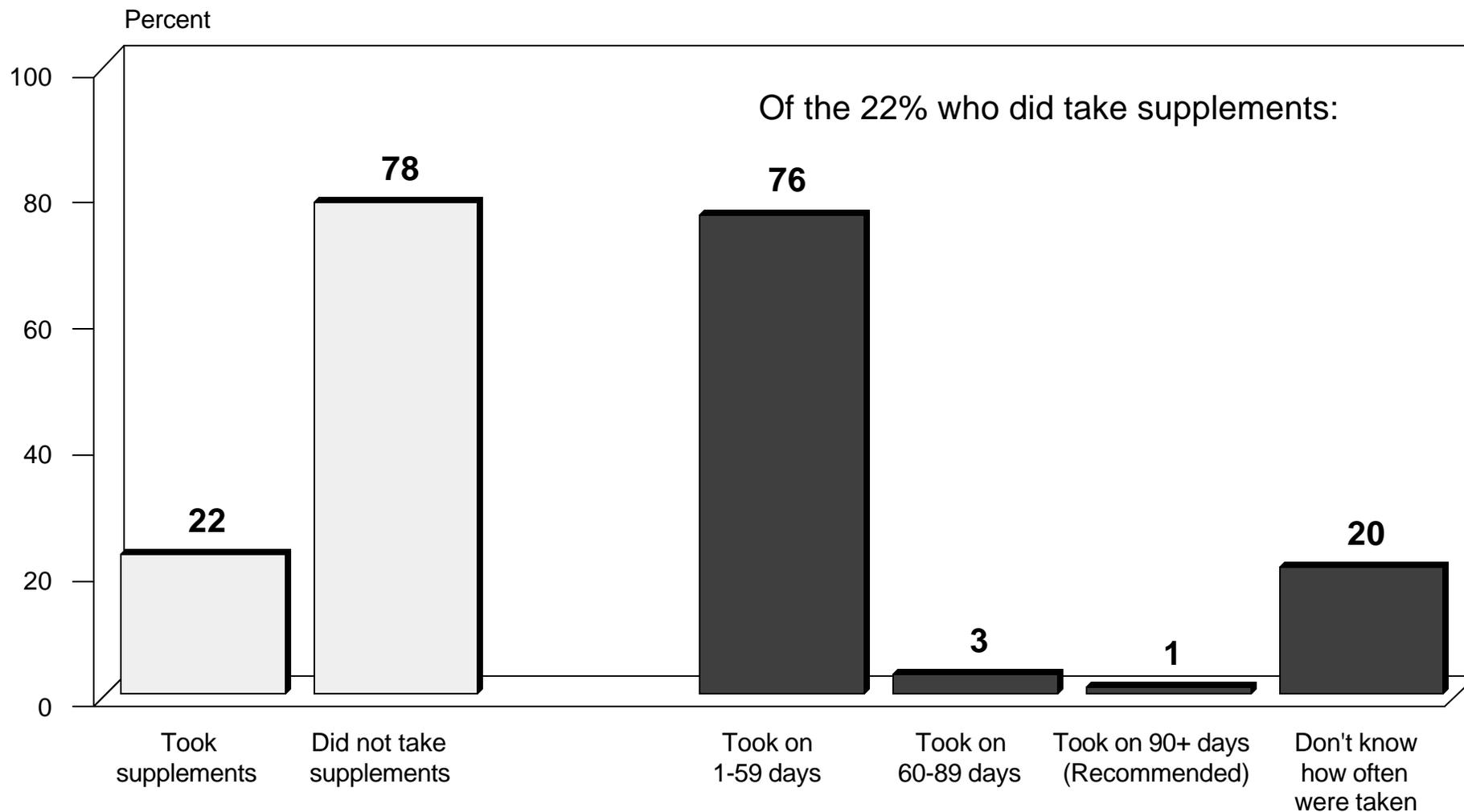


Figure 15: Diarrhea and Cough with Rapid Breathing among Children under Five Years Compared with Malnutrition Rates, Rwanda

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.

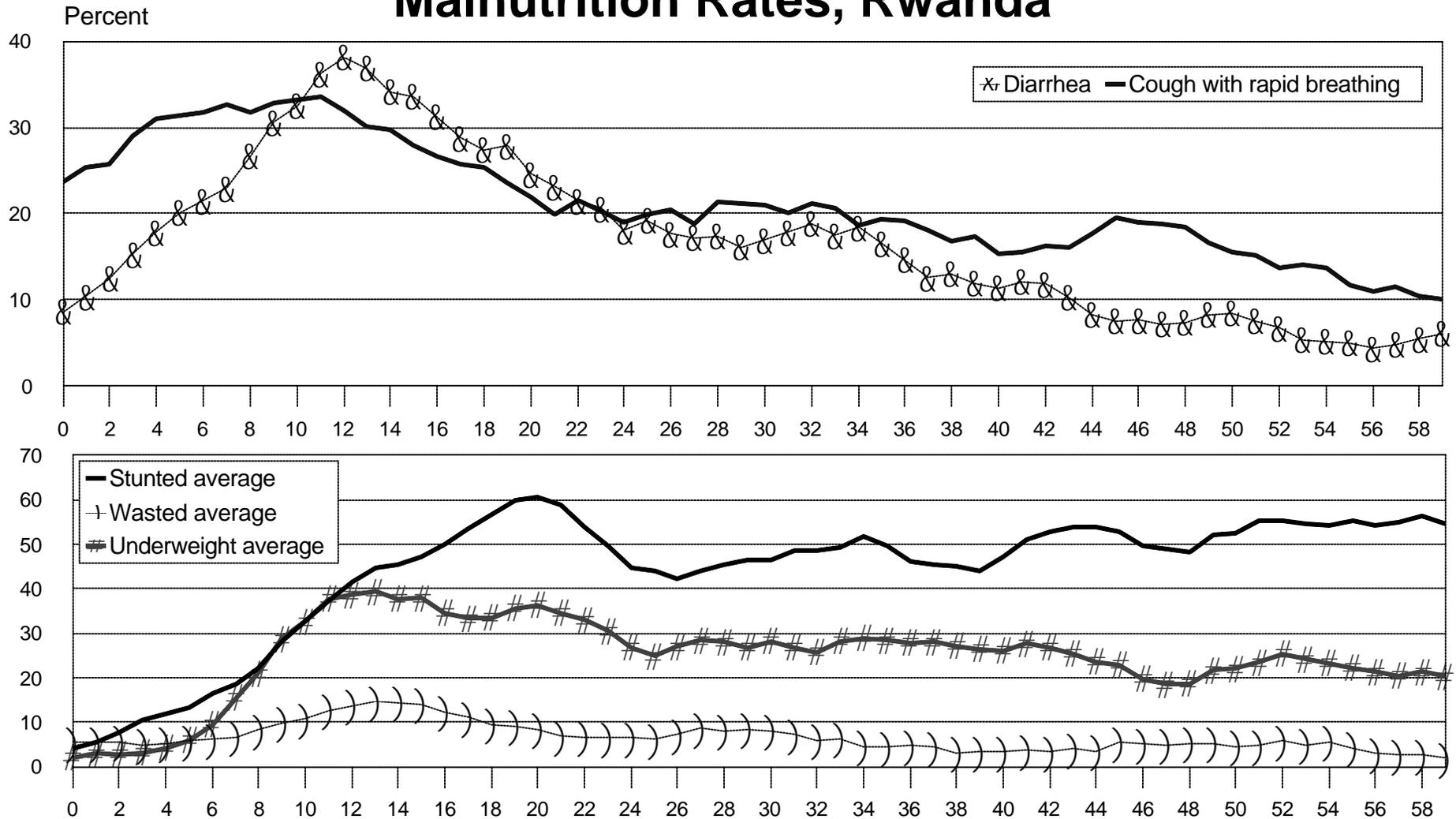
In Rwanda,

- **Twenty-two percent of children under five years of age experienced cough with rapid breathing in the two weeks preceding the survey.** Rwanda's prevalence of cough with rapid breathing increases from 24 percent to 34 percent in the first 11 months and then gradually declines to 10 percent by 59 months of age.
- **Eighteen 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 12 months when it peaks at 39 percent. The rate then steadily decreases to 8 percent by 44 months of age where it remains between 4 and 8 percent until age 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 15

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



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

Underlying Biological and Behavioral Influences of Malnutrition

Figure 16: Fertility and Birth Intervals, Rwanda 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 adequately 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 mortality, 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 the current fertility rate, a woman in Rwanda will have an average of 5.8 children by the end of her childbearing years.** This rate is in the midrange of all of the sub-Saharan countries surveyed between 1995 and 2000.
- **Rwandan mothers have a median birth interval of 32 months.** This rate is also in the midrange of all other countries surveyed.

Figure 16

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

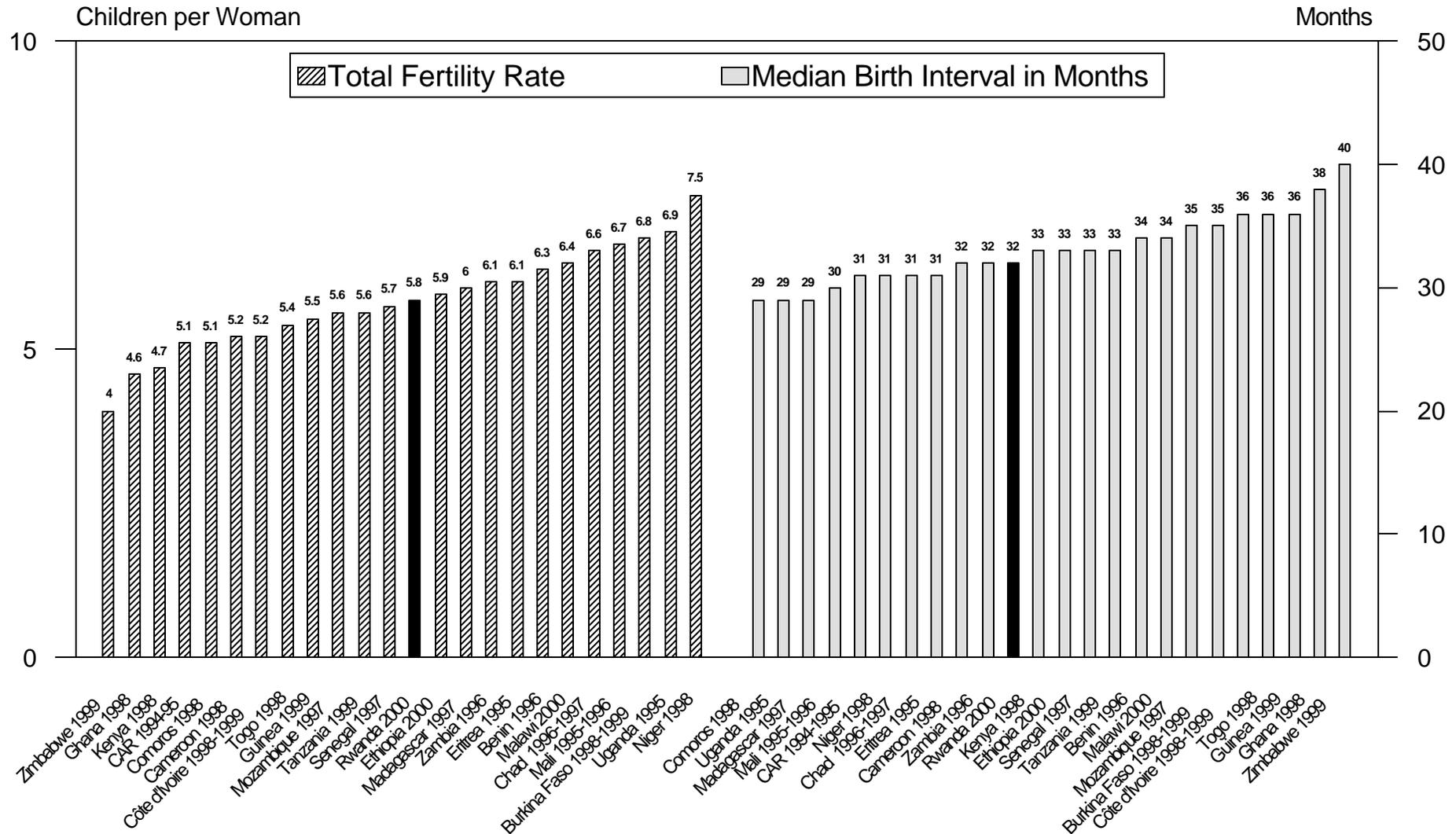


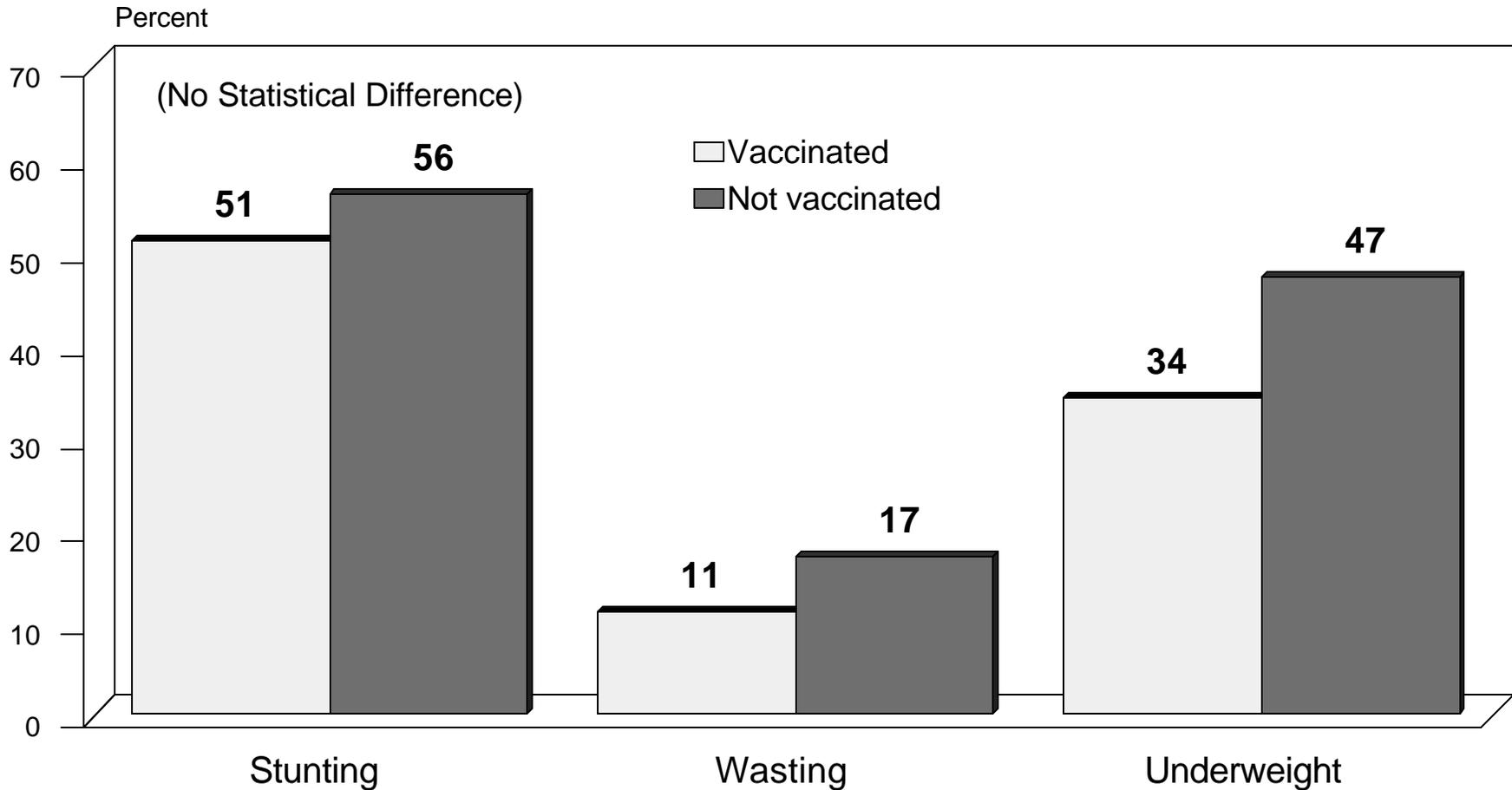
Figure 17: Undernutrition among Children Age 12-23 Months by Measles Vaccination Status, Rwanda

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 without high immunization coverage. Measles not only increases the risk of death but is also an important direct cause of malnutrition. The occurrence of measles in poor environments is associated with faltering growth, vitamin A deficiency, and immune suppression. Even though infants are not protected after birth by their mother's breast milk, they are protected by their mother's measles antibodies while in the womb. These antibodies can last up to 15 months in an infant, but due to malnutrition, they only last up to eight or nine months in children in developing countries. Therefore, measles vaccination is an important child health strategy.

- **In Rwanda, measles vaccination status is statistically related to undernutrition.** Children who did not receive a measles vaccination have a 6 percent higher rate of wasting, and a 13 percent higher rate of being underweight than those children who did receive measles vaccinations.
- **Measles vaccination status is not statistically related to stunting levels.**

Figure 17

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



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

Figure 18: Measles Vaccination Coverage among Children Age 12-23 Months, Rwanda Compared with Other Sub-Saharan Countries

In Rwanda,

- **Eighty-seven percent of children 12-23 months of age have been vaccinated against measles.** This is the highest rate of coverage among countries surveyed in sub-Saharan Africa.

Figure 18

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

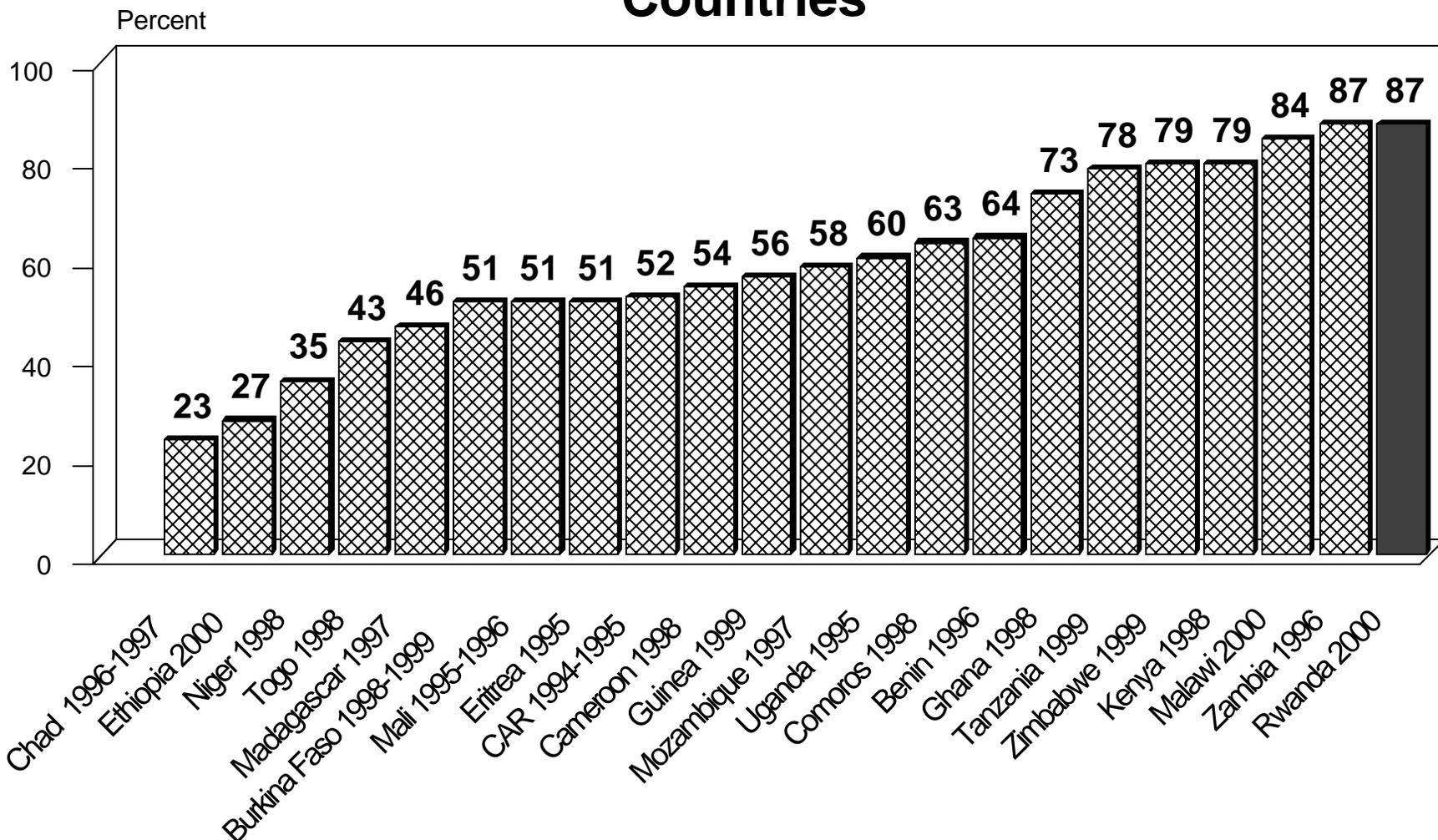


Figure 19: Feeding Practices for Infants under Six Months, Rwanda

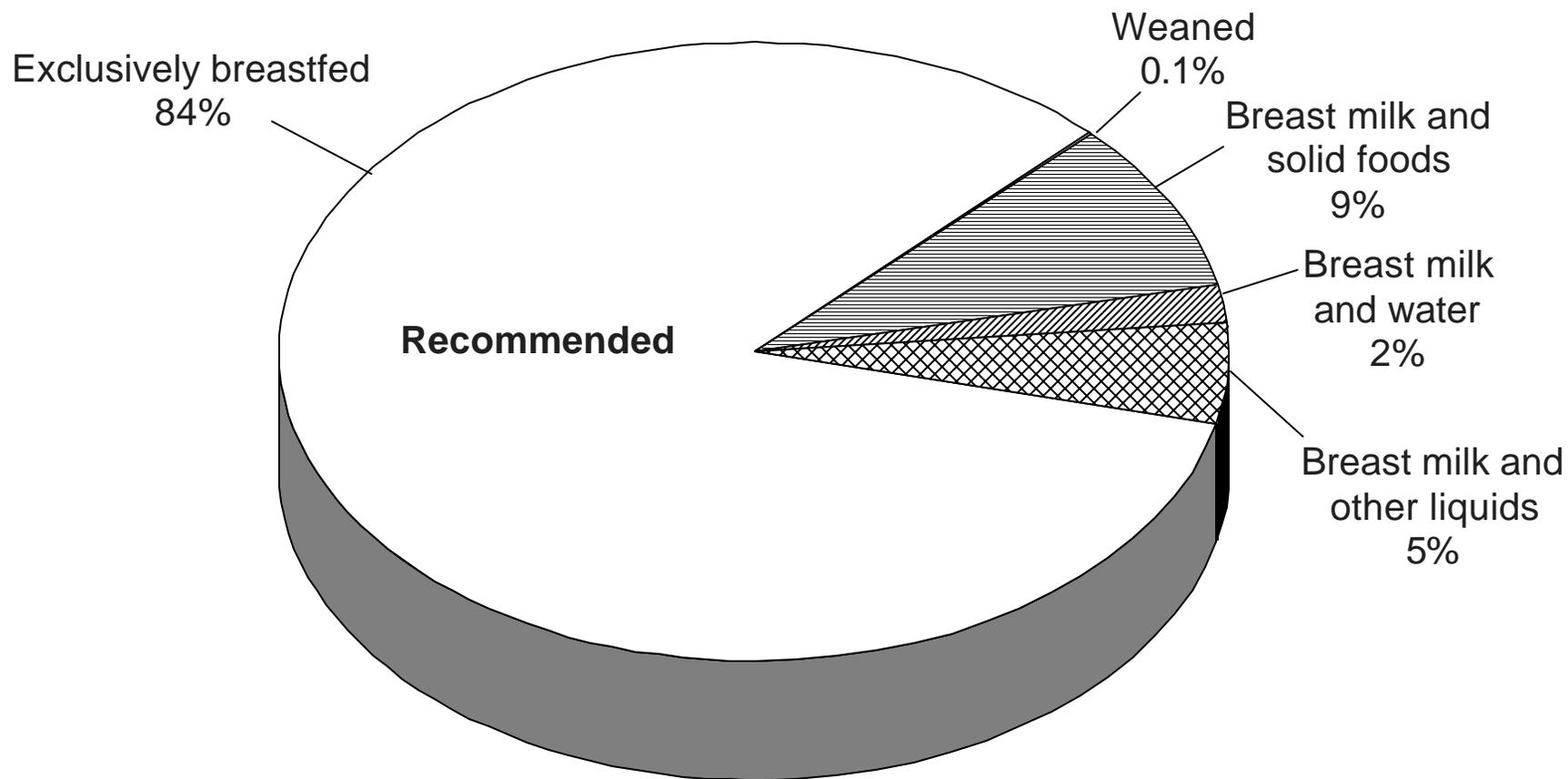
Improper feeding practices, in addition to diarrheal disease, are important determinants of malnutrition. WHO and UNICEF recommend that *all infants be exclusively breastfed from birth until six months of age*. In other words, infants should be fed only breast milk during the first six months of life.

In Rwanda, 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 Rwanda, 84 percent of children under the age of six months are exclusively breastfed, as is recommended by WHO and UNICEF.**
- **Fourteen percent of infants under six months old are given some form of liquid or solid food other than breast milk and/or water. Additionally, 2 percent of infants under six months of age are given a combination of breast milk and water.**
- **Only one-tenth of 1 percent of infants under six months were fully weaned.**

Figure 19

Feeding Practices for Infants under Six Months, Rwanda



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

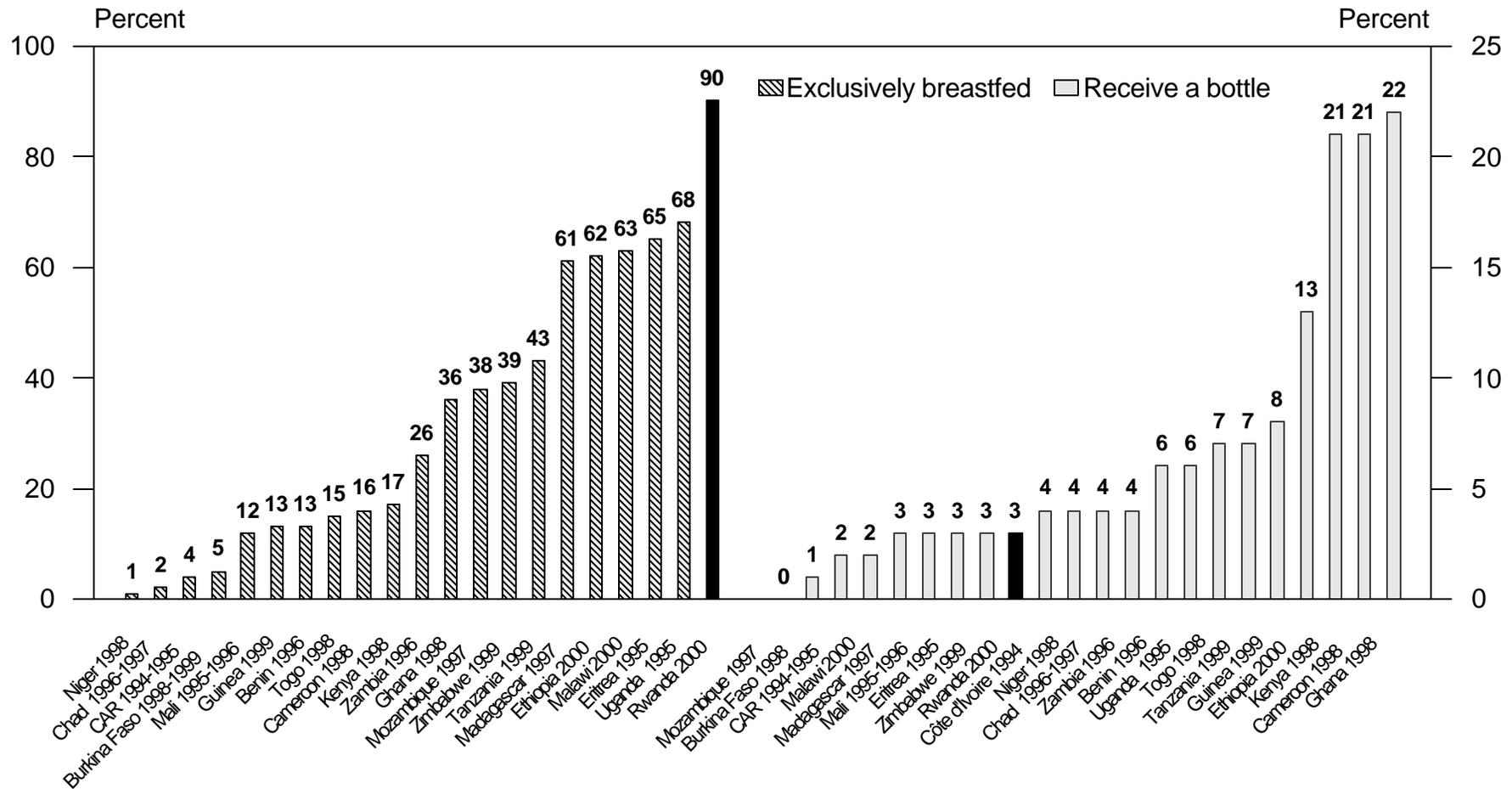
Figure 20: Infants under Four Months Who Are Exclusively Breastfed and Those Who Receive a Bottle, Rwanda Compared with Other Sub-Saharan Countries

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 mortality in Africa.

- In most of the sub-Saharan countries surveyed, relatively few mothers of infants even under four months follow the recommended practice of breastfeeding exclusively. **However, in Rwanda, 90 percent of these mothers breastfeed their young infants exclusively.** This is by far the highest rate among all sub-Saharan countries surveyed.
- **Bottle-feeding is practiced by 3 percent of mothers of infants under four months in Rwanda.** This rate is in the midrange among countries surveyed. **Bottle-feeding is not recommended** because improper sanitation with bottle-feeding can introduce pathogens to the infant. Additionally, infant formulas (which are often watered down) and other types of milk do not provide nutrition comparable to breast milk for infants less than six months of age. For these reasons, bottle-feeding puts infants at a higher risk of illness and malnutrition.

Figure 20

Infants under Four Months Who Are Exclusively Breastfed and Those Who Receive a Bottle, Rwanda 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.

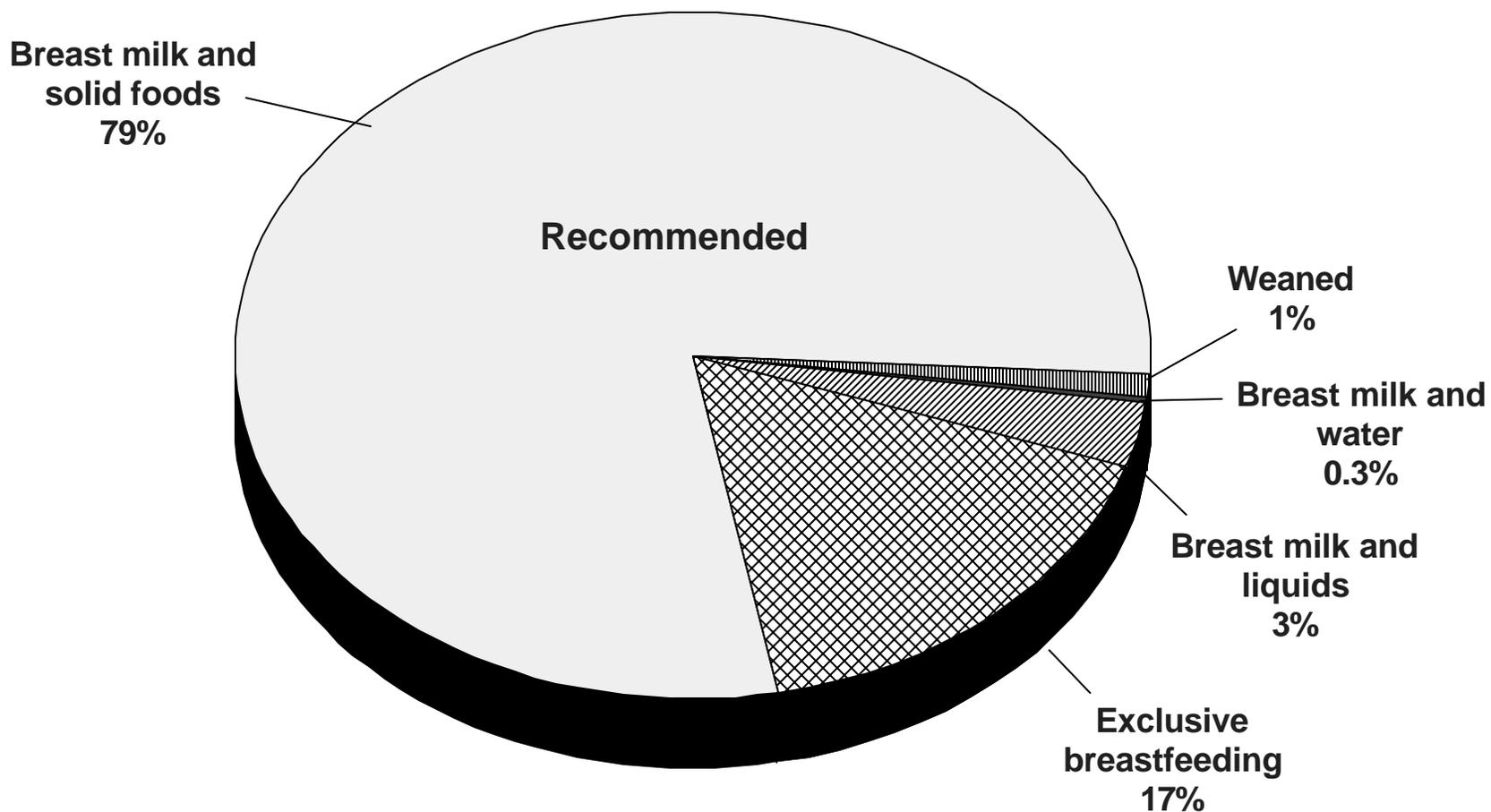
Figure 21: Feeding Practices for Infants Age 6-9 Months, Rwanda

UNICEF and WHO recommend that solid foods be introduced to infants around the age of six months because 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 Rwanda, 79 percent of infants age 6-9 months are fed solid foods in addition to breast milk.** This means that about three-fourths of all infants age 6-9 months are fed according to the recommended practice.
- **Twenty percent of infants age 6-9 months are not fed solid foods in addition to breast milk, putting these children at risk of malnutrition.**
- **About 1 percent of infants are fully weaned** and not receiving the additional nutritional and emotional support of breastfeeding.

Figure 21

Feeding Practices for Infants Age 6-9 Months, Rwanda



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.

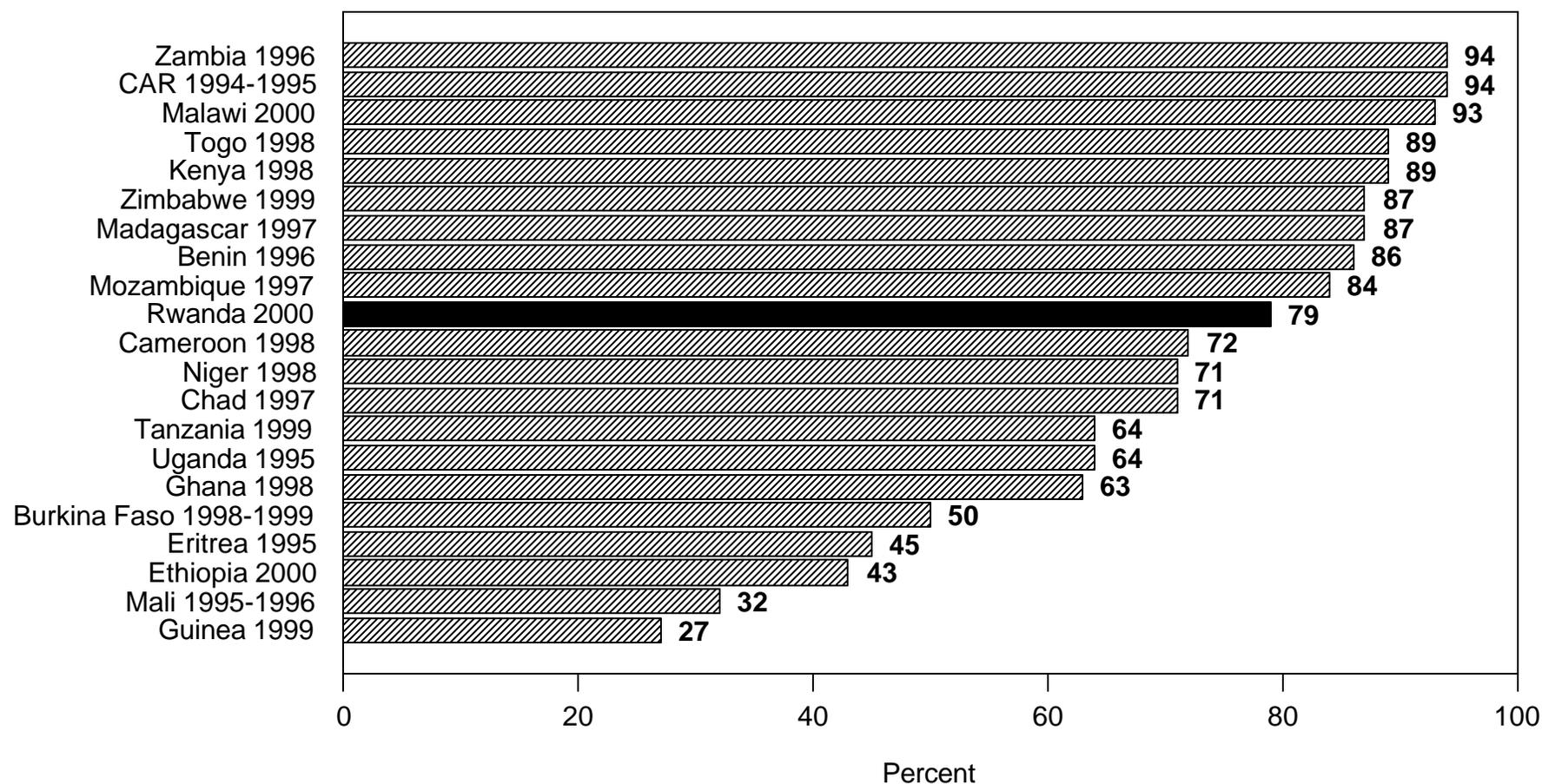
Figure 22: Infants Age 6-9 Months Receiving Solid Foods in Addition to Breast Milk, Rwanda Compared with Other Sub-Saharan Countries

In Rwanda,

- **Seventy-nine percent of infants age 6-9 months receive solid food in addition to breast milk.** This is in the midrange among all the sub-Saharan countries surveyed.

Figure 22

Infants Age 6-9 Months Receiving Solid Foods in Addition to Breast Milk, Rwanda 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 23: Children 10-23 Months Who Continue to Be Breastfed, Rwanda 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 diarrhea.

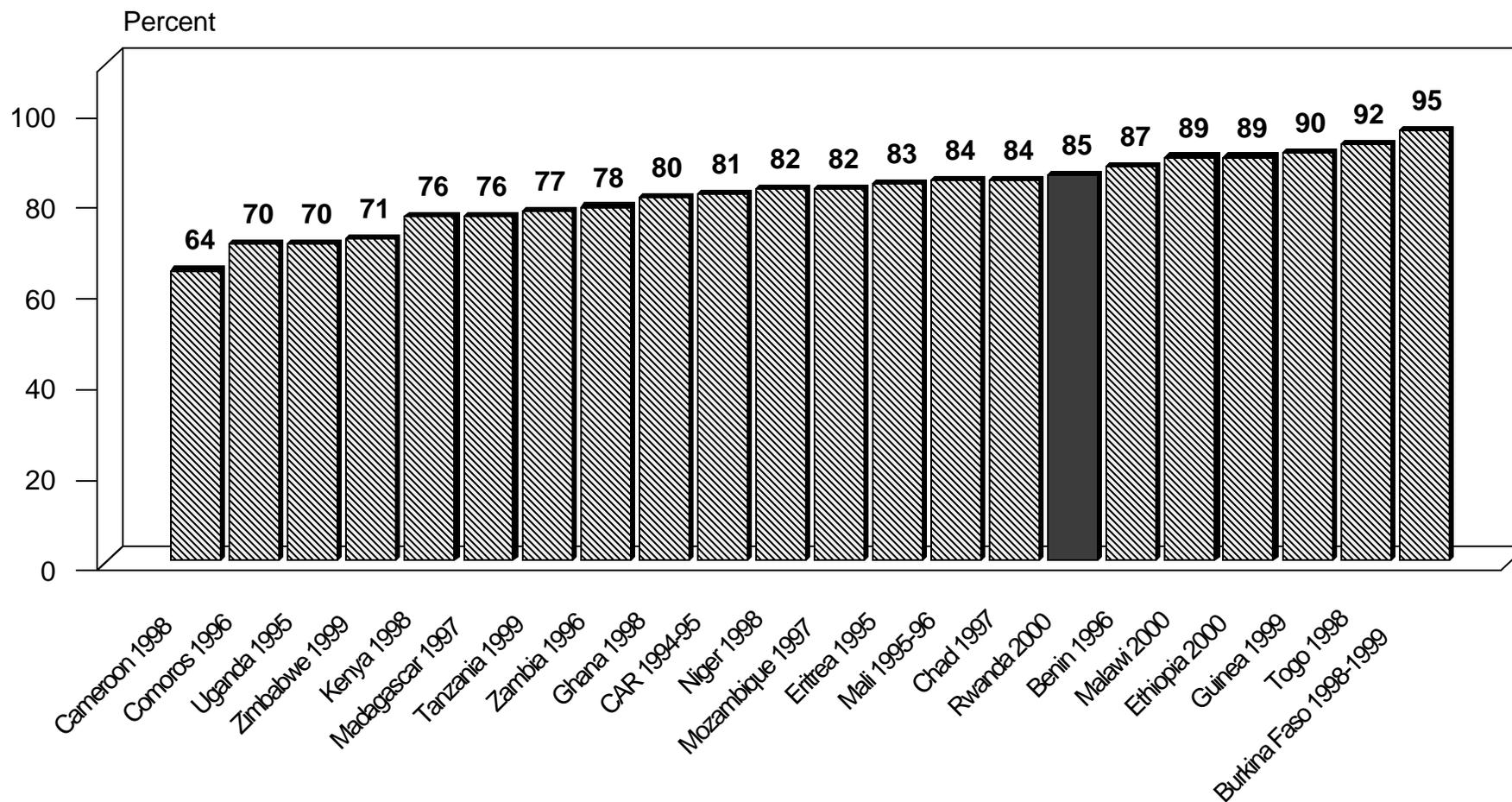
Additionally, breastfeeding up to 24 months can help reduce a woman's fertility, especially in areas where contraception is limited. Women who breastfeed for longer periods have lower fertility rates than women who breastfeed for shorter periods.

In Rwanda,

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

Figure 23

Children 10-23 Months Who Continue to Be Breastfed, Rwanda 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

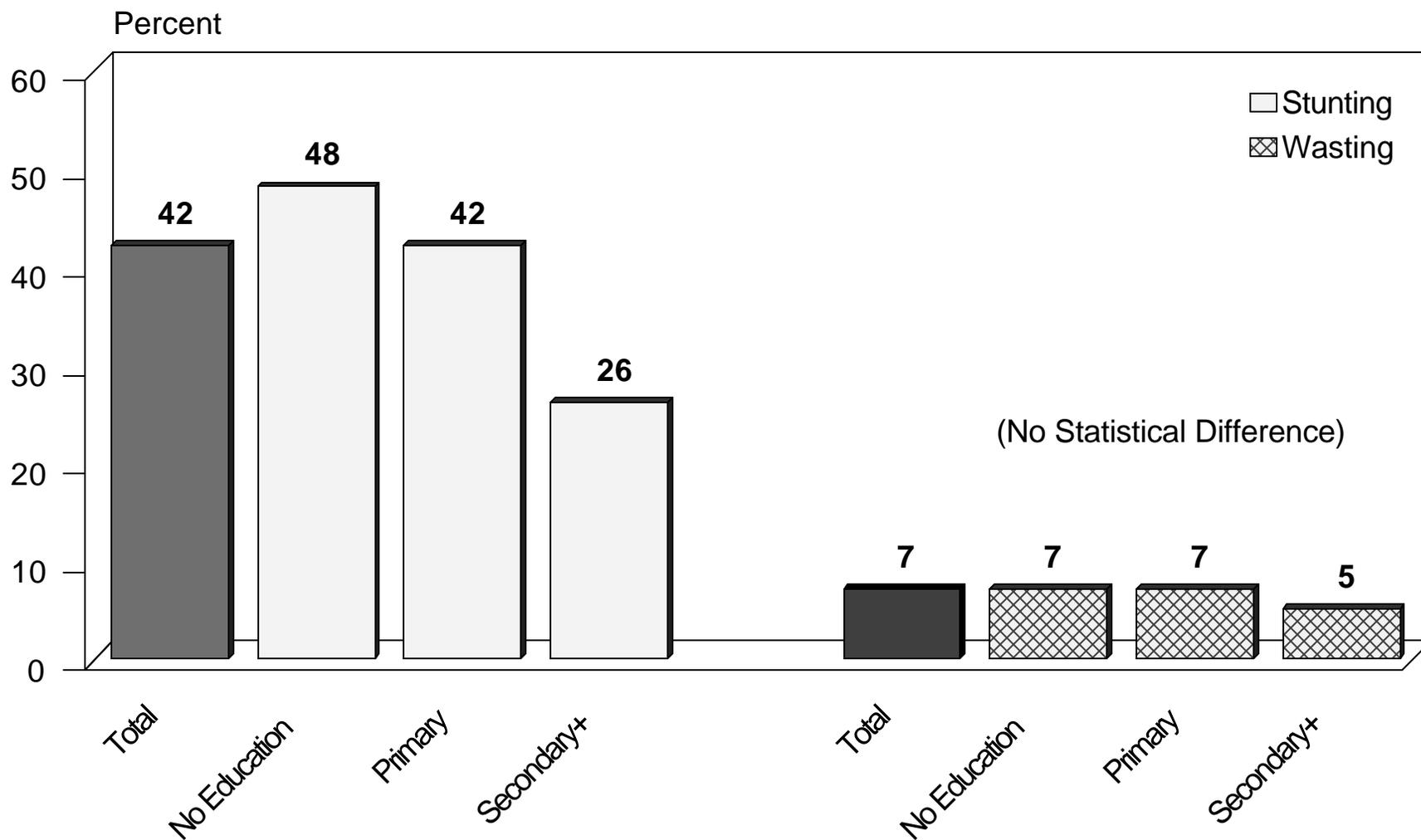
Figure 24: Stunting and Wasting among Children under Five Years by Mother's Education, Rwanda

Maternal education is related to knowledge of good child care practices and to household wealth. In Rwanda, 35 percent of the mothers of children under five years of age have never attended school, while 55 percent have some primary education and 10 percent have a secondary or higher education. There are variations in school attendance, especially between urban and rural areas. In the rural areas, 38 percent of the mothers have never attended school, 57 percent have attended primary school, and only 6 percent have gone to secondary school or higher. In contrast, only 10 percent of the mothers in urban areas have never attended school, 50 percent have attended primary school, and 40 percent have gone to secondary school or higher. Outside of Kigali Ville, mothers living in Gisenyi, Cyangugu, Ruhengeri, and Kibungo regions had the highest percentage of receiving at least a secondary school education (17 percent, 12 percent, 12 percent, and 11 percent, respectively). The percentage of mothers reporting a secondary school education is much lower in the Gikongoro (2 percent) and Kibuye (3 percent) regions.

- Maternal education has an inverse relationship with stunting in Rwanda. **As the level of maternal education increases, the level of stunting decreases.** There is a 6 percentage point difference in stunting rates between children of mothers with no education and those whose mothers have a primary education, and there is a 22 percentage point difference between children of mothers with no education and those whose mothers have a secondary education or higher.
- **Maternal education has no statistically significant relationship with wasting in Rwanda.**

Figure 24

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



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

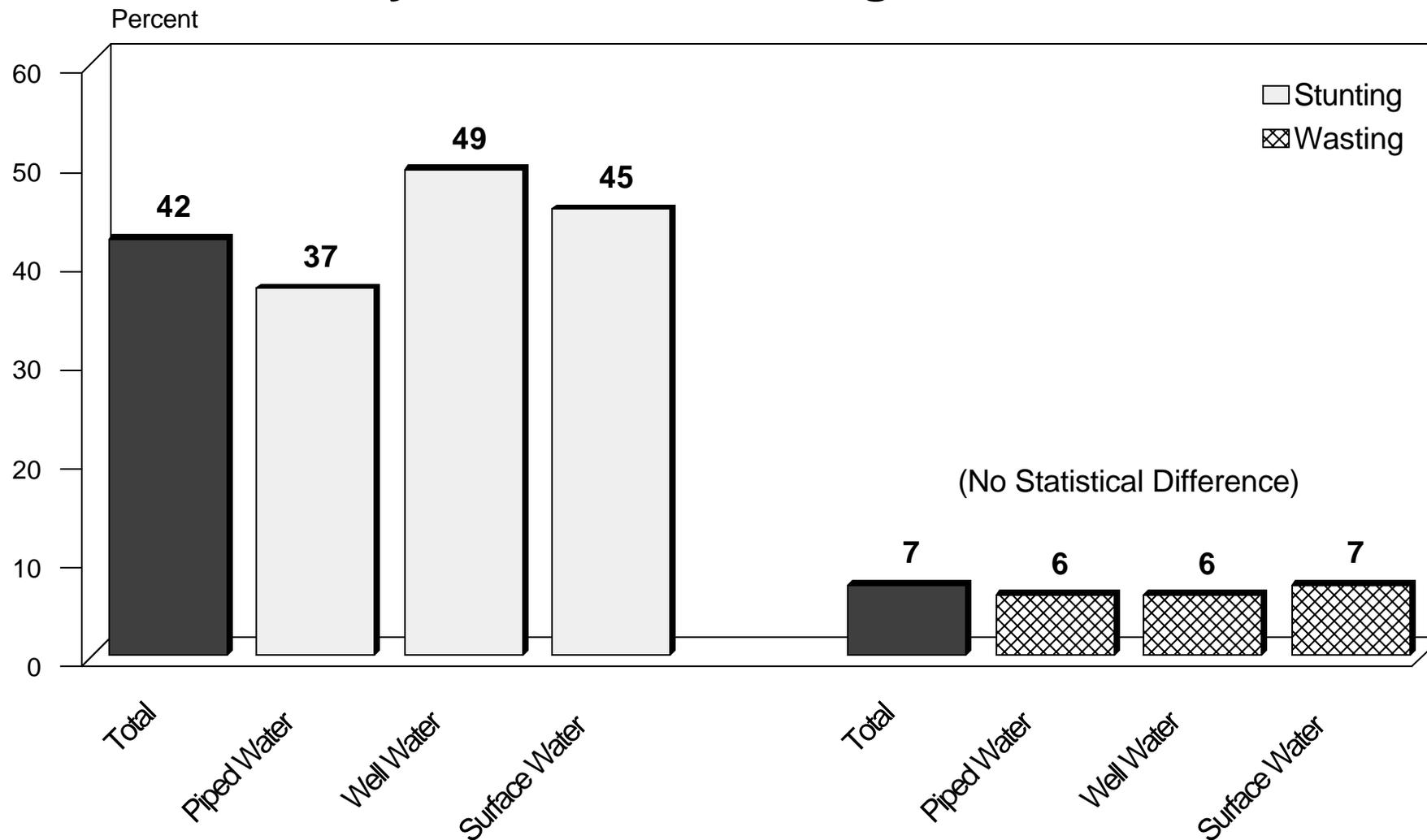
Figure 25: Stunting and Wasting among Children under Five Years by Source of Drinking Water, Rwanda

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, 35 percent use piped water, 10 percent obtain their drinking water from a well, and 55 percent use surface water.

- **In Rwanda, children whose drinking water is well water or surface water are more likely to be stunted (49 percent and 45 percent, respectively) than children with access to piped water (37 percent).**
- **Source of drinking water has no statistically significant relationship with wasting in Rwanda.**

Figure 25

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



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

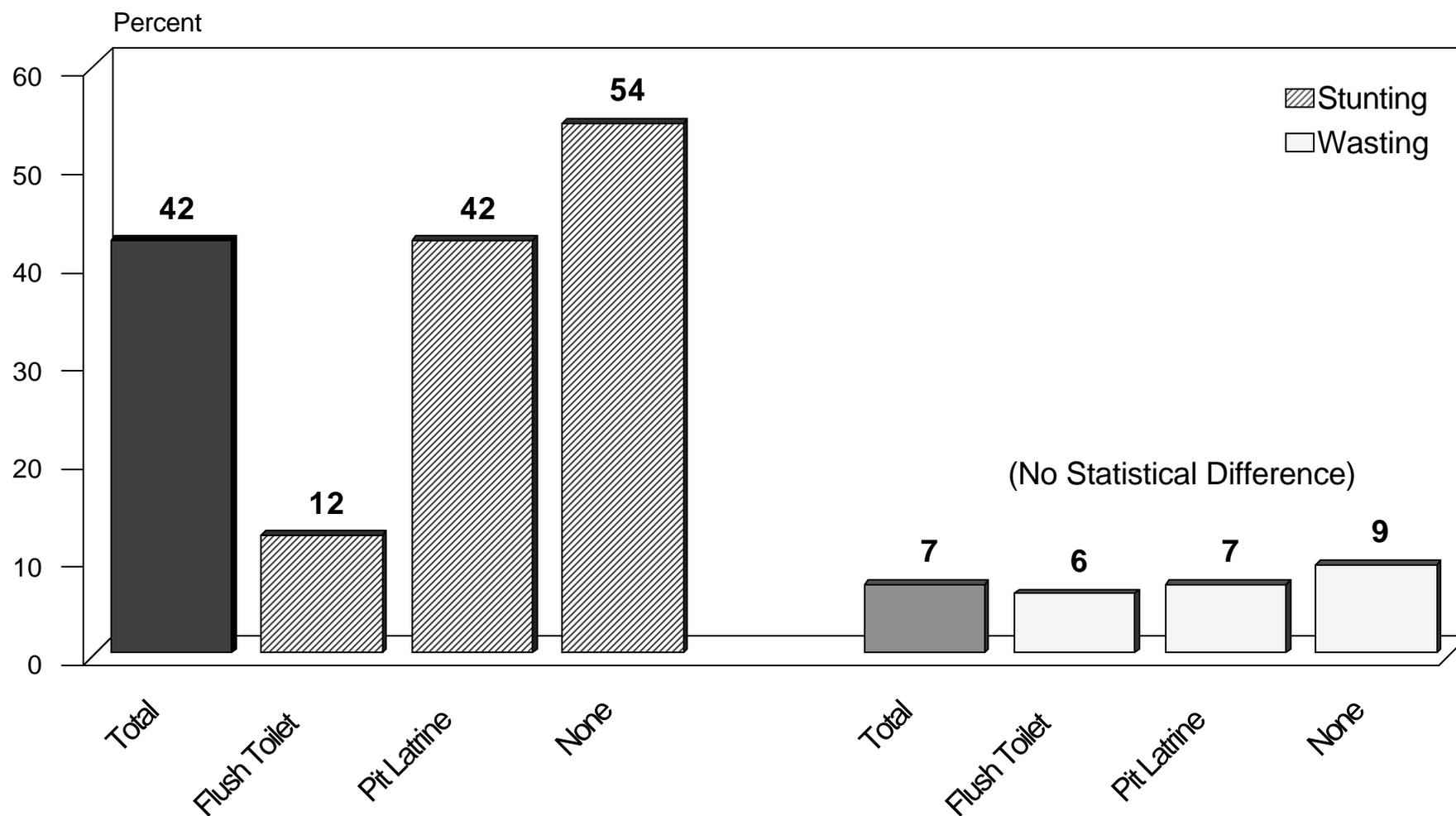
Figure 26: Stunting and Wasting among Children under Five Years by Type of Toilet, Rwanda

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 Rwanda, 95 percent of households have access to a pit latrine, 4 percent have no facilities, and 1 percent of surveyed households have access to a flush toilet.

- **Households that do not have any toilet facilities have the highest proportion of stunting in children under five years of age (54 percent).**
- **Households with access to flush toilets have the lowest proportion of children stunted (12 percent).**
- **There is no relationship between type of toilet and wasting.**

Figure 26

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



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

Basic Influences

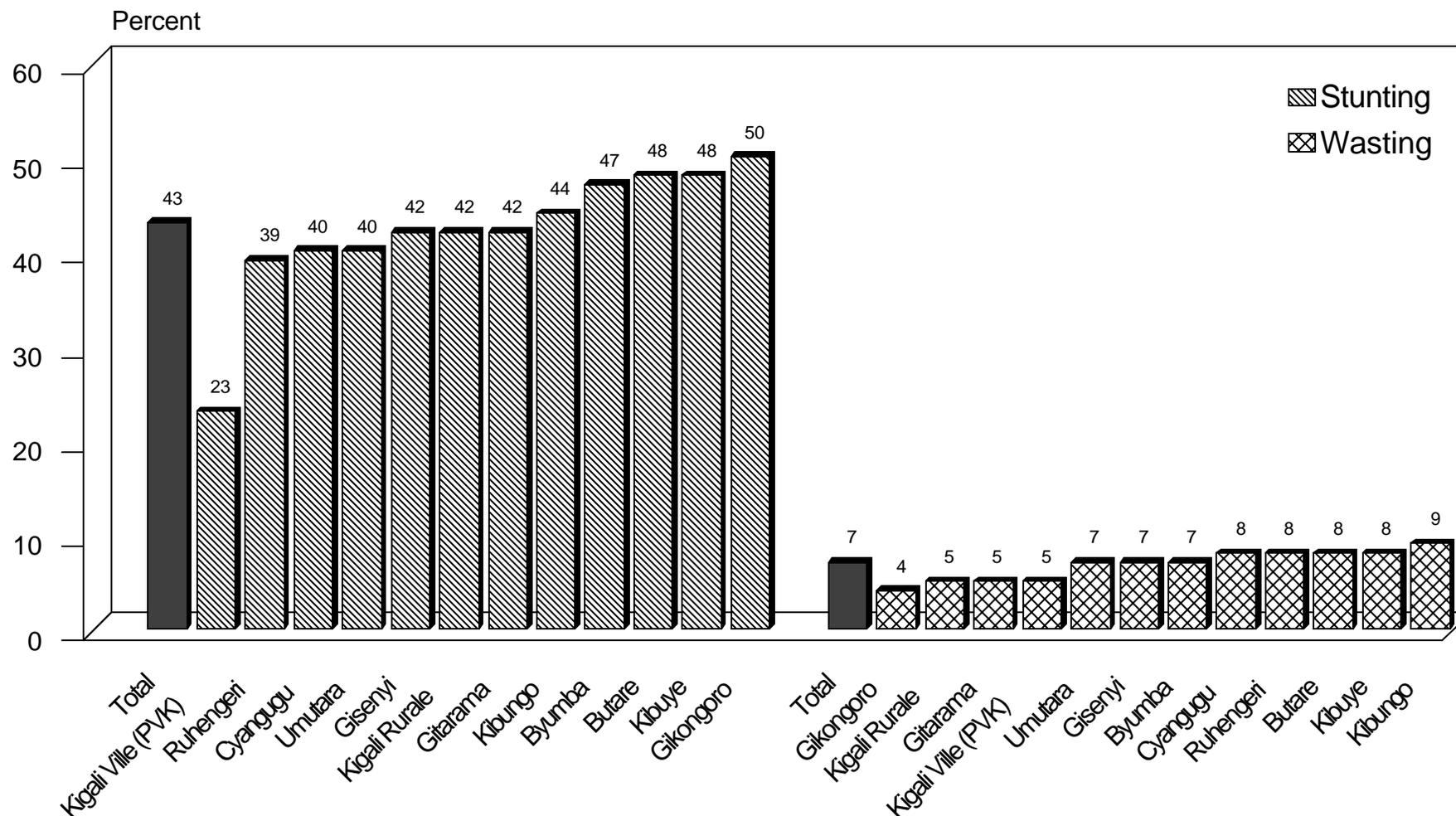
Figure 27: Stunting and Wasting among Children under Five Years by Region, Rwanda

In Rwanda,

- **Stunting ranges from 23 to 50 percent among children in the 12 regions.** Stunting rates were much lower in Kigali Ville than elsewhere in the country.
- **Wasting ranges from 4 to 9 percent among regions.** Kibungo shows the highest level of wasting.

Figure 27

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



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

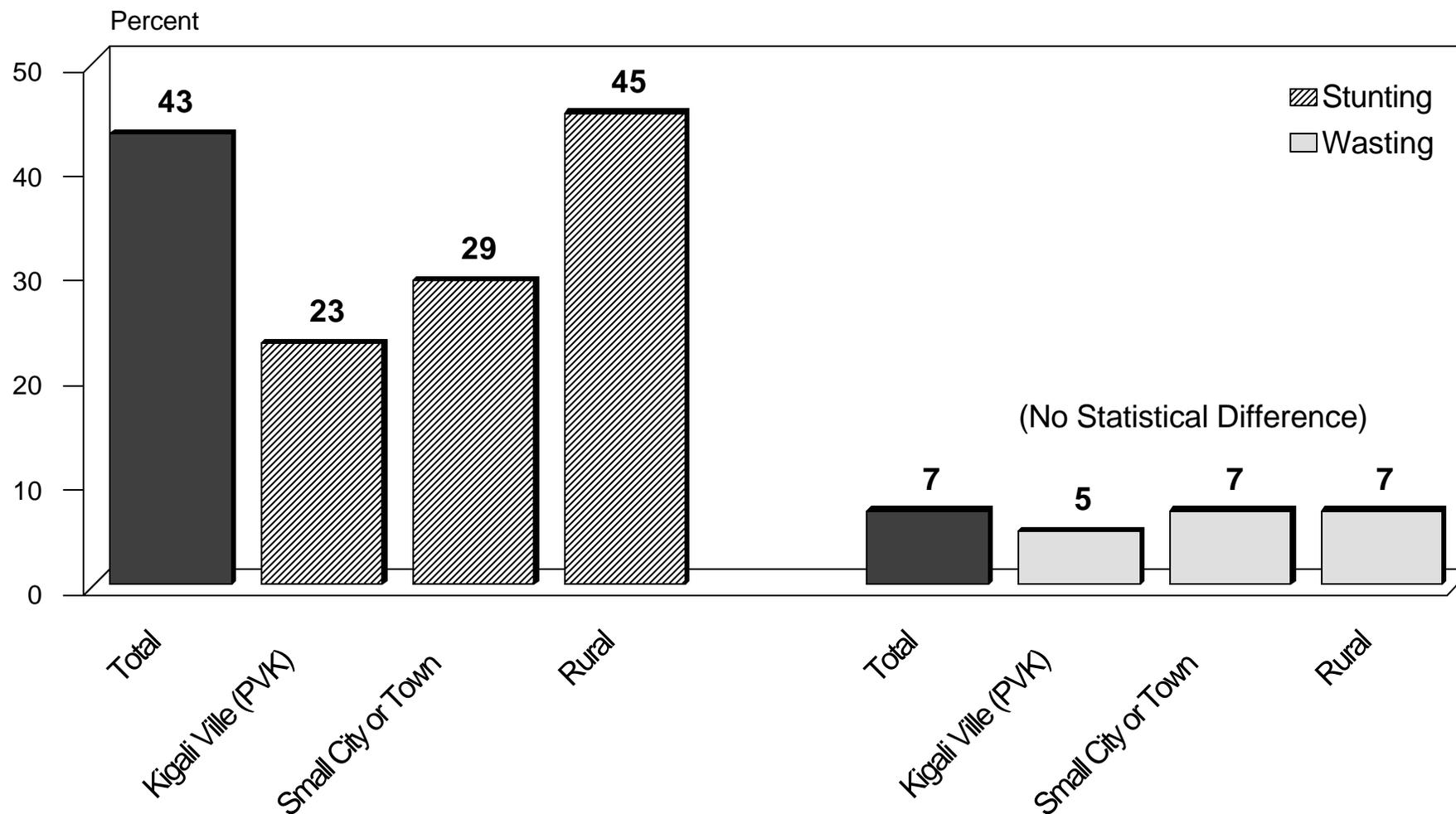
Figure 28: Stunting and Wasting among Children under Five Years by Urban-Rural Residence, Rwanda

In Rwanda,

- **Forty-five percent of rural children are stunted.** In the capital city of Kigali, 23 percent of children are affected by chronic malnutrition. In other urban areas (small cities or towns), the rate of stunting is 29 percent.
- There is no statistical difference in the rates of wasting between children living in rural areas and those living in urban areas.

Figure 28

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



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

Maternal Nutritional Status

Figure 29: Malnutrition among Mothers of Children under Five Years by Region, Rwanda

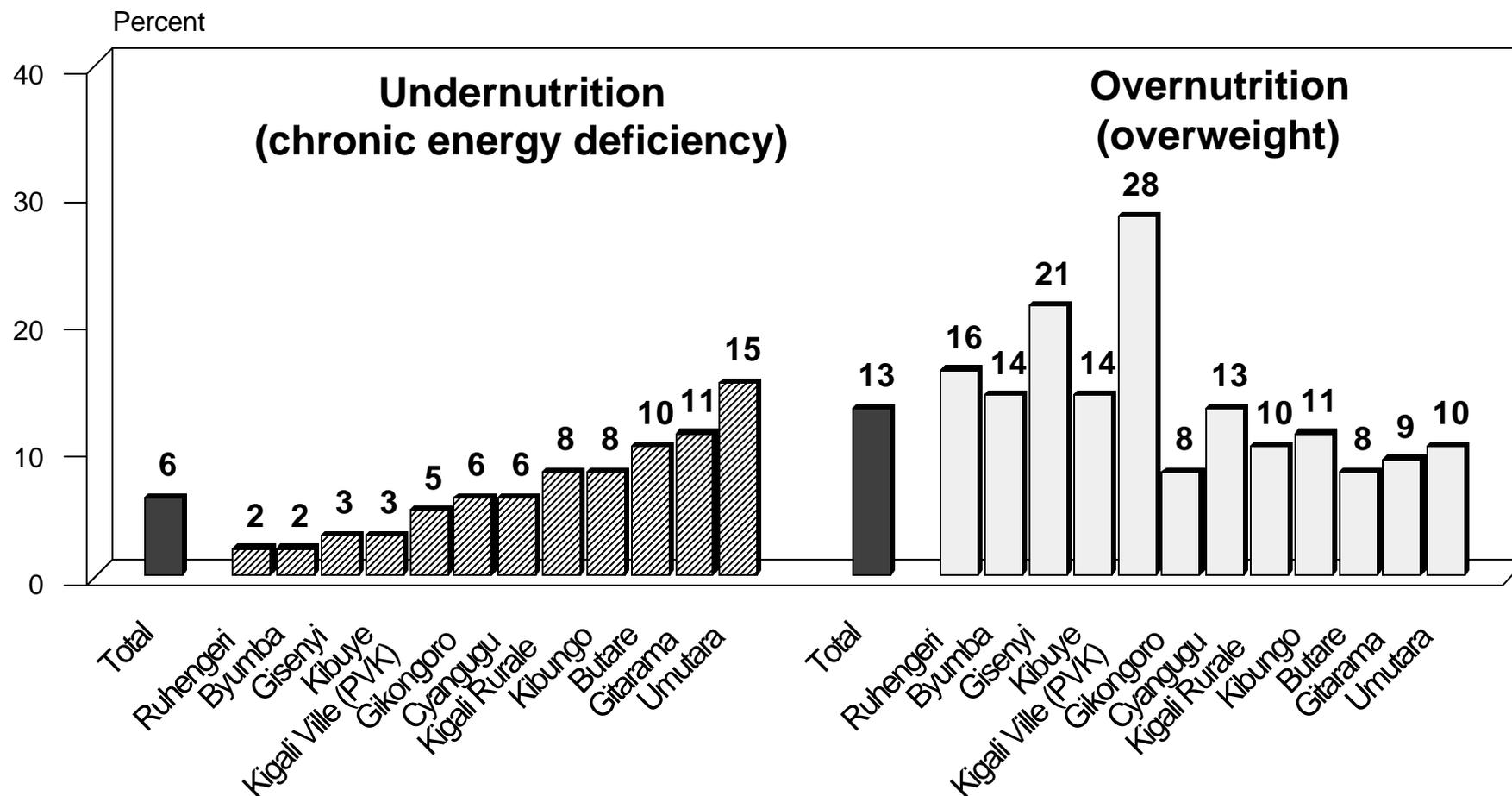
Besides being of concern in its own right, a mother's nutritional status affects her ability to successfully carry, deliver, and care for her children. There are generally accepted standards for indicators of malnutrition among adult women that can be applied.

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, $BMI = \text{kg}/\text{m}^2$. When the BMI is below the suggested cutoff point of 18.5, this indicates chronic energy deficiency or undernutrition for non-pregnant, non-lactating women. When the BMI is above 25, women are considered overweight.

- **Six percent of all mothers of children under age five in Rwanda are undernourished.**
- **The highest levels of maternal undernutrition are in the Umutara, Gitarama, and Butare regions (15, 11, and 10 percent of mothers of children under five, respectively). The lowest levels of maternal undernutrition are in the Ruhengeri and Byumba regions (2 percent) and the Gisenyi Region (3 percent).**
- **Thirteen percent of all mothers of children under five are overweight.**
- **The highest levels of overnutrition are in Kigali Ville (28 percent) and in Gisenyi (21 percent). The lowest levels of maternal overnutrition are in Gikongoro and Butare (8 percent) and Gitarama (9 percent).**

Figure 29

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



Note: Maternal undernutrition is the percentage of mothers whose BMI (kg/m²) is less than 18.5. Maternal overnutrition is the percentage of mothers whose BMI is greater than 25.

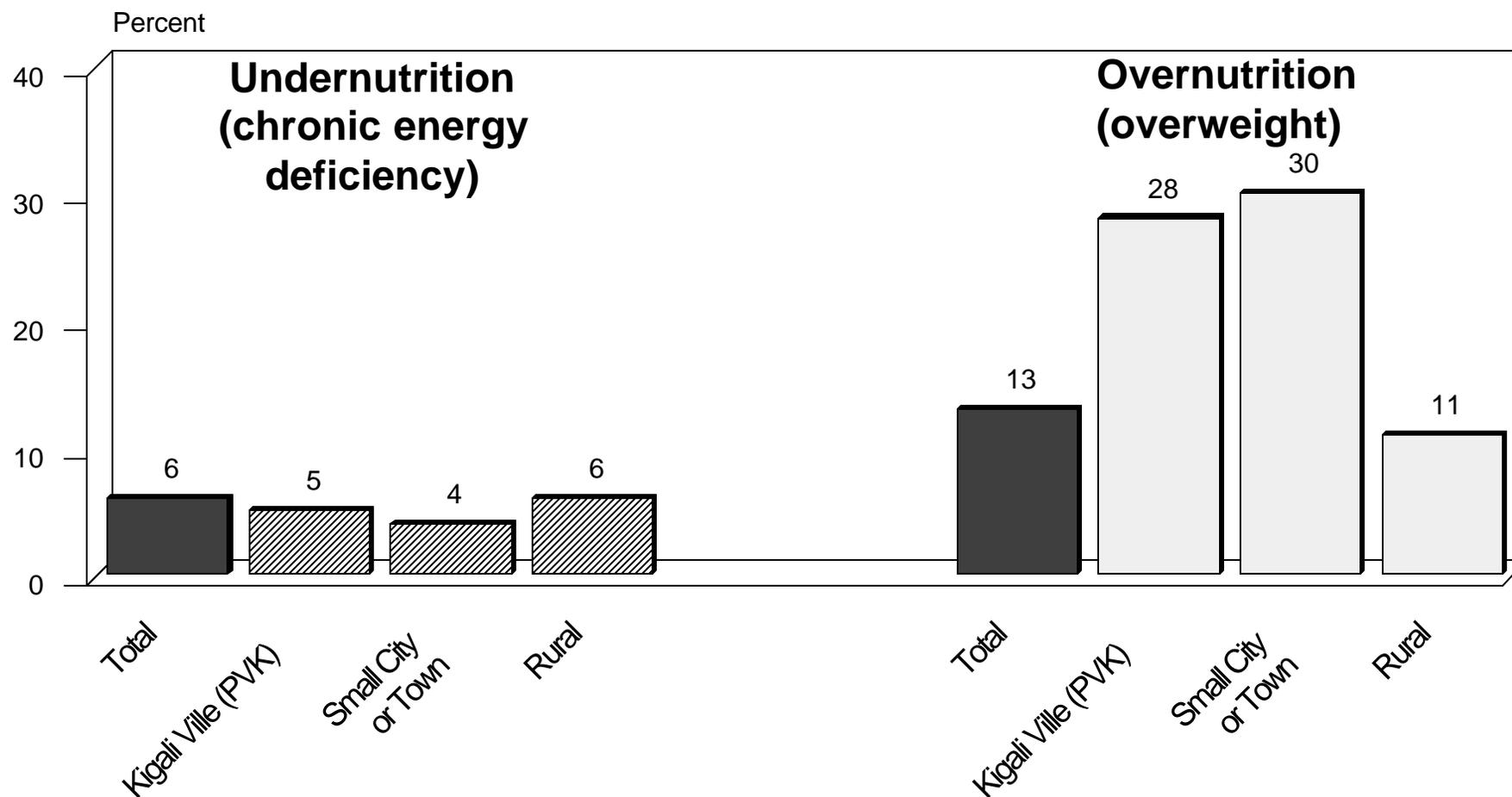
Figure 30: Malnutrition among Mothers of Children under Five Years by Residence, Rwanda

In Rwanda,

- **The undernutrition rate (chronic energy deficiency) for mothers of children under five is lowest in small cities and towns (4 percent) and is highest in rural areas (6 percent).**
- **The overnutrition rate (overweight) for mothers of children 0-59 months is lowest (11 percent) in rural areas and largest in small cities and towns (30 percent).**

Figure 30

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



Note: Maternal undernutrition is the percentage of mothers whose BMI (kg/m²) is less than 18.5. Maternal overnutrition is the percentage of mothers whose BMI is greater than 25.

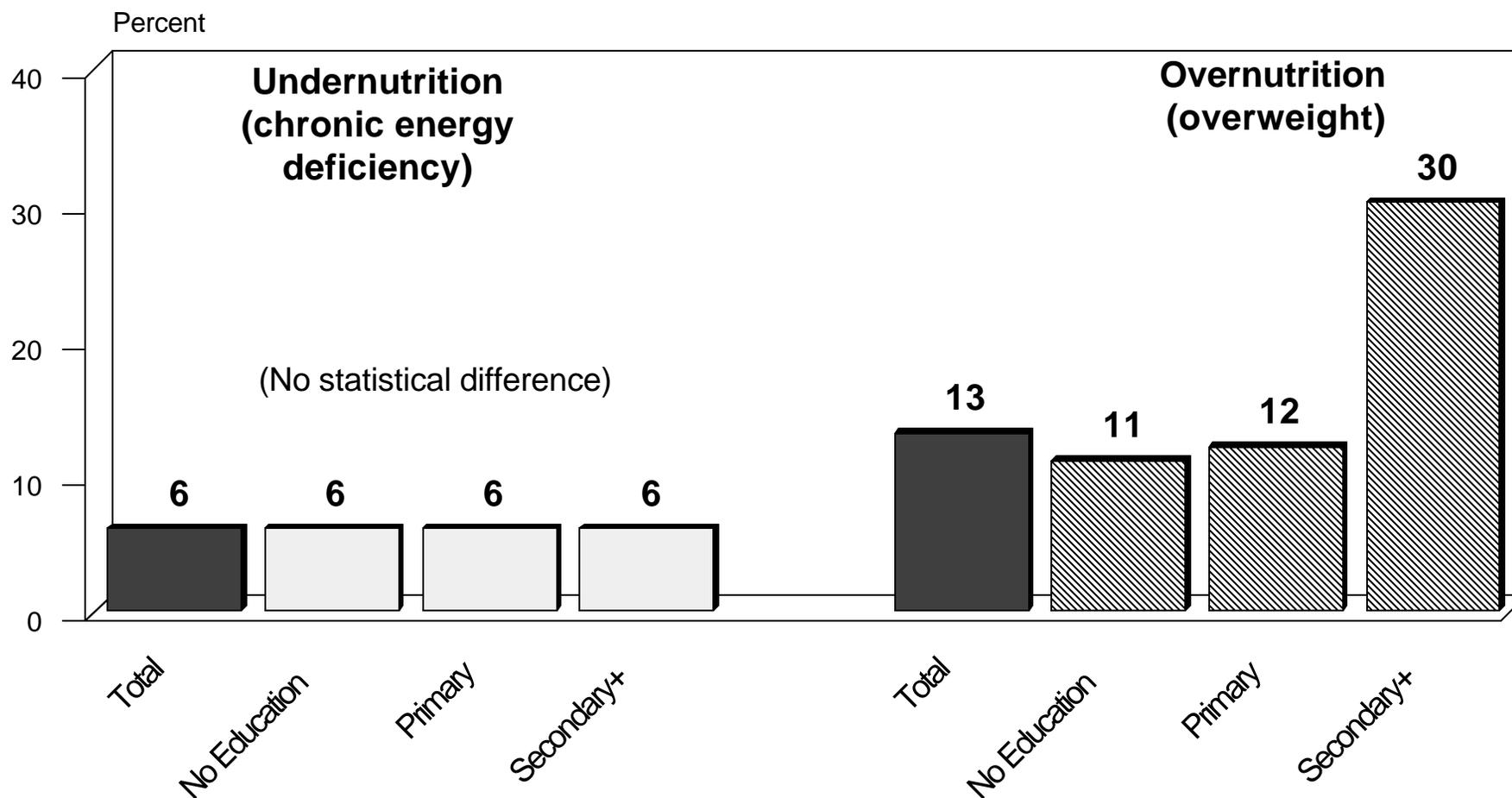
Figure 31: Malnutrition among Mothers of Children under Five Years by Education, Rwanda

In Rwanda,

- **There is no direct relationship between mother's education and maternal undernutrition.**
- **The rate of maternal overnutrition is highest among women with at least a secondary school education (30 percent).**

Figure 31

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



Note: Maternal undernutrition is the percentage of mothers whose BMI (kg/m²) is less than 18.5. Maternal overnutrition is the percentage of mothers whose BMI is greater than 25.

Figure 32: Malnutrition among Mothers of Children under Three Years, Rwanda Compared with Other Sub-Saharan Countries

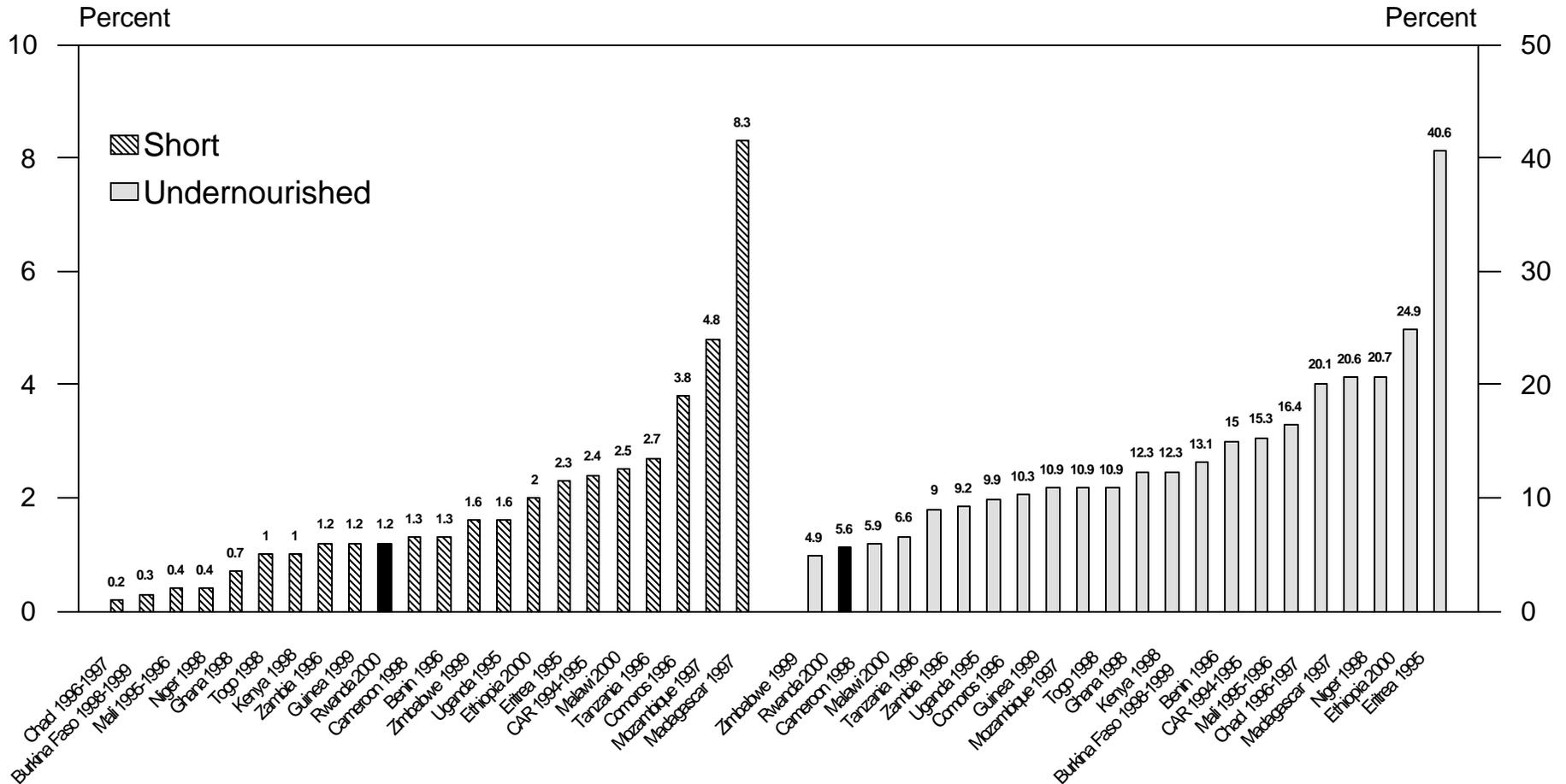
Malnutrition among mothers is likely to have a major impact on their ability to care for themselves and their children. Women less than 145 centimeters in height are considered too short. Mothers who are too short (a condition largely due to stunting during childhood and adolescence) may have difficulty 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 using the body mass index is also presented.

In Rwanda,

- **Slightly more than 1 percent of mothers of children under three are too short (< 145 cm).** This is in the midrange among all sub-Saharan countries surveyed.
- **Approximately 6 percent of mothers of children under three are undernourished (BMI < 18.5).** This is the second lowest rate among the sub-Saharan countries surveyed.

Figure 32

Malnutrition among Mothers of Children under Three Years, Rwanda 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, and Underweight Rates by Background Characteristics
Rwanda 2000

Background characteristic	Stunted	Wasted	Underweight	Background characteristic	Stunted	Wasted	Underweight
Child's age in months				Regions			
0-5	9.5	4.9	3.0	Butare	48.2	7.9	31.5
6-9	20.0	7.4	18.2	Byumba	47.1	7.0	26.0
10-11	35.7	11.3	38.8	Cyangugu	39.9	7.7	25.5
12-15	44.9	15.5	37.5	Gikongoro	49.7	4.0	30.3
16-19	54.4	10.1	32.2	Gisenyi	42.0	7.1	18.5
20-23	56.4	7.6	35.0	Gitarama	42.4	5.3	25.2
24-35	45.4	7.5	27.3	Kibungo	44.3	8.9	27.7
36-47	49.2	4.1	25.1	Kibuye	48.0	8.2	26.0
48-59	54.3	4.0	21.7	Kigali Ville (PVK)	22.8	5.2	13.7
n=6,231	p<0.001	p<0.001	p<0.001	Kigali Rurale	42.2	5.0	23.8
				Ruhengeri	38.8	7.8	22.2
				Umutara	39.8	6.7	22.1
				n=6,231	p<0.001	p<0.05	p<0.001
Gender of child				Urban-rural residence			
Male	43.9	7.0	25.1	Urban	27.4	6.4	15.2
Female	41.2	6.5	23.4	Rural	45.3	6.8	25.9
n=6,231	p<0.05	NS	NS	n=6,231	p<0.001	NS	p<0.001
Overall	42.6	6.8	24.3	Overall	42.6	6.8	24.3

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

NS=Not significant at p≤0.05

Appendix 2

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

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: weight-for-age, height-for-age, and weight-for-height graphed against the normal curve. The weight-for-height curve is closest to the normal curve. Therefore, the proportion of malnourished children according to this index is closer to what would be seen in the reference population. Height-for-age and weight-for-age, however, are greatly to the left of the standard curve indicating that there is a large number of malnourished children. The implications are 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 Rwanda

