Tanzania 1999

Nutrition of Young Children and Mothers

Africa Nutrition Chartbooks

National Bureau of Statistics
U.S. Agency for International Development
ORC Macro
MEASURE DHS+

AFRICA NUTRITION CHARTBOOKS

NUTRITION OF YOUNG CHILDREN AND MOTHERS IN TANZANIA

Findings from the 1999 Tanzania Reproductive and Child Health Survey

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June 2001

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

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Introduction

Malnutrition[1] is one of the most important health and welfare problems among infants and young children in Tanzania. 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. Diarrhea and acute respiratory infection (ARI) are the top two causes of child morbidity and mortality in developing countries. 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 1999 Tanzania Reproductive and Child Health Survey (TRCHS 1999), a nationally representative survey of 3,826 households, conducted by the Tanzania National Bureau of Statistics in collaboration with the Reproductive and Child Health Section of the Ministry of Health. ORC Macro provided technical assistance through its MEASURE *DHS*+ program. The survey was initiated and jointly funded by the U.S. Agency for International Development (USAID/Tanzania), United Nations Children's Fund/Tanzania (UNICEF/ Tanzania), and the United Nations Population Fund (UNFPA/Tanzania). Of the 3,281 children age 0-59 months who were part of the study, 2,898 were alive at the time of the survey, and of these, 2,582 have complete anthropometric data and are therefore included in the undernutrition 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 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 determining 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.

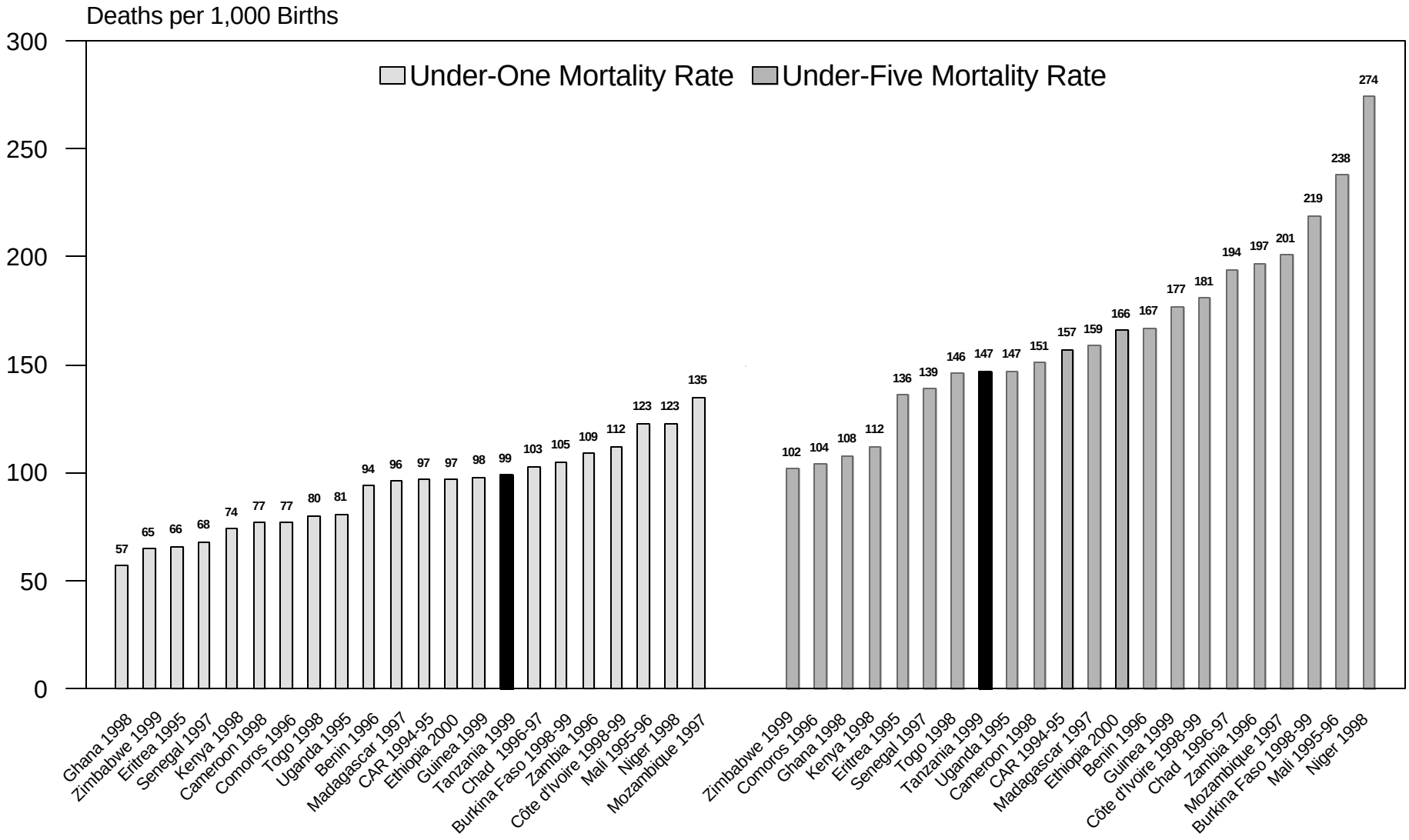
Figure 1: Infant and Child Mortality, Tanzania Compared with Other Sub-Saharan Countries

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-year 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.

- **Tanzania's under-one mortality rate (99 deaths per 1,000 births) indicates that approximately 10 percent of children born in Tanzania will die before their first birthday.** This rate is in the midrange among sub-Saharan countries surveyed.

- **Tanzania's under-five mortality rate (147 deaths per 1,000 births) indicates that approximately 15 percent of children born in Tanzania will die before their fifth birthday.** Again, this rate places Tanzania in the midrange among sub-Saharan countries surveyed.

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



Source: DHS Surveys 1995-2000

Figure 2: Contribution of Malnutrition to Under-Five Mortality, Tanzania

Malnutrition 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 Tanzania,

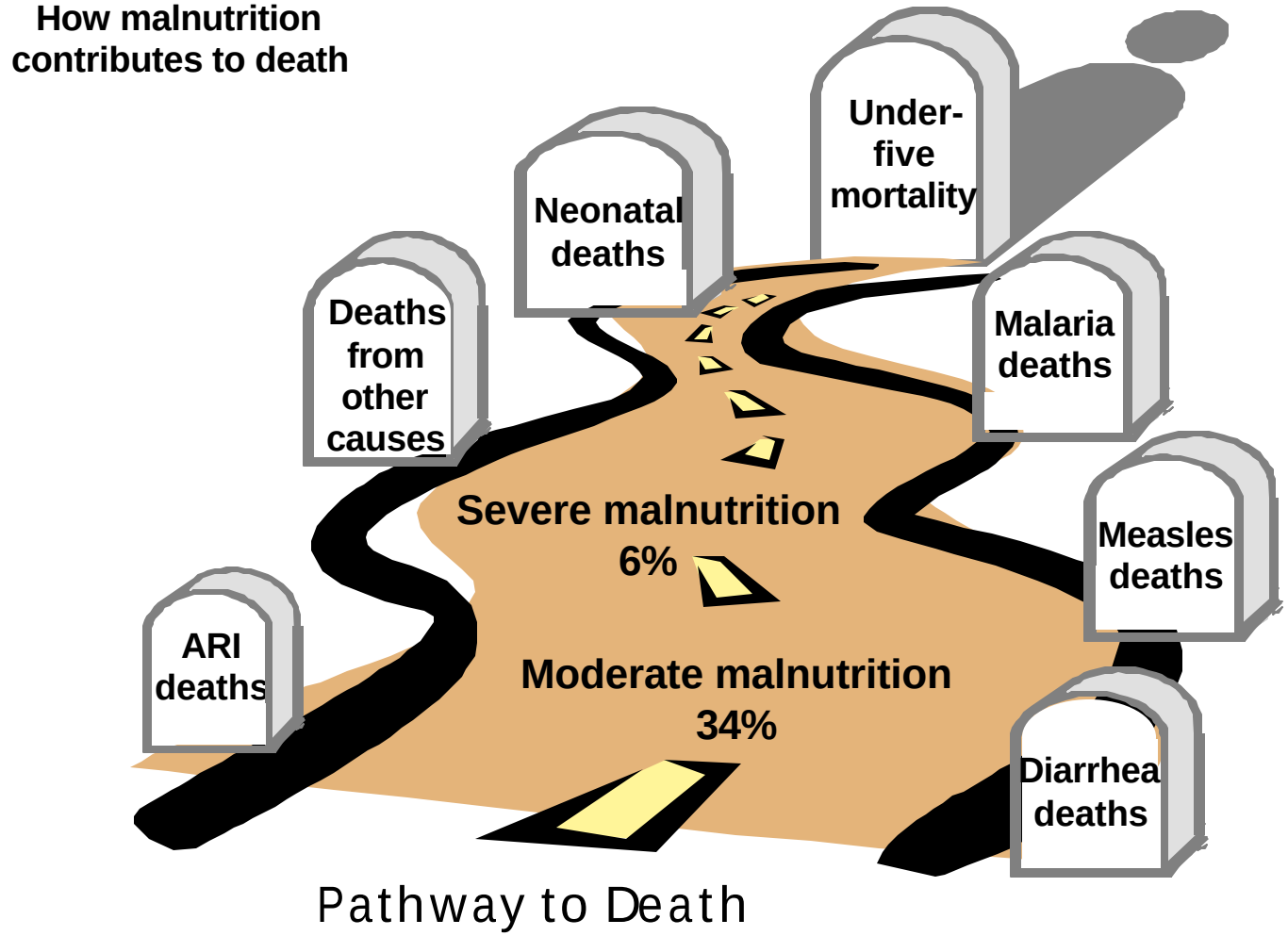
- **Forty percent of all deaths that occur before age five are related to malnutrition (severe and moderate malnutrition)**.

- Because of its extensive prevalence, **moderate malnutrition (34 percent) contributes to more deaths than severe malnutrition (6 percent).**

- **Sixty percent of all under-five deaths are not 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 Malnutrition to Under-Five Mortality, Tanzania



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

Source: Tanzania RCHS 1999

Figure 3: Survival and Nutritional Status of Children, Tanzania

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

In Tanzania,

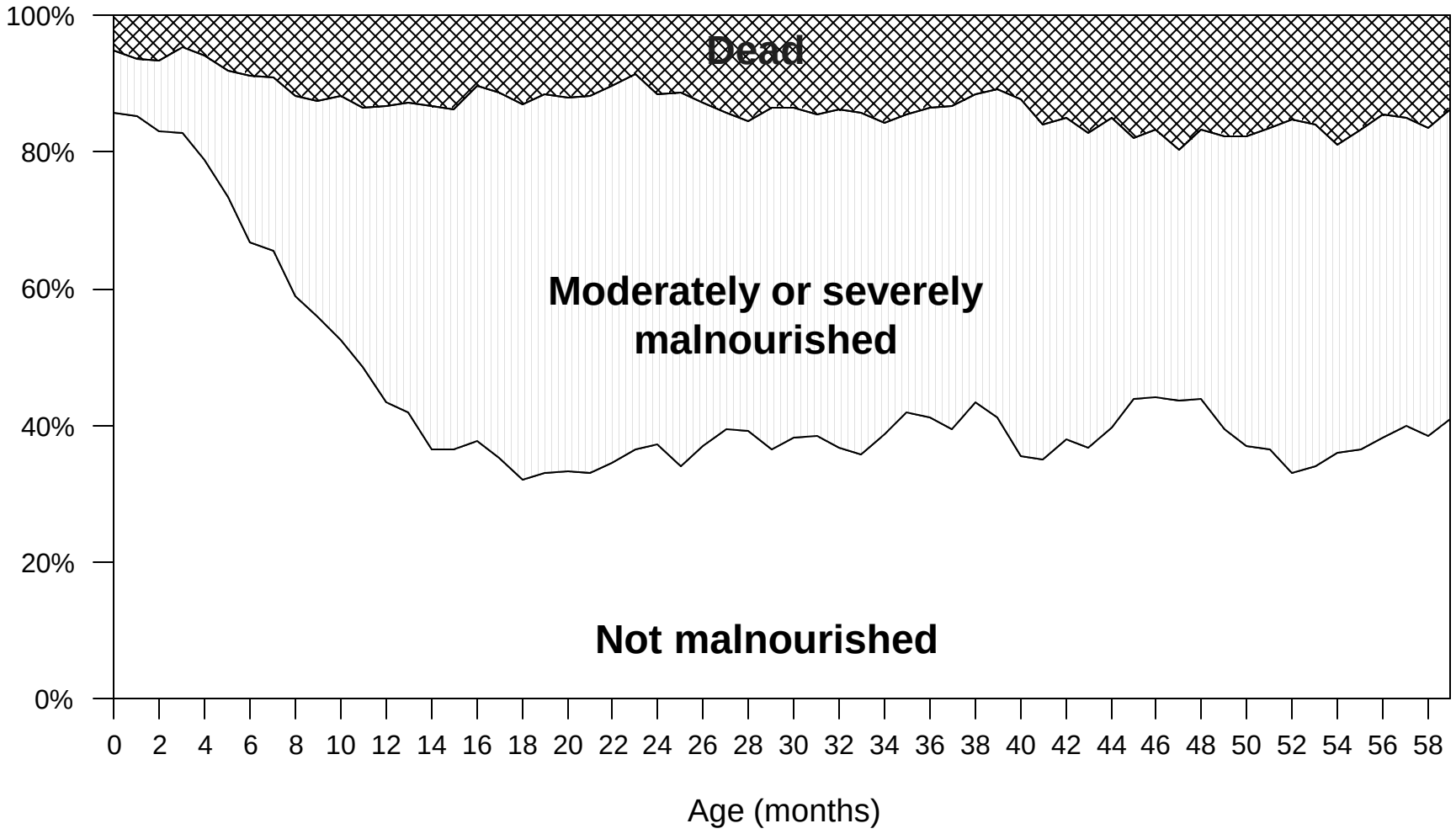
- **Between birth and 18 months of age, the percentage of children who are alive and not malnourished drops rapidly from 86 percent to 32 percent.** Thereafter, the rate remains stable, between 32 and 44 percent through 59 months.

- **Between birth and 18 months of age, the percentage of children who are moderately or severely malnourished[1] increases dramatically from 9 percent to 55 percent.** This percentage subsequently levels off but decreases slightly to 45 percent at 59 months of age.

- **In the first few months after birth, about 4 percent of all children have died. By 47 months, the percentage of children who have died reaches its peak of 20 percent.** Between 12 and 59 months, the rate for the most part ranges between 13 and 17 percent.

[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 -3 SD and -2 SD is considered moderately malnourished.

Figure 3
Survival and Nutritional Status of Children, Tanzania



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.

Source: Tanzania RCHS 1999

Malnutrition in Tanzania

Figure 4: Malnutrition among Children under Five Years, Tanzania

In Tanzania,

- **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 approximately 22 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 two-and-a-half times the level expected in a healthy population.

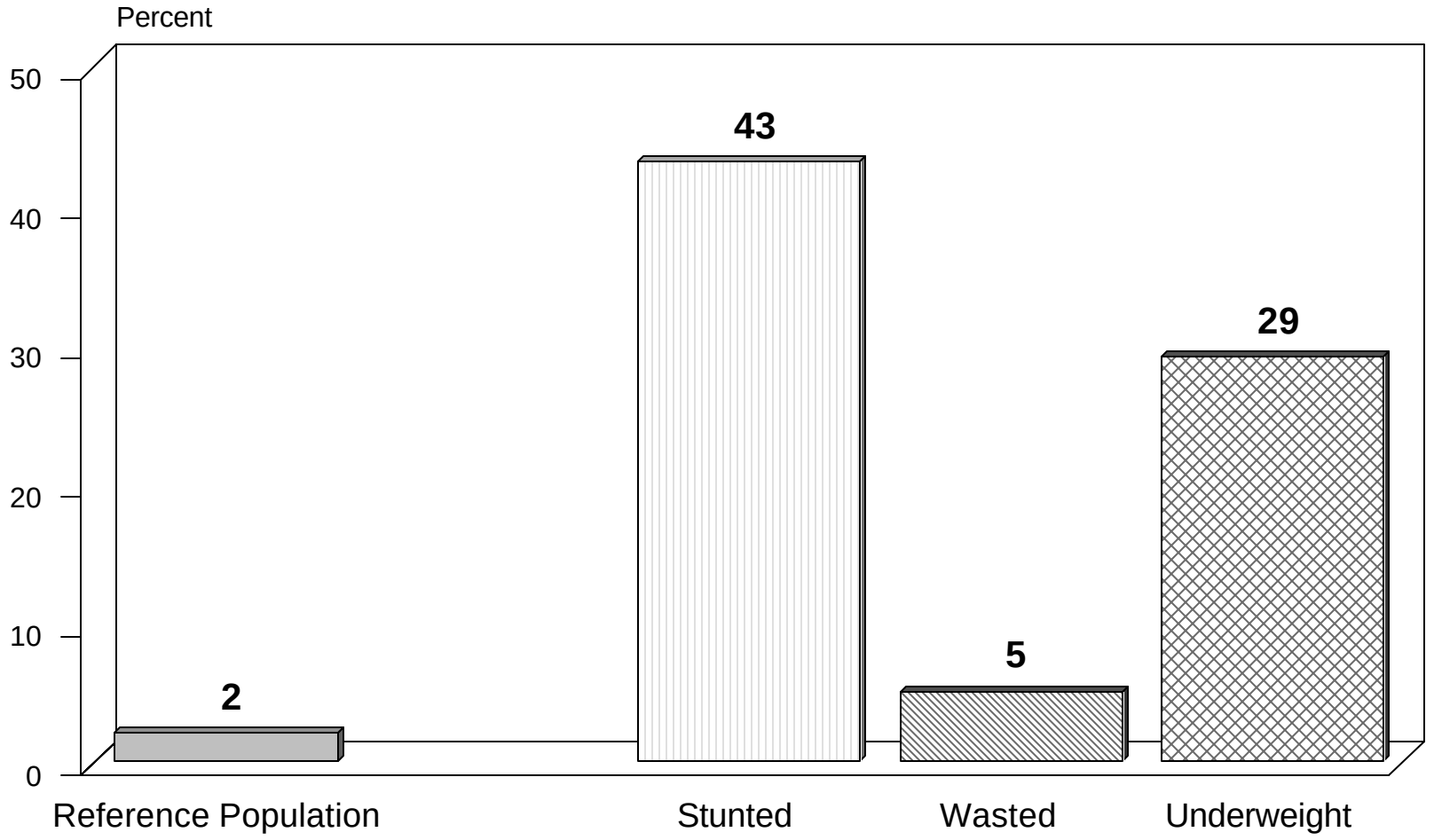
- **Twenty-nine percent of children under five years are *underweight***[3] for their age. This is more than 14 times the level expected in a healthy, well-nourished population.

[1] A stunted child has a height-for-age Z-score that is below -2 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.

Figure 4
Malnutrition among Children under Five Years, Tanzania



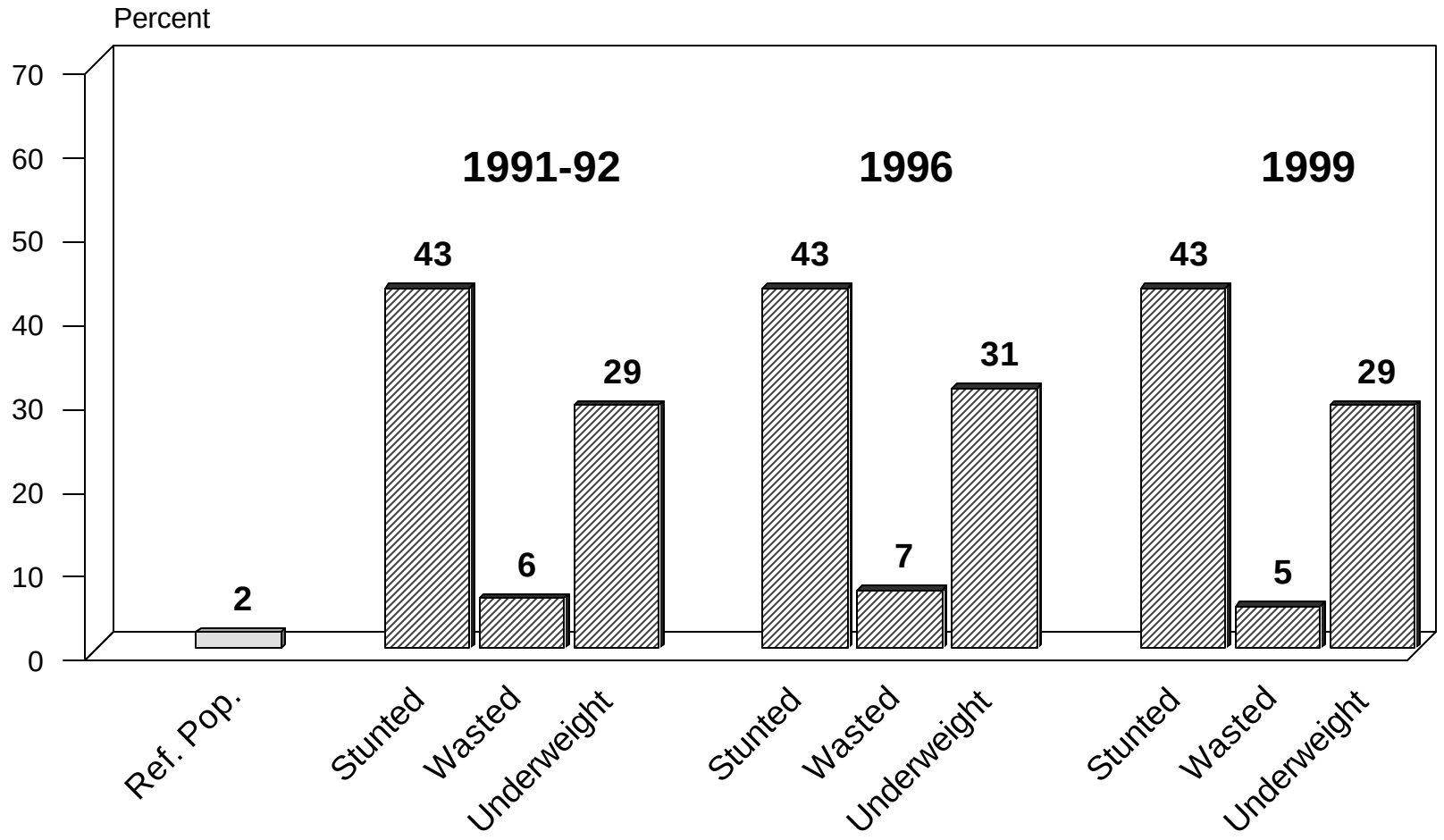
Note: *Stunting* reflects chronic malnutrition; *wasting* reflects acute malnutrition; *underweight* reflects chronic or acute malnutrition or a combination of both.

Source: Tanzania RCHS 1999

Figure 5: Changes in Malnutrition Rates among Children under Five Years, Tanzania 1991-92, 1996, and 1999

- The findings of the 1999 TRCHS suggest that the nutritional status of Tanzanian children under five has not changed significantly since either the 1991-92 Tanzanian Demographic and Health Survey (TDHS) or the 1996 TDHS.

Figure 5
Changes in Malnutrition Rates among Children under Five Years, Tanzania 1991-92, 1996, and 1999



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

Sources: TDHS 1991-92, TDHS 1996, and TRCHS 1999

Figure 6: Malnutrition among Children under Five Years Who Do Not Reside with Their Mother, Tanzania

Previously, anthropometric data from DHS surveys excluded children whose mother did not live in the household. Currently, all children in the household are measured despite their mother's residence or survival status. In the TRCHS, 196 children under five years did not reside with their mother.

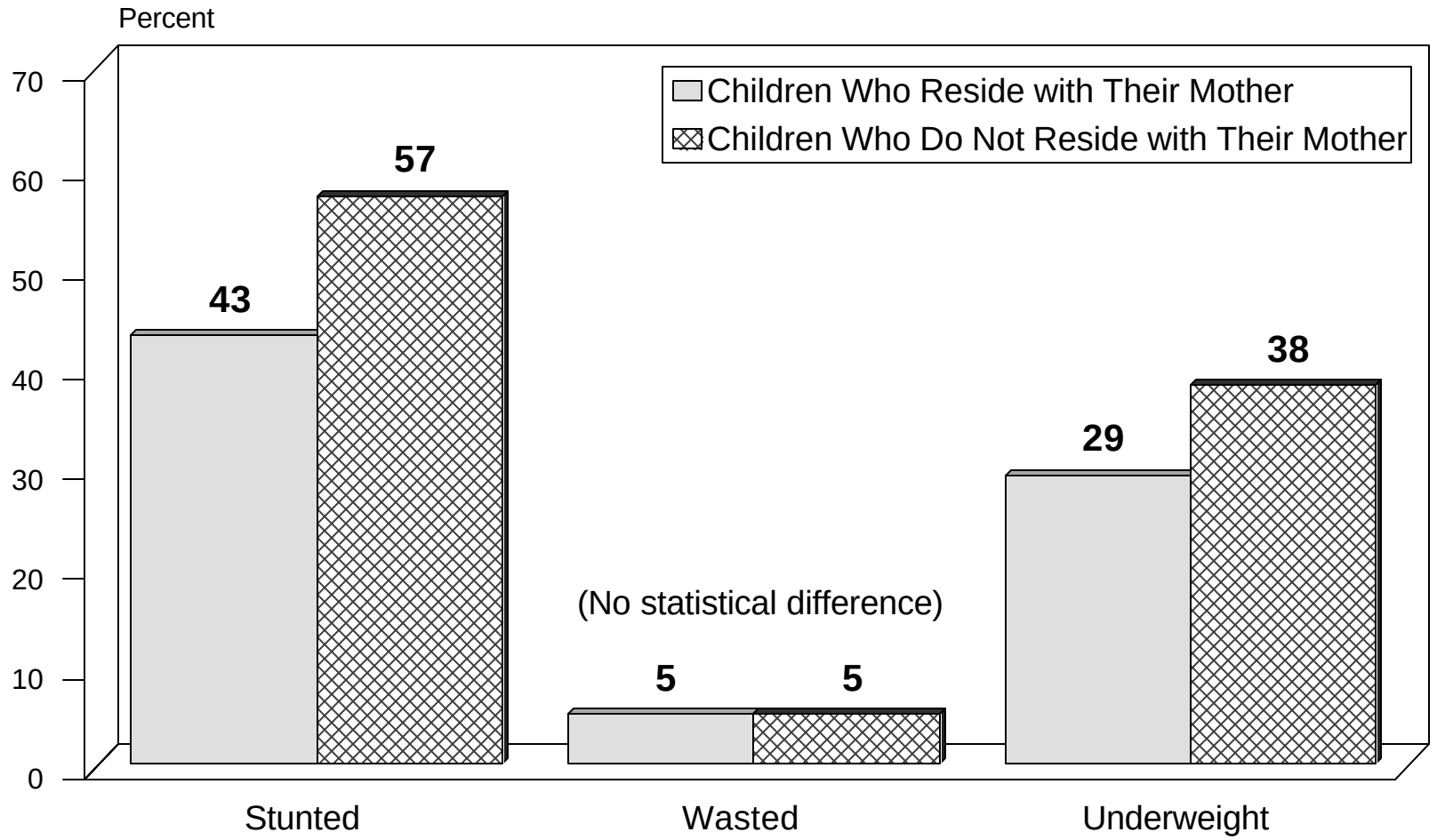
In Tanzania,

- **Fifty-seven percent of children age 0-59 months who do not reside with their mother are stunted**, compared with 43 percent of children who do live with their mother.

- **Five percent of children who do not reside with their mother are wasted.** This is the same proportion as for children who live with their mother.

- **Thirty-eight percent of children who do not reside with their mother are underweight**, compared with 29 percent of children who live with their mother.

Figure 6
Malnutrition among Children under Five Years Who Do Not Reside with Their Mother, Tanzania



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

Source: Tanzania RCHS 1999

Figure 7: Stunting, Wasting, and Underweight by Age, Tanzania

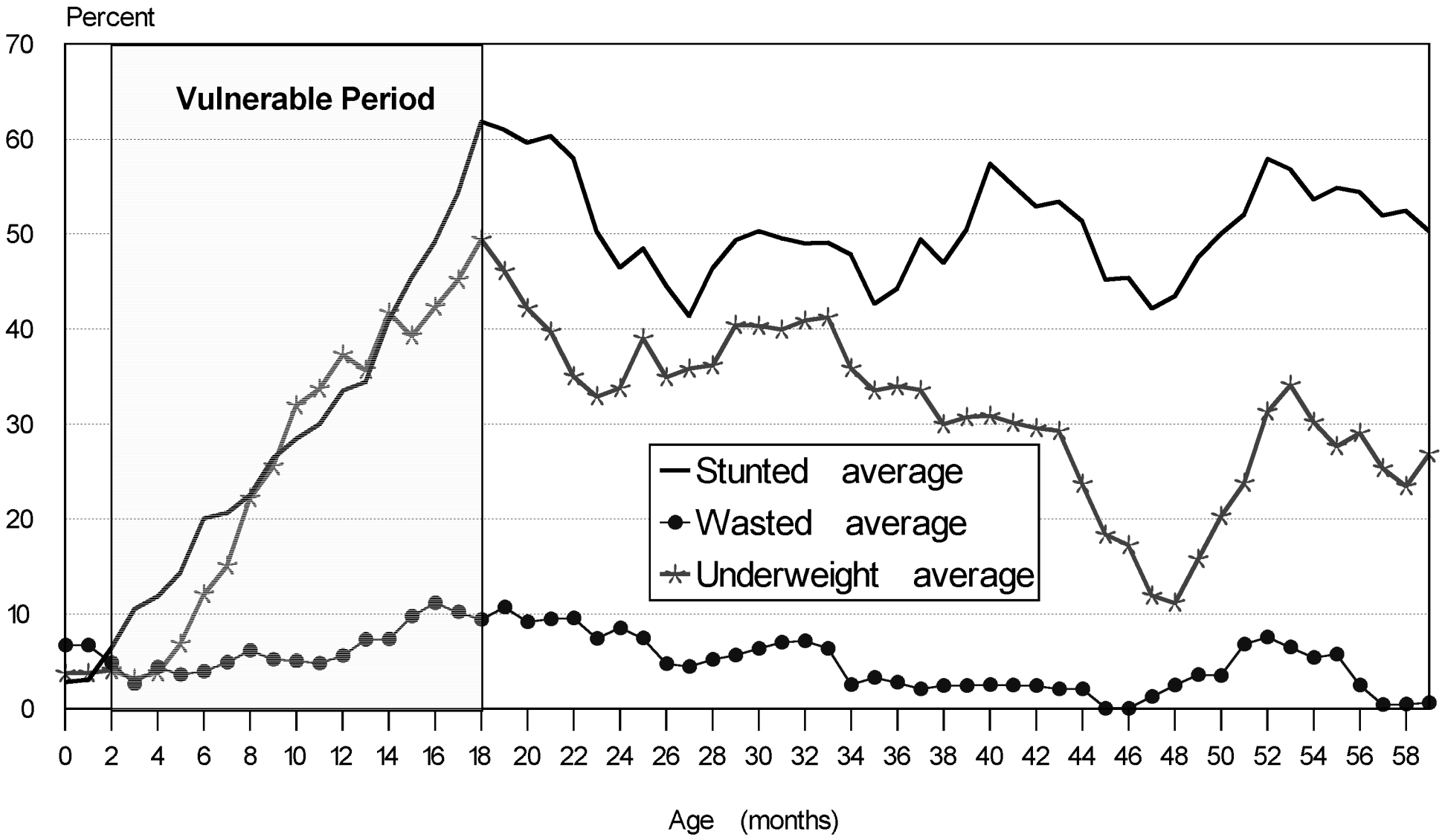
In Tanzania, the time between 2 months and 18 months of age is a vulnerable period.

- **The proportion of children stunted rises sharply from 0 to 18 months of age, peaking at 62 percent.** The proportion of children stunted drops to 41 percent at 27 months of age and then fluctuates between 42 and 58 percent through 50 months of age. At 59 months, 50 percent of children are stunted.

- **The proportion of children wasted rises to 11 percent at 16 months.** It then declines to less than 3 percent at 34 months and to less than 1 percent at 45 months. Despite a rise to 7 percent at 52 months, the proportion of wasted children at 59 months is less than 1 percent.

- **The proportion of children underweight sharply rises from 4 to 18 months of age, when it reaches its peak of 49 percent.** The proportion declines to about 30 percent at 37 months of age. In spite of a sharp dip to a rate of 11 percent at 48 months, 27 percent of children are underweight at 59 months.

Figure 7
Stunting, Wasting, and Underweight by Age, Tanzania



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.

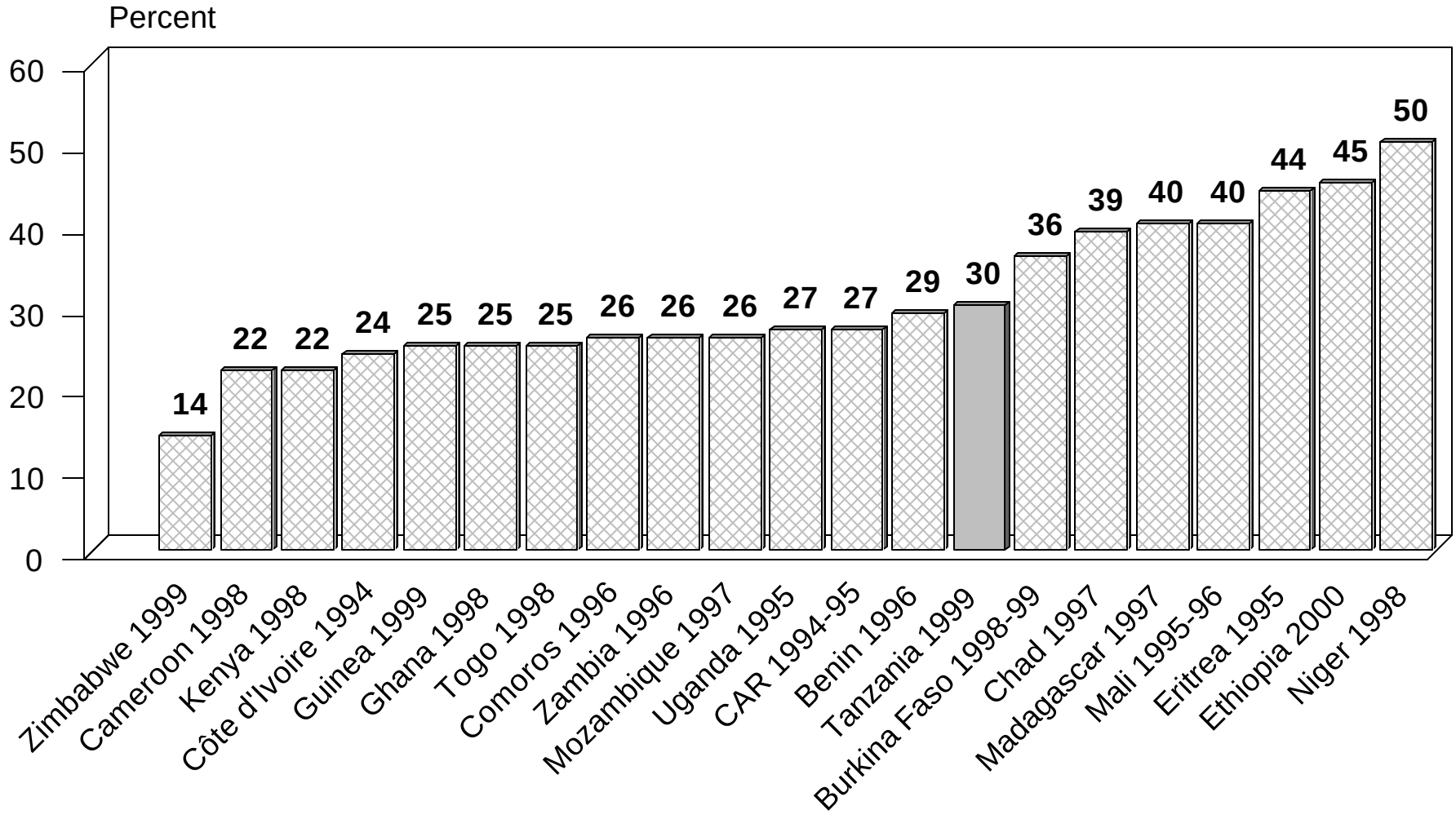
Source: Tanzania RCHS 1999

Figure 8: Underweight among Children under Three Years, Tanzania 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 30 percent of children underweight, Tanzania has a rate close to the median 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, Tanzania Compared with Other Sub-Saharan Countries



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

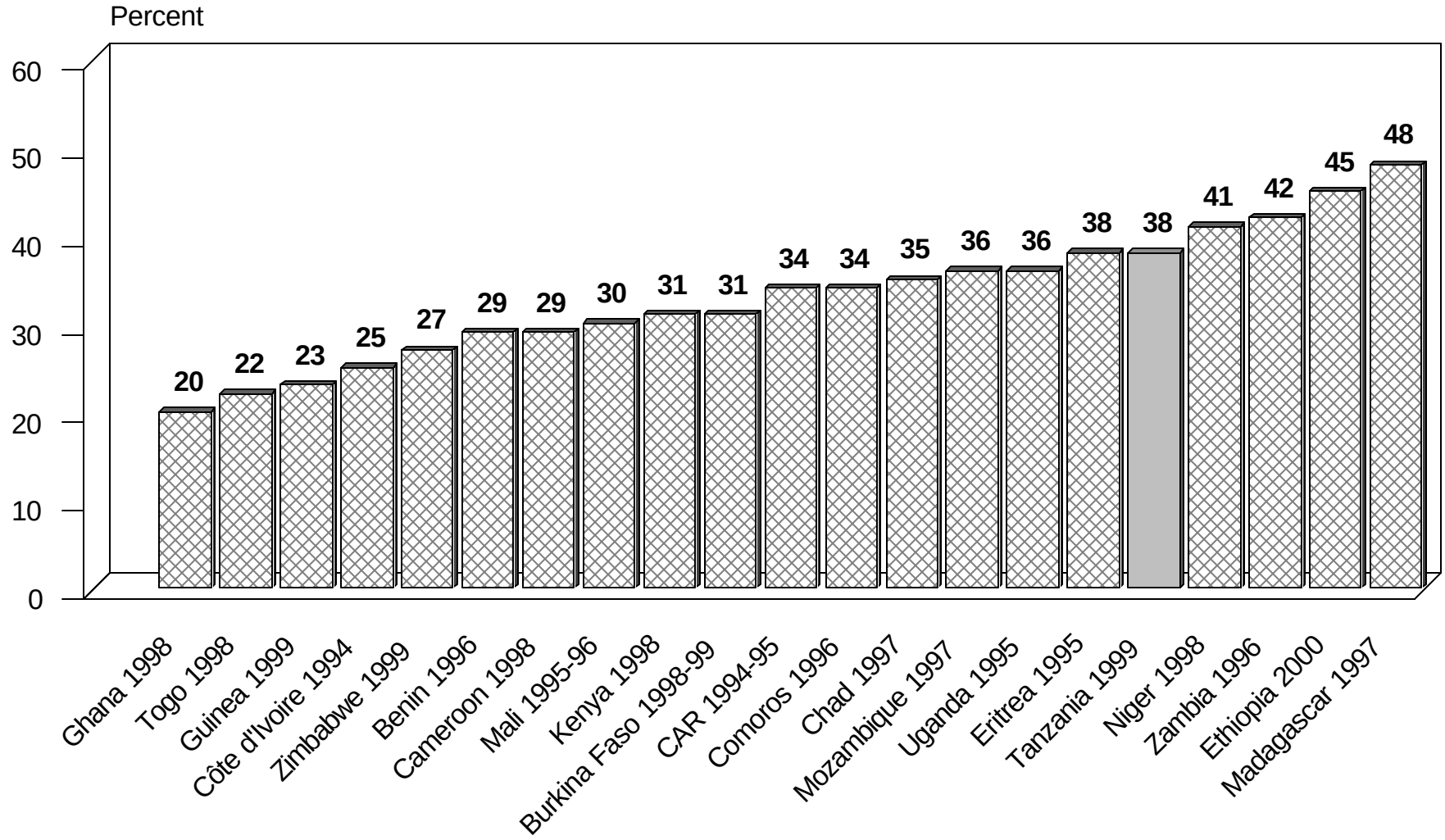
Source: DHS Surveys 1994-2000

Figure 9: Stunting among Children under Three Years, Tanzania 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 38 percent, the proportion of stunted children in Tanzania is the fifth highest 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, Tanzania Compared with Other Sub-Saharan Countries



Note: *Stunting* reflects chronic malnutrition.

Source: DHS Surveys 1994-2000

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 1990. 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

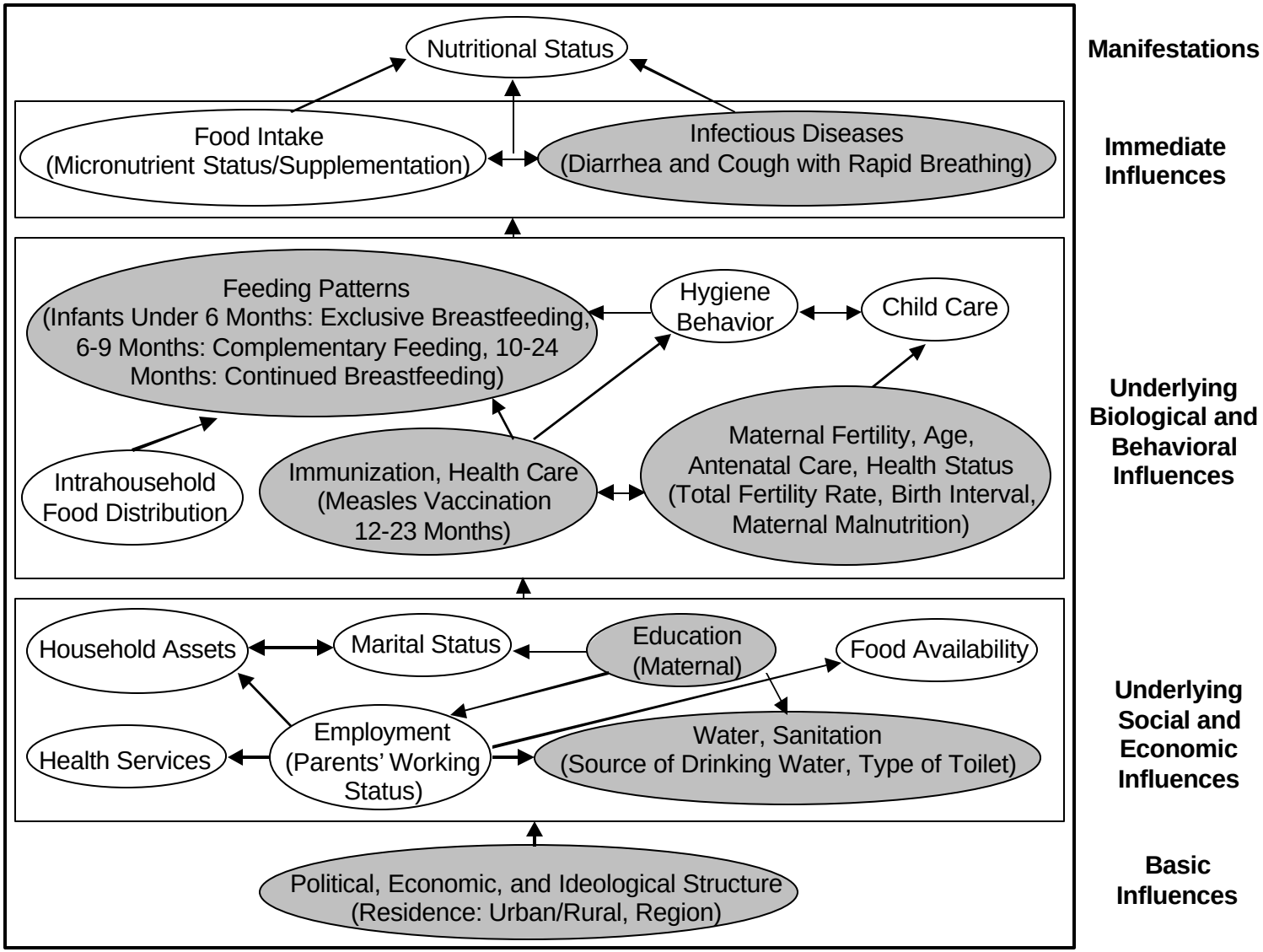
- **Immediate influences,** such as food intake (micronutrient status and supplementation) and infectious diseases (diarrhea and respiratory infections)

- **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.

Conceptual Framework for Nutritional Status



Adapted from UNICEF 1990

Immediate Causes of Malnutrition

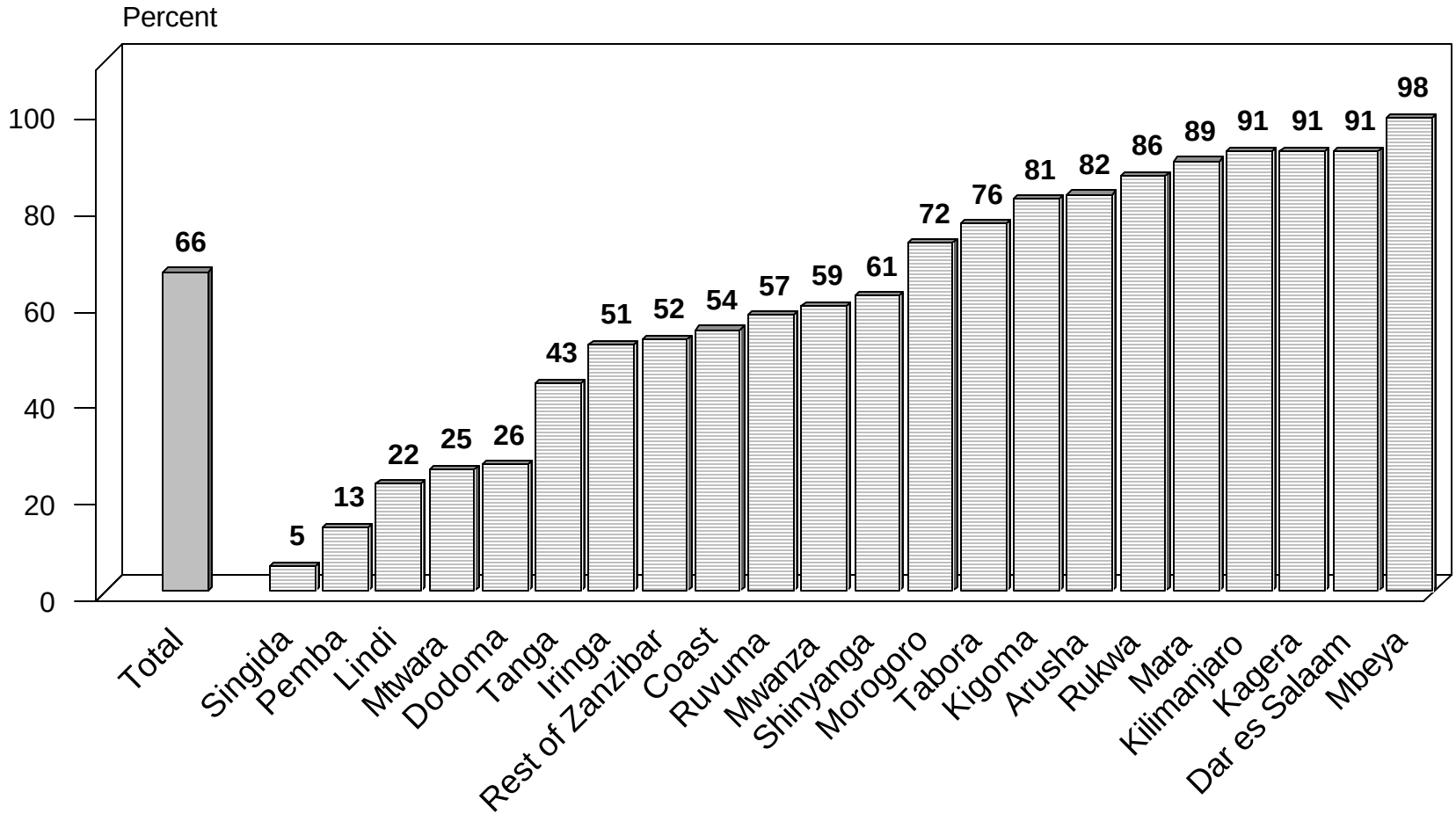
Figure 10: Use of Iodized Salt among Households with Children under Five Years by Region, Tanzania

Iodine deficiency is known to cause goiter, cretinism (a severe form of neurological defects), 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 causes goiters and 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 Tanzania, 66 percent of households with children use a type of salt that has an adequate level of iodine to prevent IDD. Use of iodized salt varies widely according to region. In Kilimanjaro, Kagera, Dar es Salaam, and Mbeya, iodized salt is used by more than 90 percent of households. In Singida and Pemba regions, however, the percentage of households using iodized salt is 13 percent and less than 5 percent, respectively.**

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



Source: Tanzania RCHS 1999

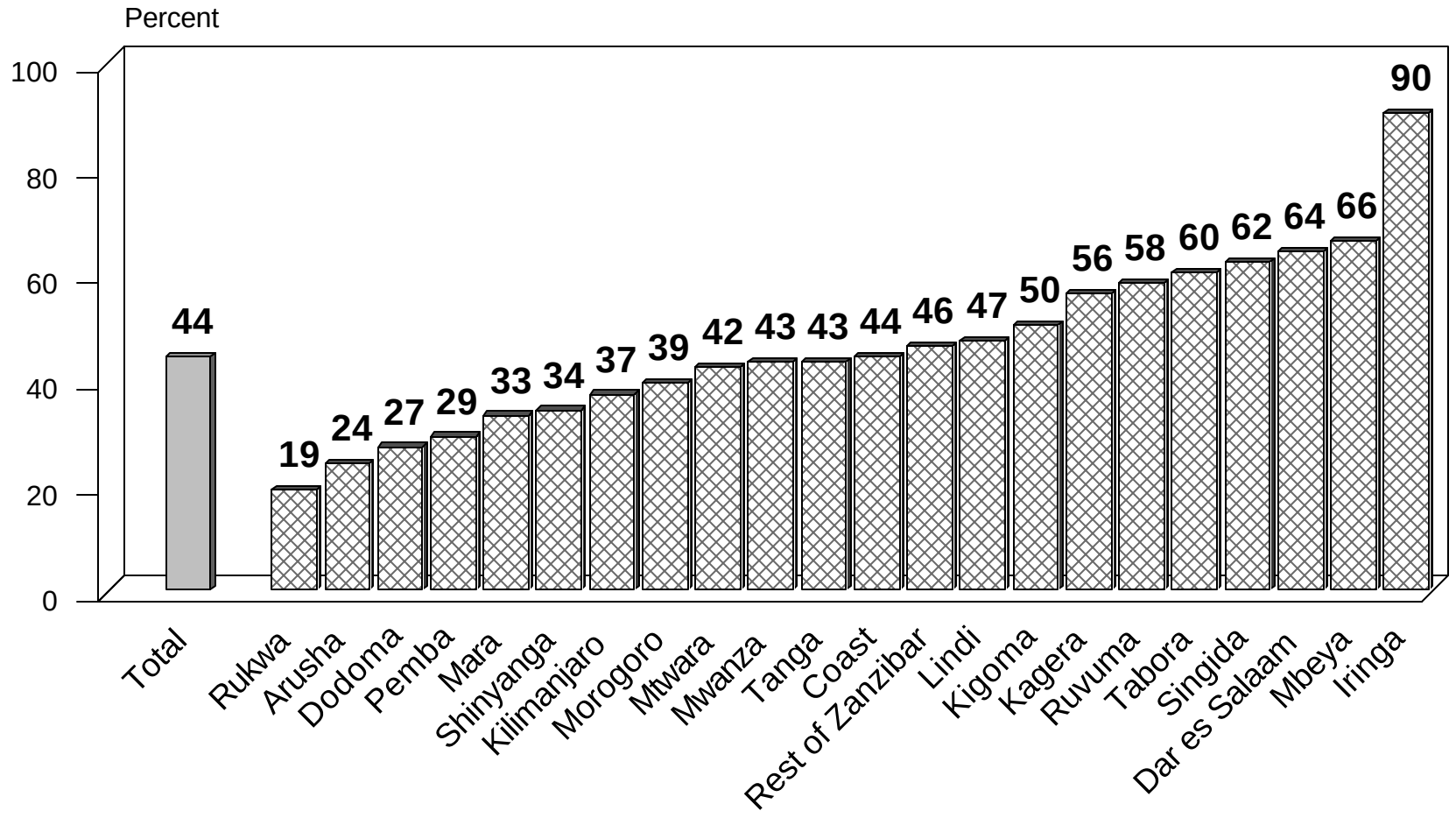
Figure 11: Iron Supplementation among Mothers of Children under Five Years by Region, Tanzania

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 B_{12} deficiency, protein deficiency, sickle cell disease, malaria, and parasite infection also cause anemia.

Iron deficiency 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.

- **Forty-four percent of all mothers received some iron supplementation** during their last pregnancy. Iron supplementation varies widely from region to region. In Iringa, for example, the rate of iron supplementation among mothers is 90 percent. In Rukwa and Arusha, however, less than one mother in four receives iron supplementation.

Figure 11
Iron Supplementation among Mothers of Children under Five Years by Region, Tanzania



Source: Tanzania RCHS 1999

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

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.

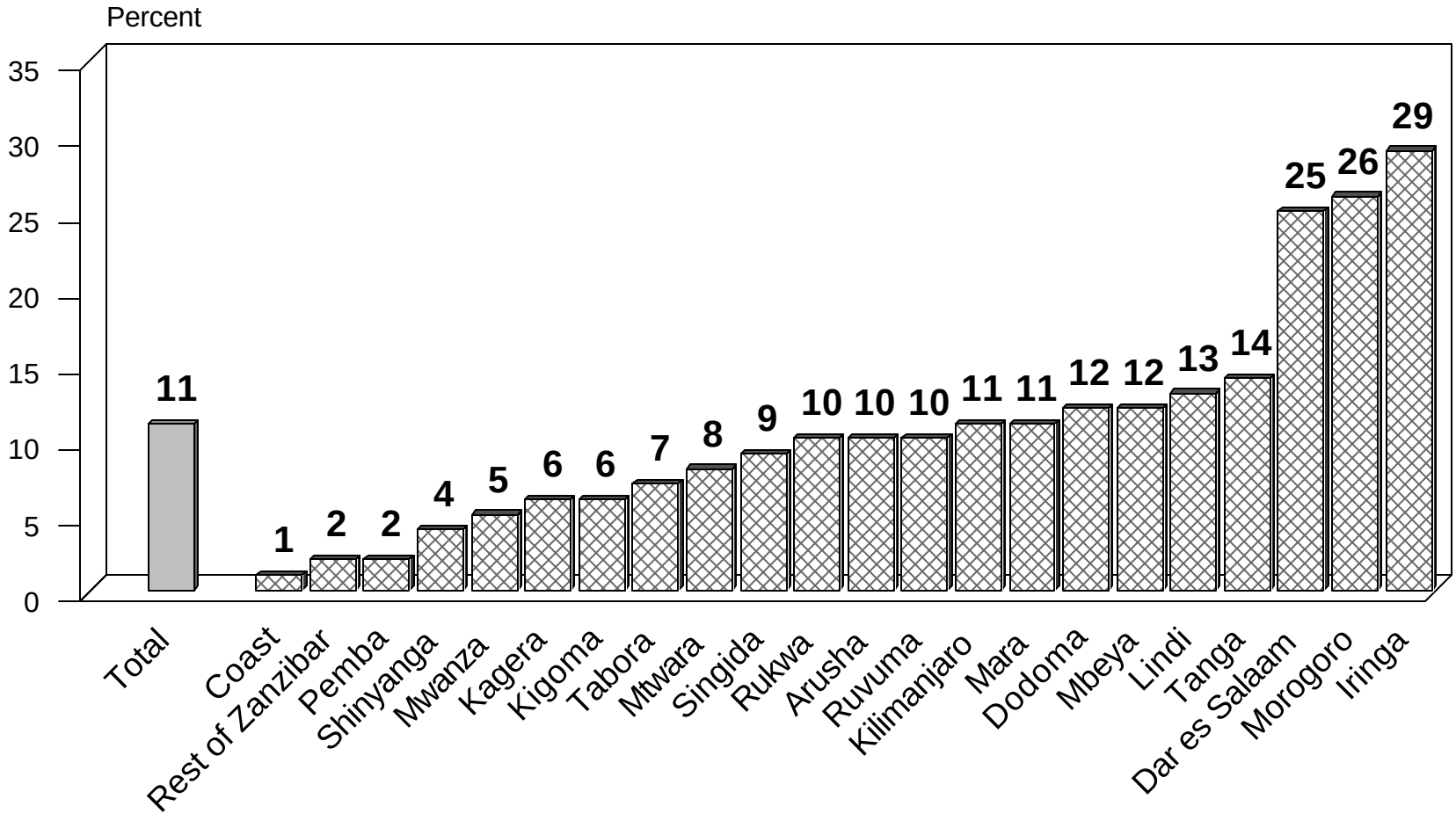
Vitamin A supplementation also benefits children who are breastfed. If mothers have vitamin A deficiency, their children can be born with low stores of vitamin A. Low birth weight babies are especially at risk. Additionally, infants often do not receive an adequate amount of vitamin A from breast milk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

In Tanzania,

- **Eleven percent of mothers received vitamin A supplements within two months after delivery.**

- **The rate of vitamin A supplementation among women varies widely according to region. In Dar es Salaam, Morogoro, and Iringa, more than one-fourth of all mothers received vitamin A supplements. In the Coast and Pemba regions and in the rest of Zanzibar, however, the proportion of women who received these supplements is negligible.**

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



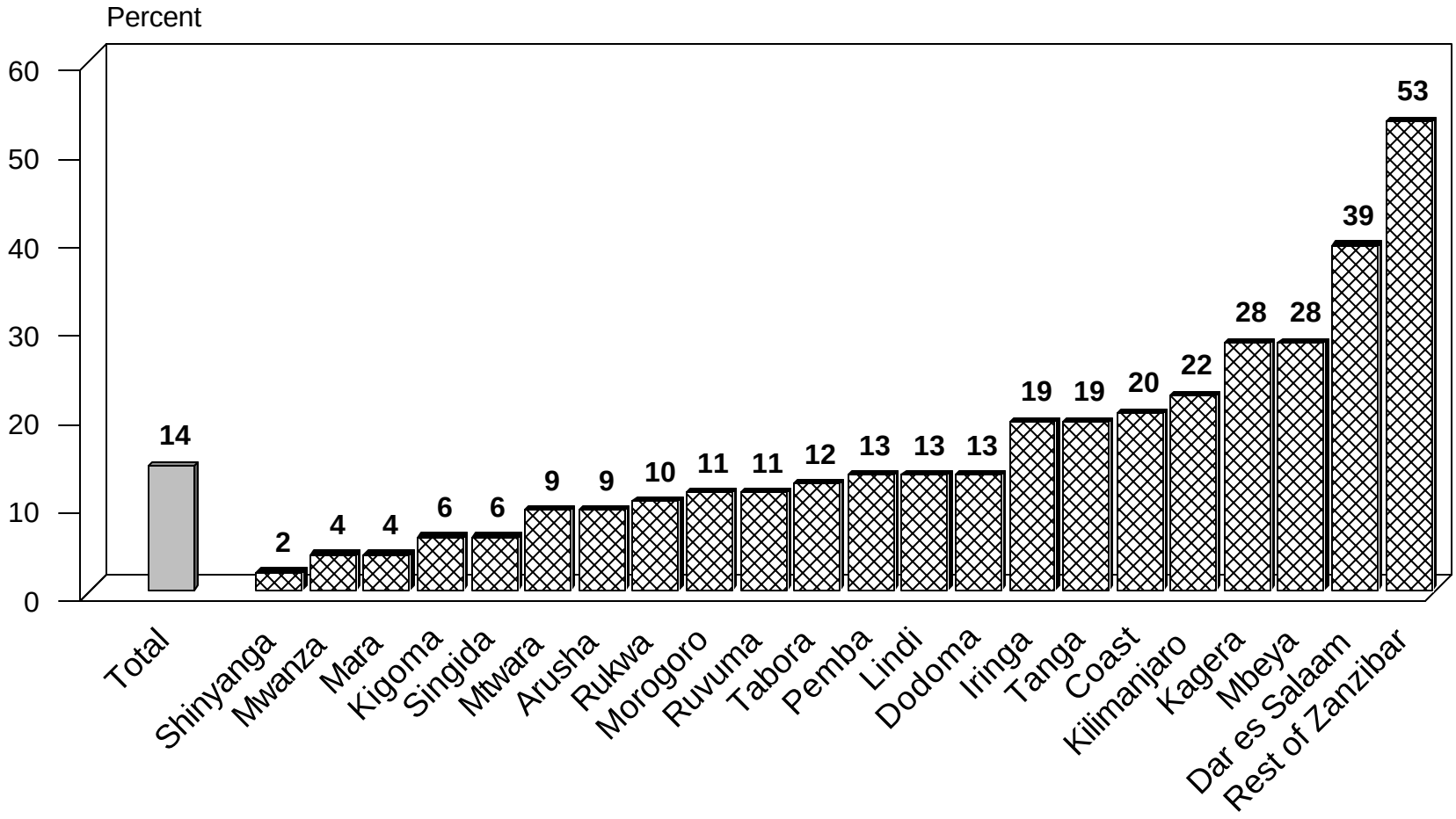
Source: Tanzania RCHS 1999

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

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, 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.

- **The percentage of children in Tanzania who received vitamin A supplementation during the six months prior to the survey is 14 percent. The rate of vitamin A supplementation in children was much higher in Dar es Salaam and the rest of Zanzibar (39 and 53 percent, respectively) than it was in other areas of the country.**

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



Source: Tanzania RCHS 1999

Figure 14: Diarrhea and Cough with Rapid Breathing among Children under Five Years Compared with Malnutrition Rates, Tanzania

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.

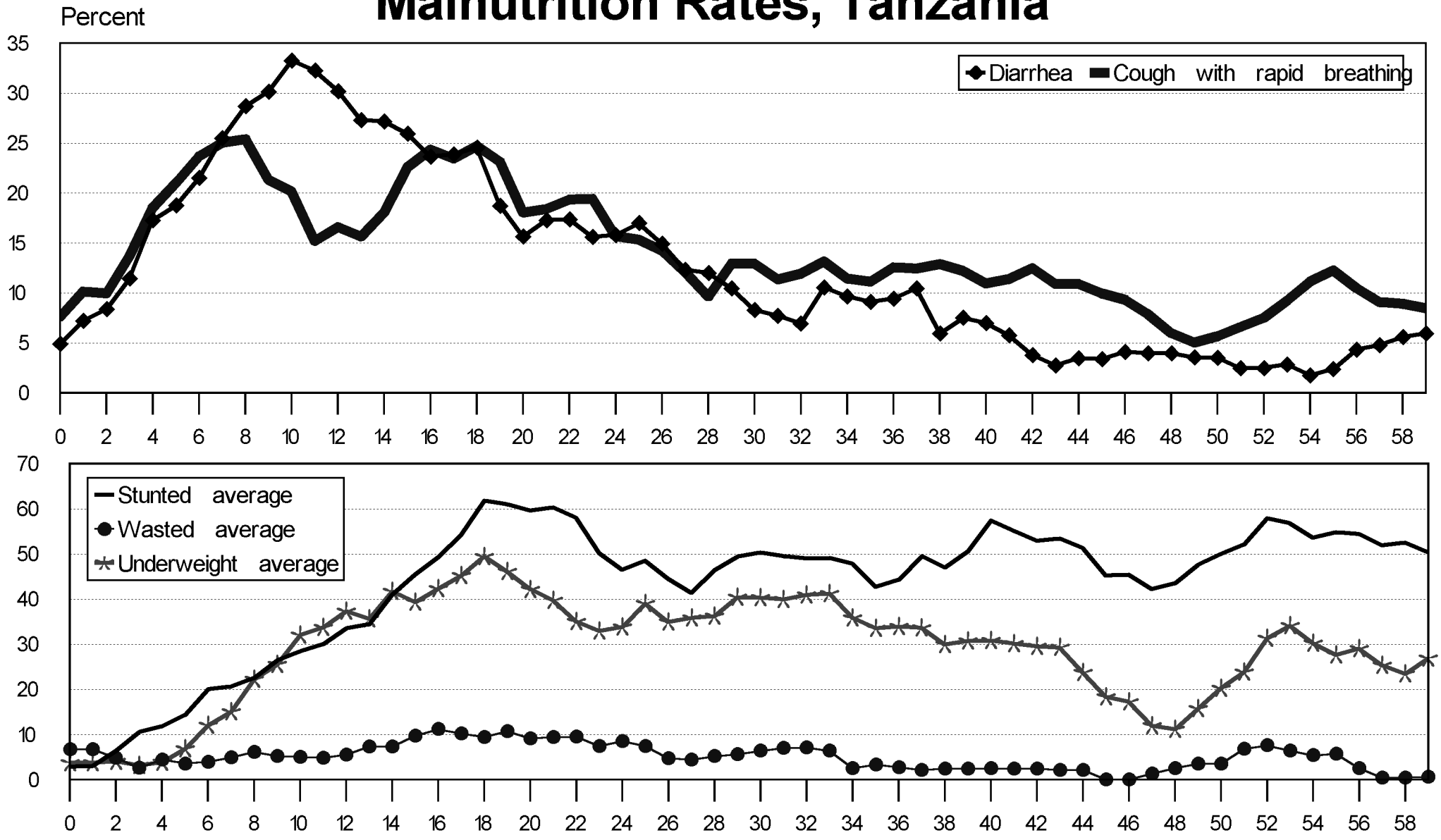
In Tanzania,

- **Approximately 14 percent of children under five years of age experienced cough with rapid breathing in the two weeks preceding the survey.** Tanzania's prevalence of cough with rapid breathing increases from 8 percent at birth to 25 percent at ages 8 and 16 months and gradually declines to less than 10 percent by 59 months of age.

- **Approximately 13 percent of children under five years of age had diarrhea in the two weeks preceding the survey.** The prevalence of diarrhea increases rapidly from the first to the tenth month, when it peaks at 33 percent. The rate then steadily decreases to less than 5 percent by 40 months of age and then rises to about 6 percent by 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 14
Diarrhea and Cough with Rapid Breathing among Children under Five Years Compared with Malnutrition Rates, Tanzania



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

Source: Tanzania RCHS 1999

Underlying Biological and Behavioral Causes of Malnutrition

Figure 15: Fertility and Birth Intervals, Tanzania Compared with Other Sub-Saharan Countries

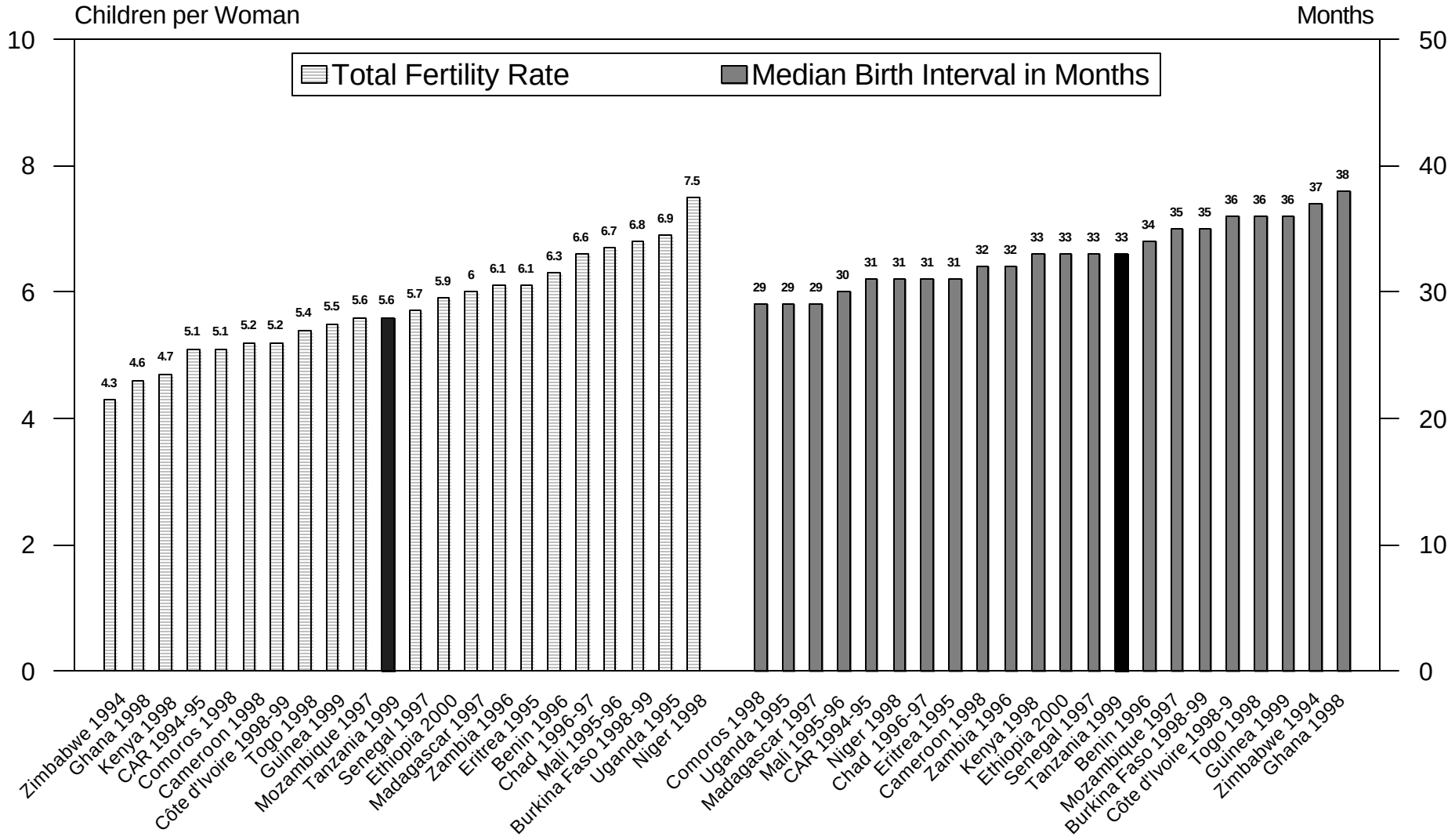
High fertility rates, especially when accompanied by short birth intervals, are detrimental to children's nutritional status. In most countries in sub-Saharan Africa, families have scarce resources to provide adequate nutrition and health care for their children. As the number of children per woman increases, 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 precursors to poor nutritional status in early childhood.

- **At the current fertility rate, a woman in Tanzania will have an average of 5.6 children by the end of her childbearing years.** This rate is in the midrange of all of the sub-Saharan countries surveyed between 1994-2000.

- **Tanzanian mothers have a median birth interval of 33 months.** This rate is also in the midrange of all other countries surveyed.

Figure 15
Fertility and Birth Intervals, Tanzania Compared with Other Sub-Saharan Countries



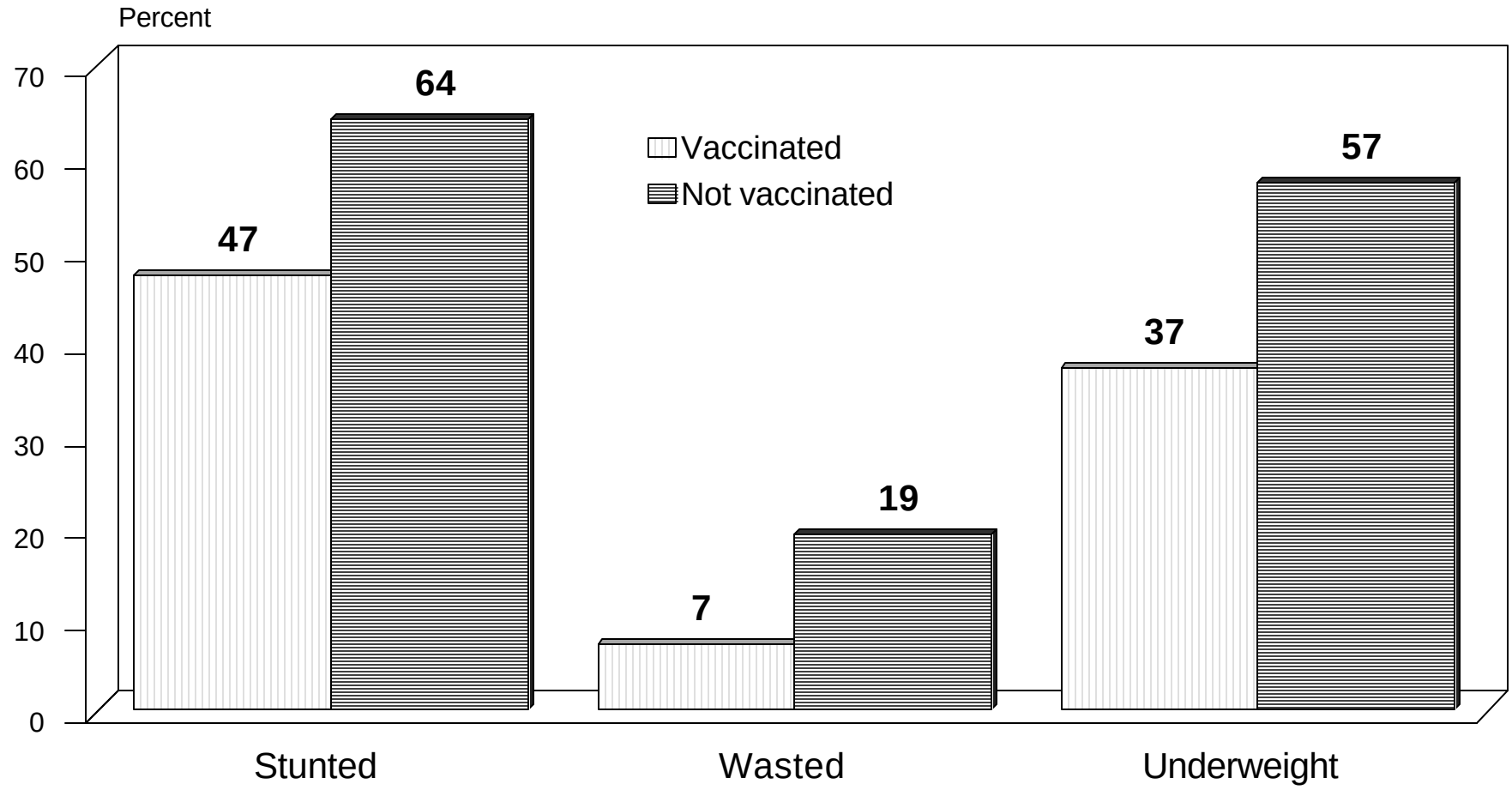
Source: DHS Surveys 1994-2000

Figure 16: Malnutrition among Children Age 12-23 Months by Measles Vaccination Status, Tanzania

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 8 or 9 months in children in developing countries. Therefore, measles vaccination is an important child health strategy.

- **In Tanzania, measles vaccination status is statistically related to malnutrition.** Children who did not receive a measles vaccination have a 17 percent higher rate of stunting, a 12 percent higher rate of wasting, and a 20 percent higher rate of being underweight than those children who did receive measles vaccinations.

Figure 16
Malnutrition among Children Age 12-23 Months by Measles Vaccination Status, Tanzania



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

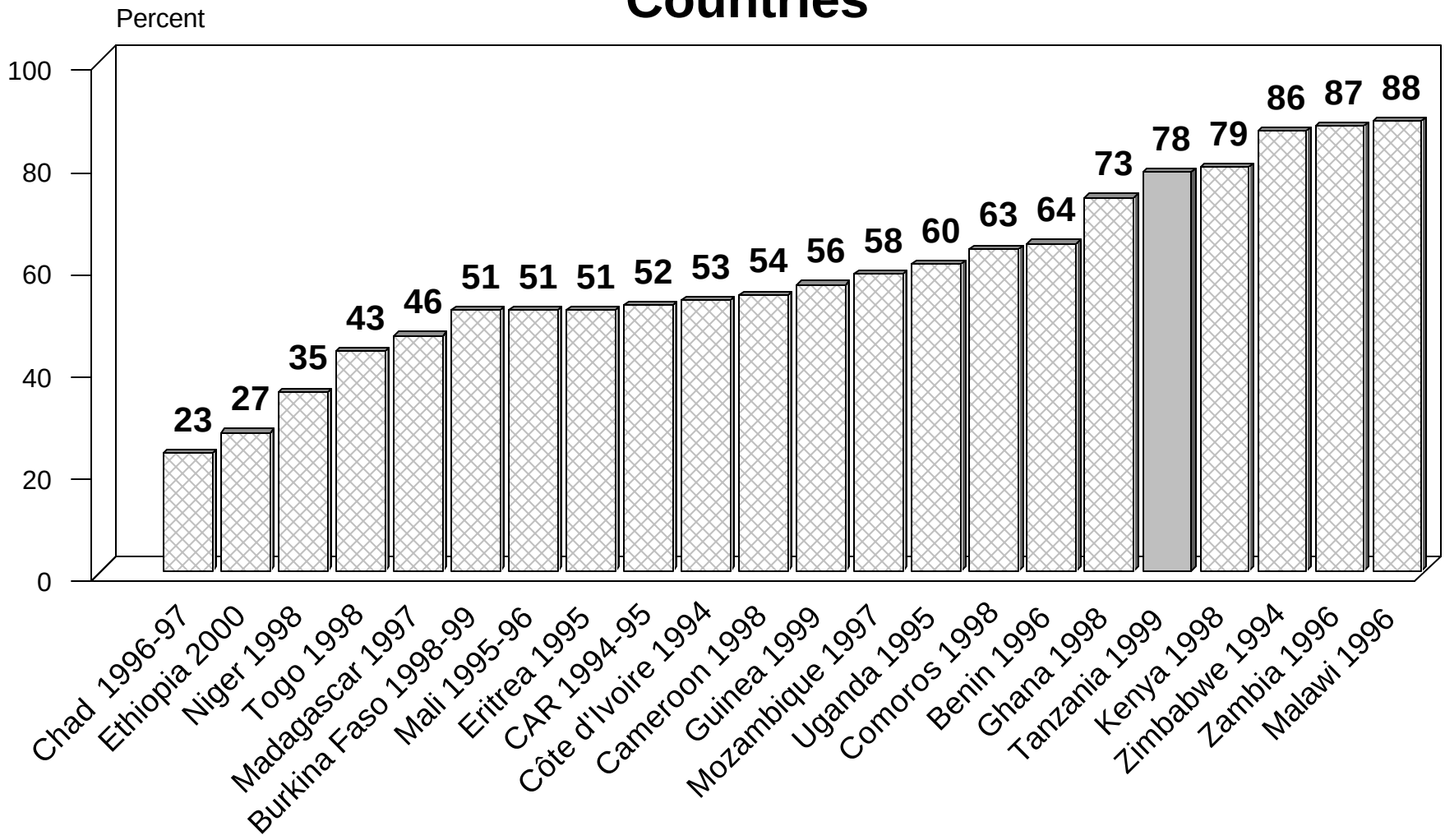
Source: Tanzania RCHS 1999

Figure 17: Measles Vaccination Coverage among Children Age 12-23 Months, Tanzania Compared with Other Sub-Saharan Countries

In Tanzania,

- **Seventy-eight percent of children 12-23 months of age have been vaccinated against measles. This represents the fifth highest rate of coverage among countries surveyed in sub-Saharan Africa.**

Figure 17
Measles Vaccination Coverage among Children Age 12-23 Months, Tanzania Compared with Other Sub-Saharan Countries



Source: DHS Surveys 1994-2000

Figure 18: Feeding Practices for Infants under Six Months, Tanzania

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 their lives.

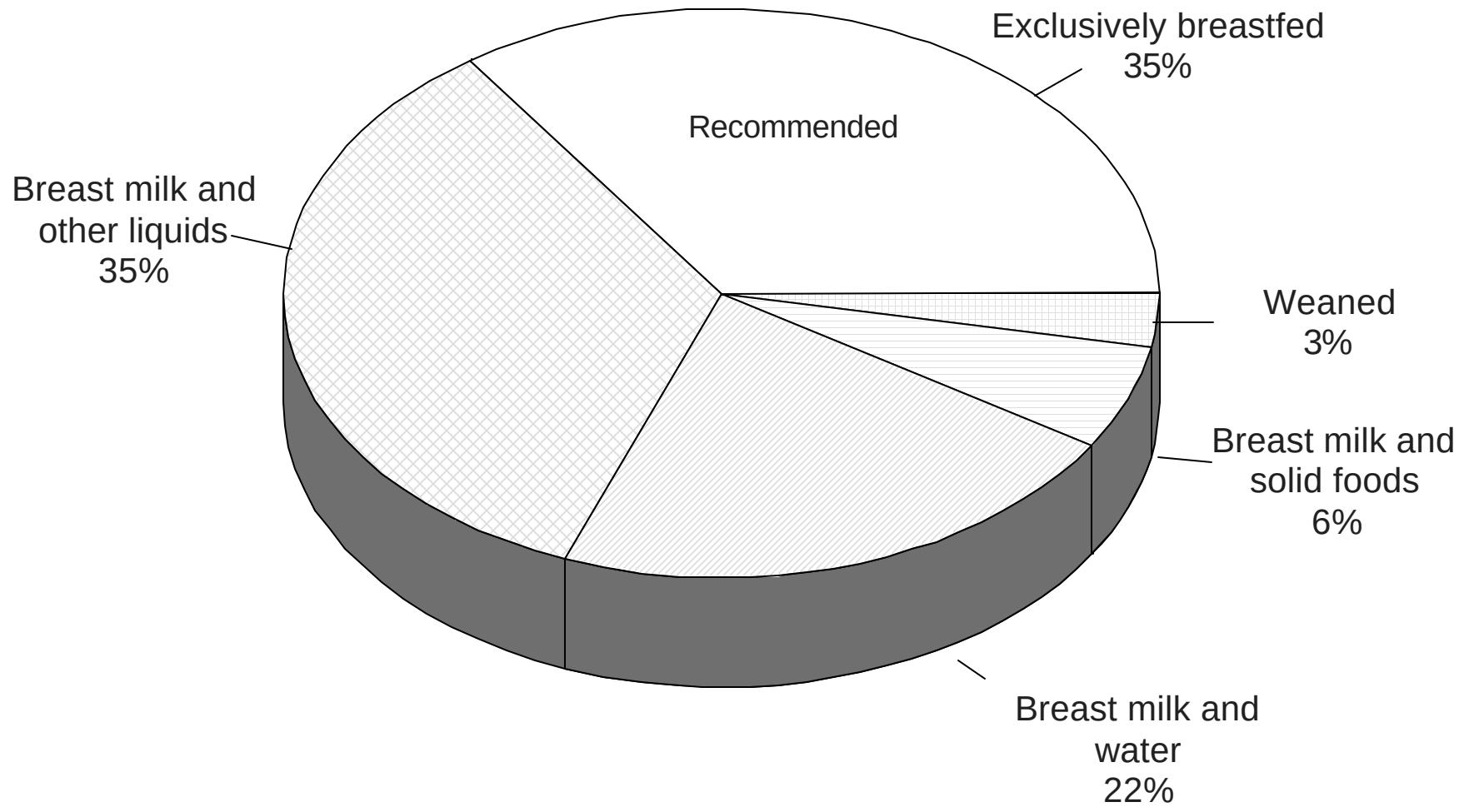
In Tanzania, the introduction of liquids, such as water, sugar water and juice, formula, and solid foods, takes place earlier than the recommended age of about six months. This practice has a deleterious effect on nutritional status for a number of reasons. First, the liquids and solid foods offered 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.

- **Only 35 percent of children under the age of six months are exclusively breastfed, as is recommended by UNICEF.**

- **Forty-one percent of infants under six months old are given some form of liquid or solid food other than breast milk and/or water, and 3 percent are fully weaned.**

- **Twenty-two percent of infants under six months of age are given a combination of breast milk and water only.**

Figure 18
Feeding Practices for Infants under Six Months, Tanzania



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

Source: Tanzania RCHS 1999

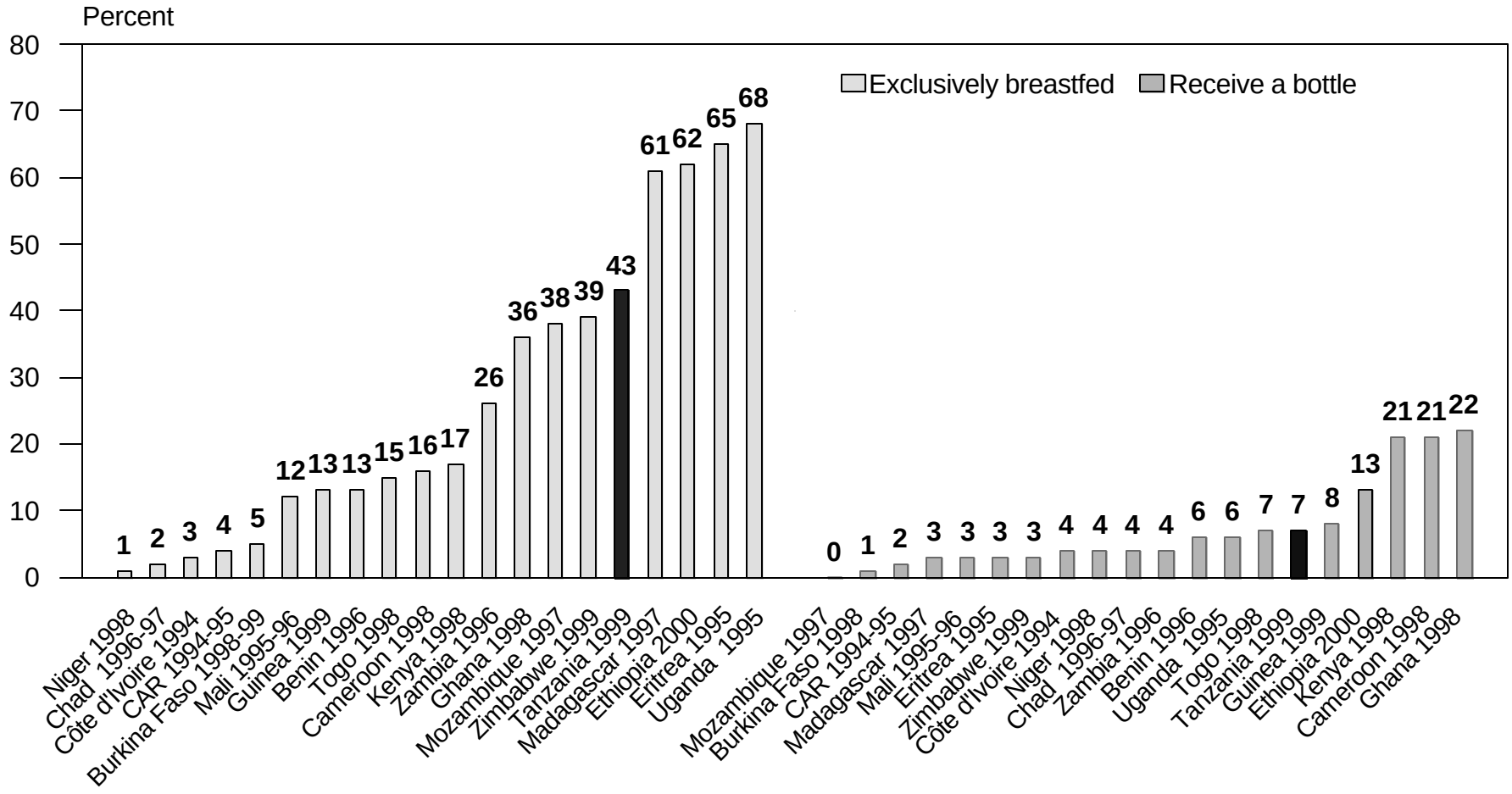
Figure 19: Infants under Four Months Who Are Exclusively Breastfed and Those Who Receive a Bottle, Tanzania Compared with Other Sub-Saharan Countries

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. **In Tanzania, 43 percent of these mothers breastfeed their young infants exclusively.** This places Tanzania in the upper quarter of sub-Saharan countries.

- **Bottle-feeding is practiced by 7 percent of mothers of infants under four months in Tanzania.** Tanzania's rate is in the midrange for bottle-feeding among sub-Saharan 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 comparable nutrition 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 19
Infants under Four Months Who Are Exclusively Breastfed and Those Who Receive a Bottle, Tanzania Compared with Other Sub-Saharan Countries



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

Source: DHS Surveys 1994-2000

Figure 20: Feeding Practices for Infants Age 6-9 Months, Tanzania

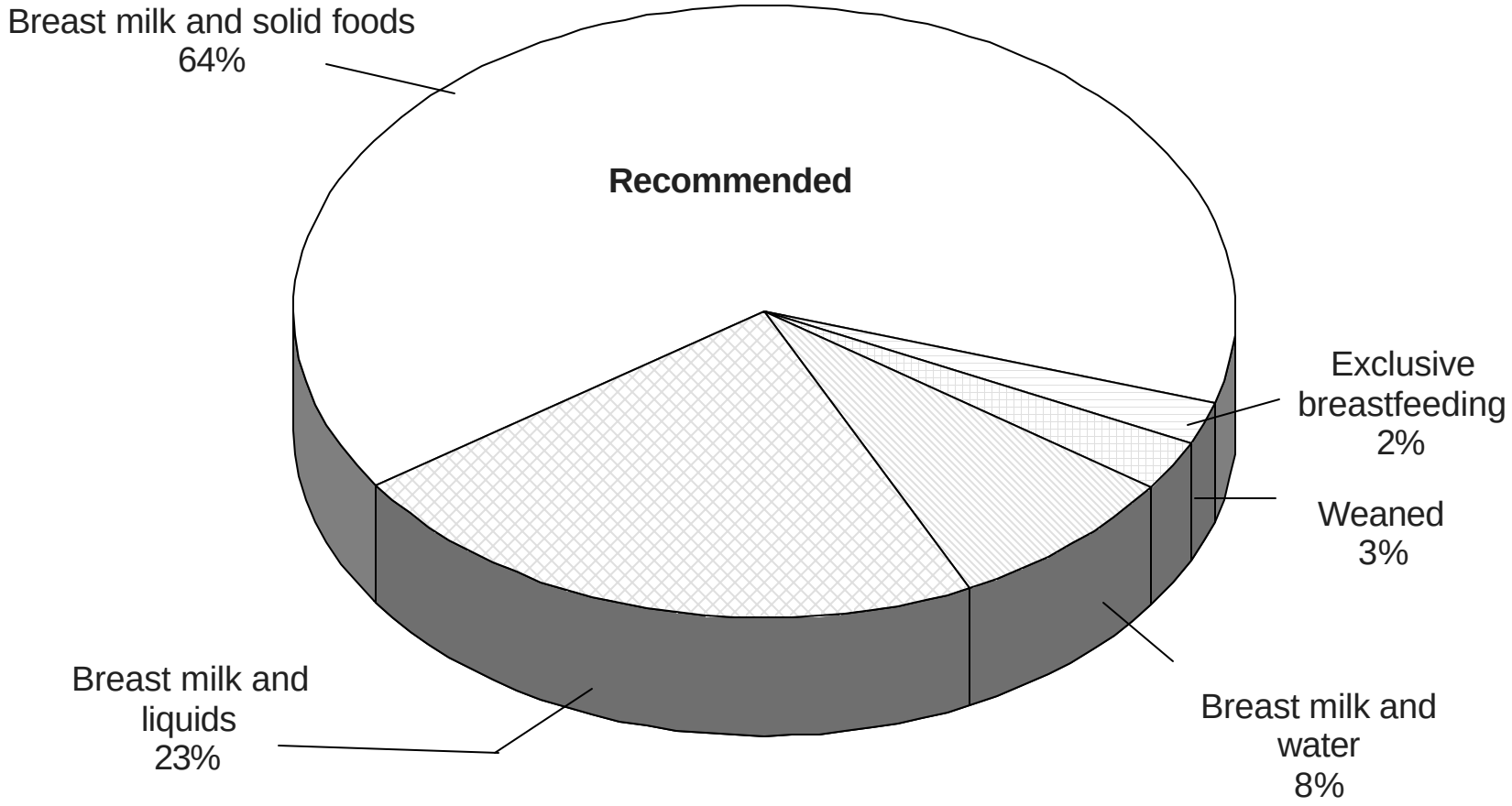
UNICEF recommends that solid foods be introduced to infants around the age of six months because breast milk alone is no longer sufficient to maintain a child's optimal growth at that point. Thus, *all infants over six months of age should receive solid foods* along with breast milk.

- **Sixty-four percent of infants age 6-9 months are fed solid foods in addition to breast milk.** This means that more than six out of ten infants age 6-9 months are fed according to the recommended practice. **This represents a sharp decline from the results of the 1996 DHS survey, which reported that 88 percent of infants 6-9 months were being fed solid food in addition to breast milk.**

- **Thirty-three percent of infants age 6-9 months are not fed solid foods in addition to breast milk, which puts these children at risk of malnutrition.**

- **Three percent of infants are fully weaned** and are therefore not receiving the additional nutritional and emotional support of breastfeeding.

Figure 20
Feeding Practices for Infants Age 6-9 Months, Tanzania



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

Source: Tanzania RCHS 1999

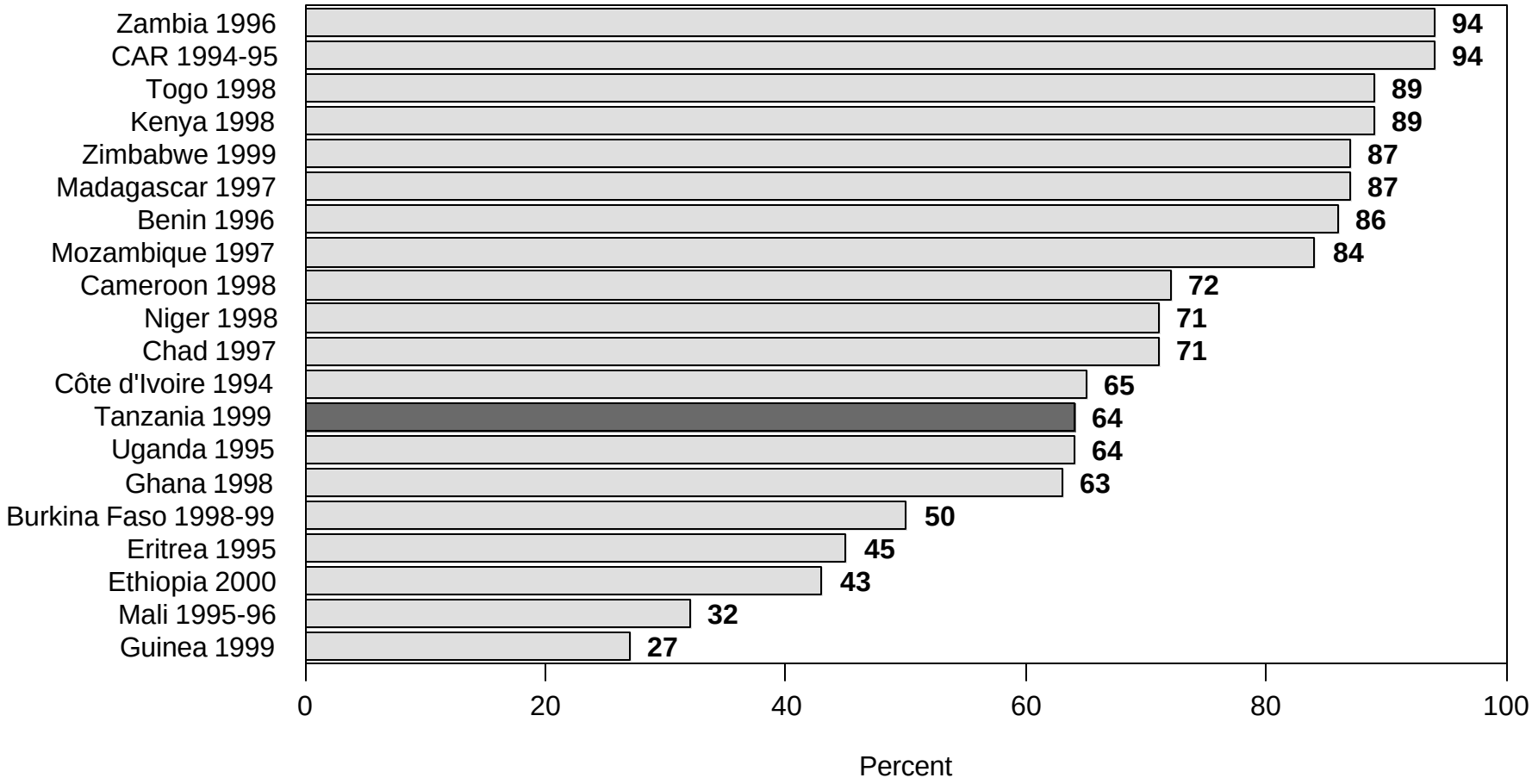
Figure 21: Infants Age 6-9 Months Receiving Solid Foods in Addition to Breast Milk, Tanzania Compared with Other Sub-Saharan Countries

Optimal infant feeding practices include the introduction of complementary foods at about six months of age. The introduction of complementary feeding is necessary because 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.

In Tanzania,

- **Sixty-four percent of infants age 6-9 months receive solid foods in addition to breast milk.** This rate puts Tanzania in the lower half of countries in regard to the proper feeding of infants 6-9 months among all sub-Saharan countries surveyed. The 36 percent of infants who are not given complementary foods are more susceptible to stunting and wasting.

Figure 21
Infants Age 6-9 Months Receiving Solid Foods in Addition to Breast Milk, Tanzania Compared with Other Sub-Saharan Countries



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

Source: DHS Surveys 1994-2000

Underlying Social and Economic Causes of Malnutrition

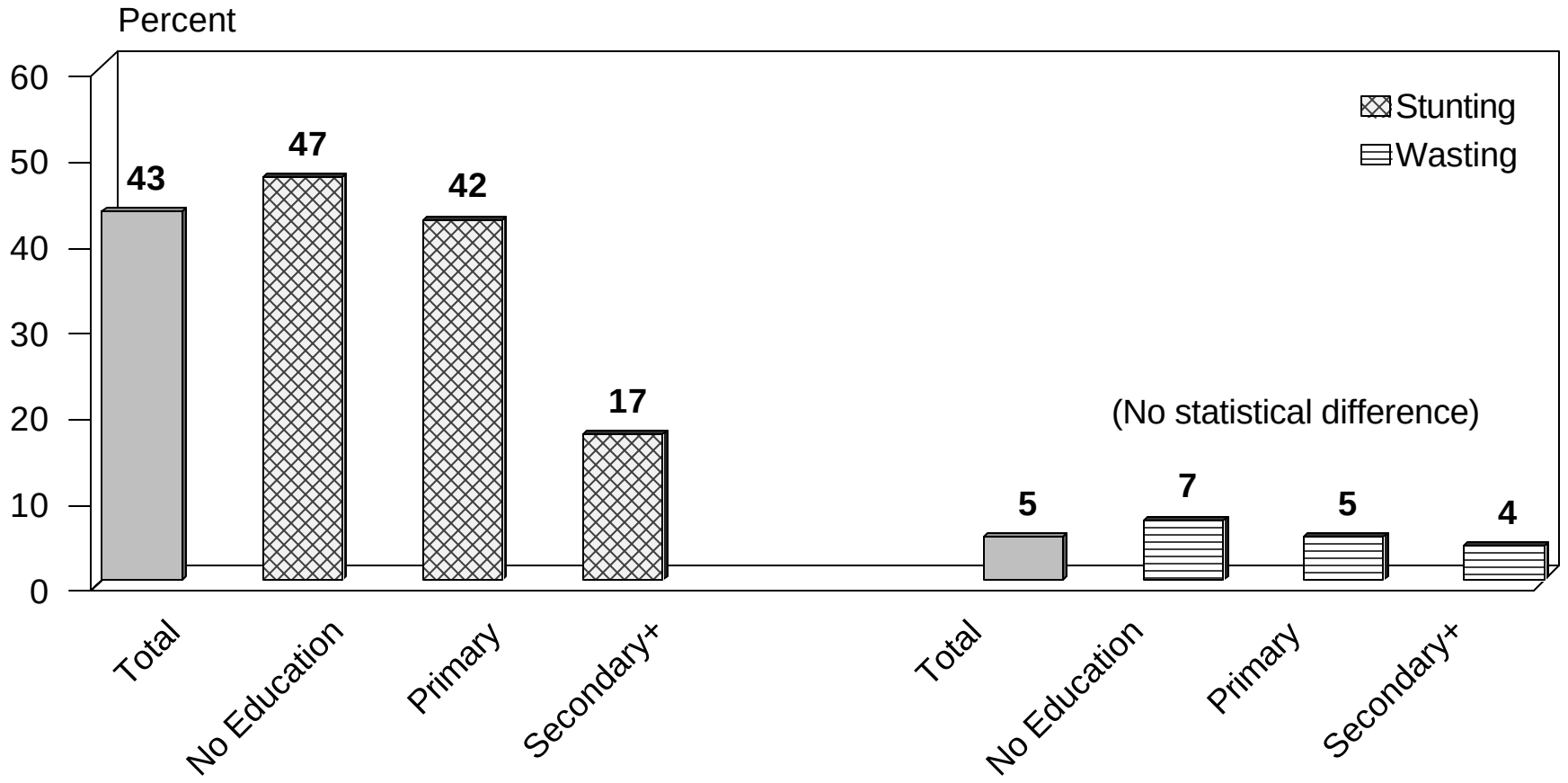
Figure 22: Stunting and Wasting among Children under Five Years by Mother's Education, Tanzania

Maternal education is related to knowledge of good child care practices and to household wealth. In Tanzania, 28 percent of the mothers of children under five years of age have never attended school, while 68 percent have had some primary education and four percent have a secondary or higher education. There is some variation in school attendance, for example, between urban and rural areas. In the rural areas, 31 percent of the mothers have never attended school, 67 percent have attended primary school, and 2 percent have gone to secondary school or higher. In contrast, only 11 percent of the mothers in urban areas have never attended school, 77 percent have attended primary school, and 12 percent have gone to secondary school or higher. Among the regions, the highest percentage of mothers reporting a secondary school education or higher live in the rest of Zanzibar (43 percent), Dar es Salaam (20 percent), and Pemba (19 percent).

- Maternal education has an inverse relationship with stunting in Tanzania. **As the level of maternal education increases, the level of stunting decreases.** There is a 5 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 30 percentage point difference between children of mothers with no education and those whose mothers have a secondary education or higher.

- Maternal education also has an inverse relationship with being underweight in Tanzania. There is a 4 percentage point difference in underweight rates between children of mothers with no education and those whose mothers have a primary education, and there is a 20 percentage point difference between children of mothers with no education and those whose mothers have a secondary education or higher. There is no relationship between maternal education and wasting rates.

Figure 22
Undernutrition among Children under Five Years by Mother's Education, Tanzania



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

Source: Tanzania RCHS 1999

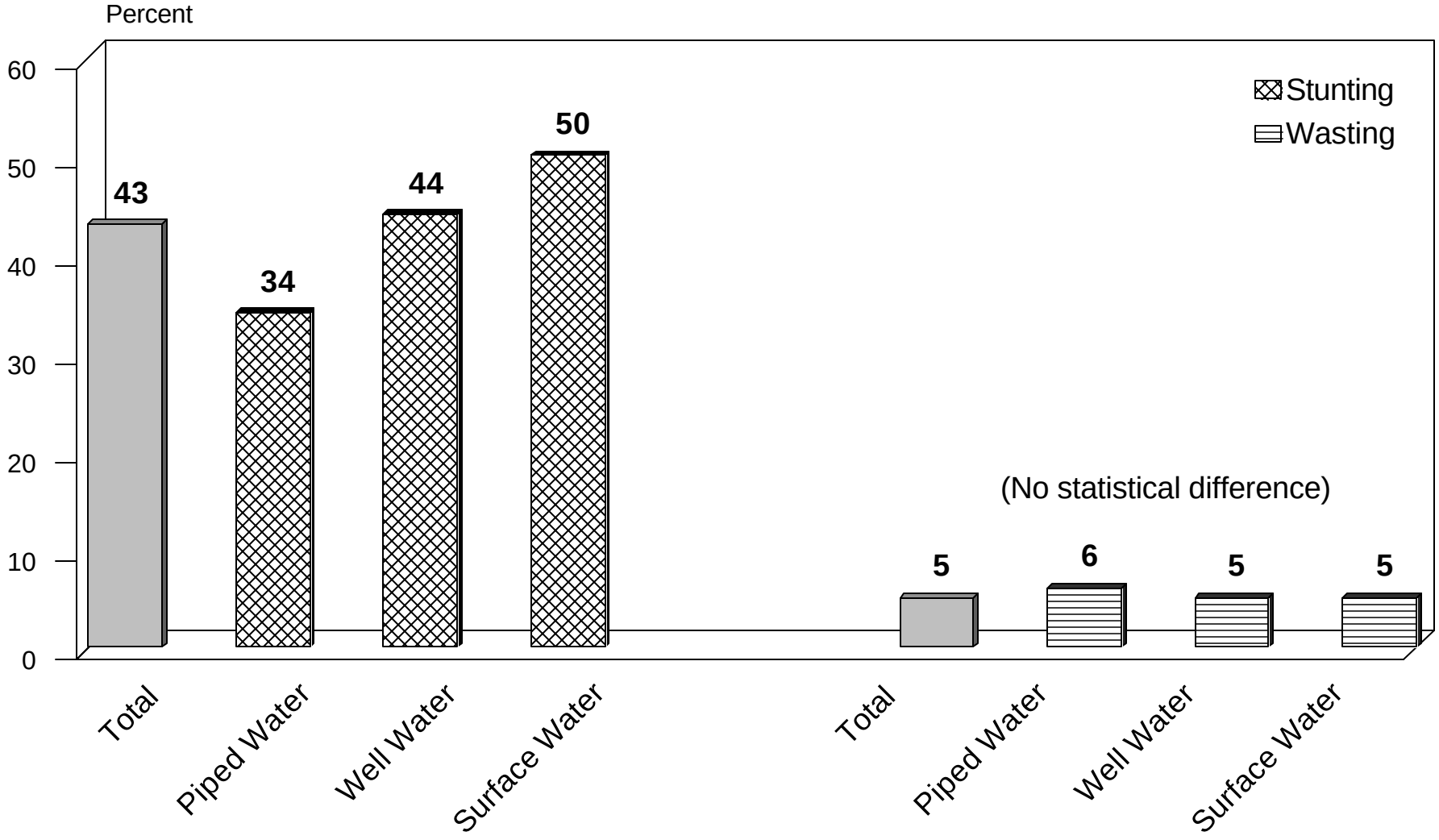
Figure 23: Stunting and Wasting among Children under Five Years by Source of Drinking Water, Tanzania

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, 41 percent obtain their drinking water from a well, 25 percent use surface water, and less than 1 percent use either rain water or water brought in by tanker truck.

- **Children whose drinking water is well water or surface water are more likely to be stunted (44 percent and 50 percent, respectively) than children with access to piped water (34 percent).**

- **There is no relationship between source of drinking water and wasting.**

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



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

Source: Tanzania RCHS 1999

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

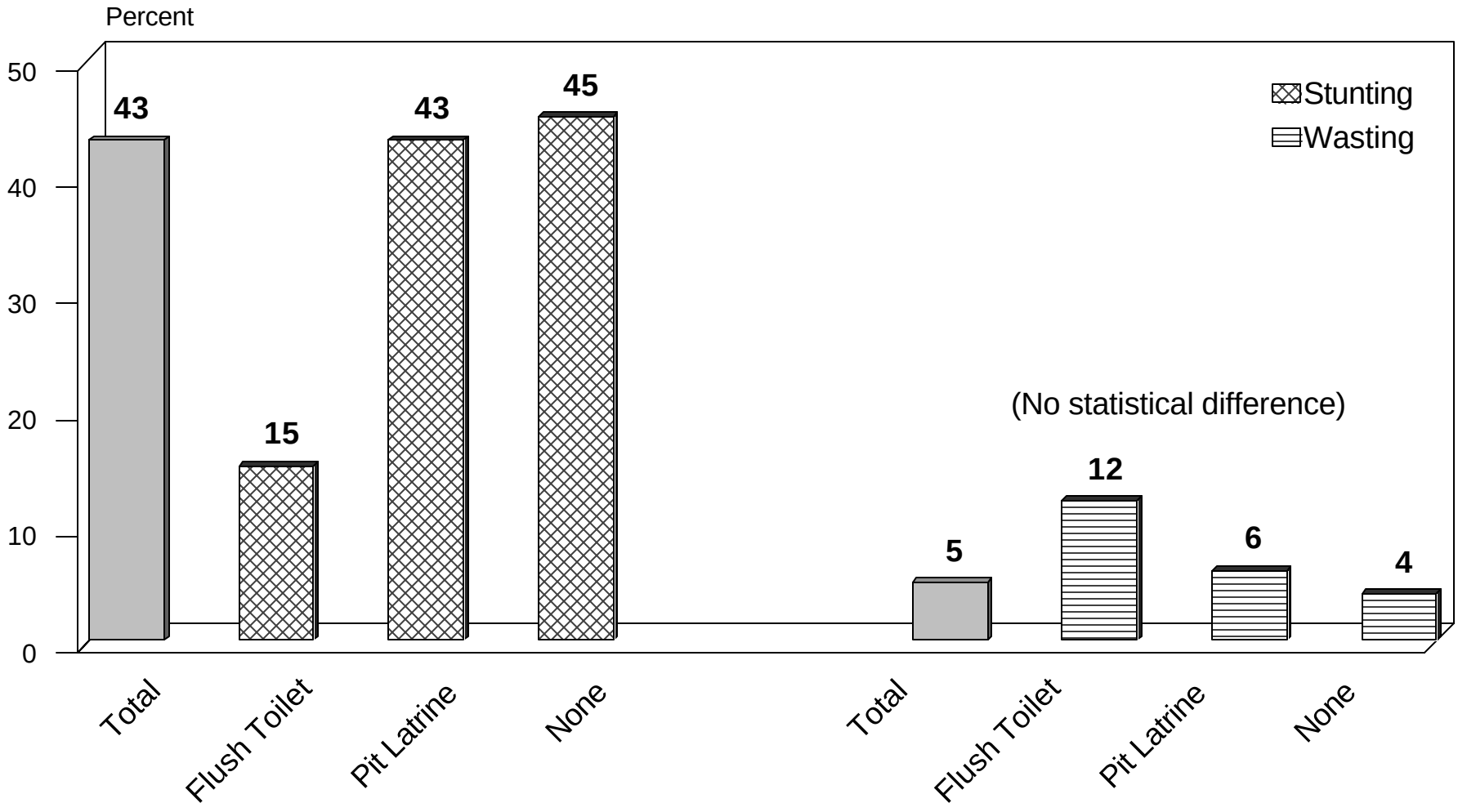
The type of toilet used by a household reflects its wealth, and poor households are less likely to have adequate toilet facilities. Inadequate sanitation facilities result in an increased risk of diarrheal disease, which contributes to malnutrition. Infants and children from households that do not have ready access to a flush toilet are at greater risk of being malnourished than children from households with this amenity. In Tanzania, 84 percent of households have access to a pit latrine, less than 2 percent have access to a flush toilet, and 14 percent of surveyed households have no facilities.

- **Households that do not have any toilet facilities have the highest proportion of stunting in children under five years of age (45 percent).**

- **Households with access to flush toilets have the lowest proportion of children stunted (15 percent). Note, however, that the number of households with a flush toilet is low.**

- **There is no relationship between type of toilet and wasting. This is due to the small number of households with flush toilets.**

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



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

Source: Tanzania RCHS 1999

Basic Influences

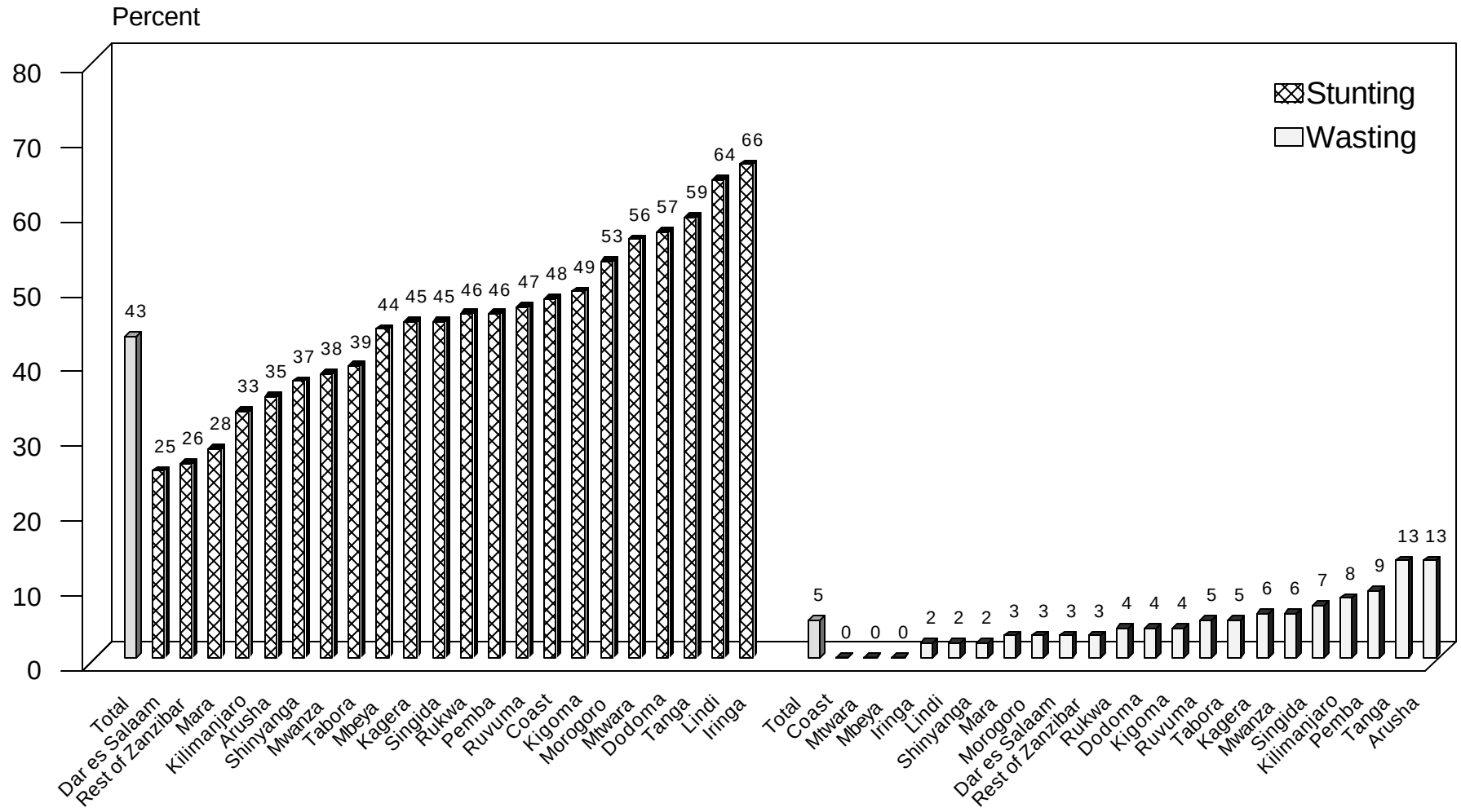
Figure 25: Stunting and Wasting among Children under Five Years by Region, Tanzania

In Tanzania,

- **Stunting ranges from 25 to 66 percent among children in the 22 regions.** The highest levels of stunting were reported in the Iringa and Lindi regions. The lowest level of stunting was reported in Dar es Salaam.

- **Wasting ranges from 0 to 13 percent among children in the 22 regions**. The highest levels were found in the Arusha and Tanga regions, while no wasting was found in either Mbeya, Mtwara, or the Coast.

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



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

Source: Tanzania RCHS 1999

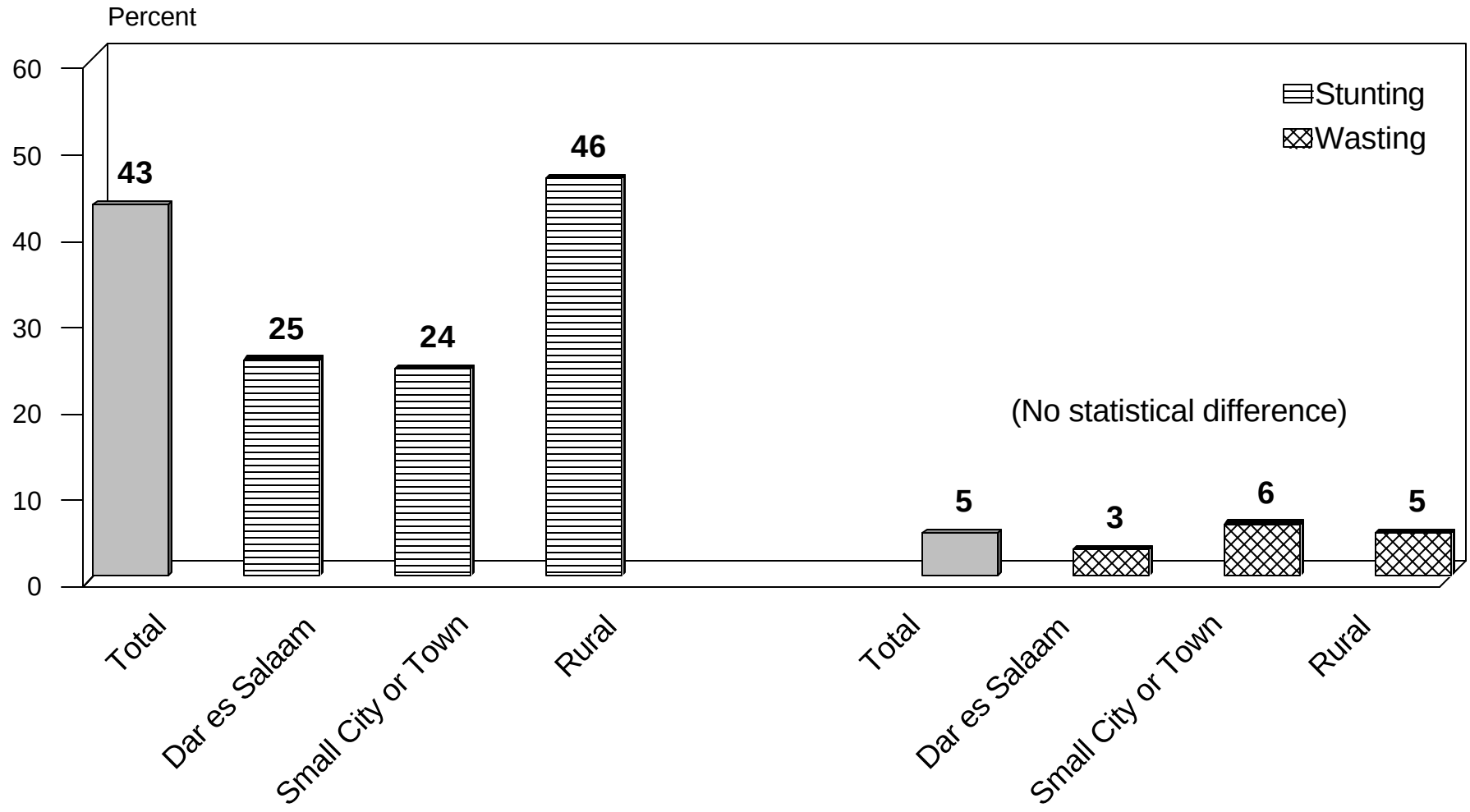
Figure 26: Stunting and Wasting among Children under Five Years by Urban-Rural Residence, Tanzania

In Tanzania,

- **Forty-six percent of rural children are stunted.** The rate of chronic malnutrition is much less in the capital city of Dar es Salaam (25 percent) and in other urban areas (24 percent).

- There is no statistical difference in the rates of wasting between those living in rural areas and those living in urban areas.

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



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

Source: Tanzania RCHS 1999

Appendices

Appendix 1
Stunting, Wasting, and Underweight Rates by Background Characteristics
Tanzania 1999

Background characteristic	Stunted	Wasted	Under-weight
Child's age in months			
0-5	9.4	3.4	3.3
6-11	23.5	6.0	21.7
12-17	43.2	9.1	41.5
18-23	59.2	10.2	41.5
24-29	45.0	4.1	35.0
30-35	52.6	6.4	43.0
36-47	50.8	2.1	27.0
48-59	51.8	4.5	25.4
n=2,582	p<0.001	p<0.001	p<0.001
Gender of child			
Female	41.5	5.2	30.2
Male	43.7	5.6	27.5
n=2,582	NS	NS	NS
Urban-rural residence			
Capital	25.2	3.3	17.5
Other urban	24.3	6.4	19.9
Rural	46.5	5.3	30.9
n=2,582	p<0.001	NS	p<0.001
Overall	42.6	5.4	28.9

Background characteristic	Stunted	Wasted	Under-weight
Regions			
Dodoma	57.4	3.8	33.9
Arusha	35.1	13.1	33.5
Kilimanjaro	33.3	7.6	36.5
Tanga	59.1	12.6	46.9
Morogoro	53.3	3.3	32.9
Coast	47.5	0.0	16.9
Dar es Salaam	25.2	3.3	17.5
Lindi	63.8	2.0	36.5
Mtwara	56.1	0.0	28.0
Ruvuma	47.0	4.6	35.4
Iringa	66.1	1.9	41.5
Mbeya	44.2	0.0	24.0
Singida	45.4	6.8	34.6
Tabora	39.3	5.4	22.2
Rukwa	45.6	3.7	25.5
Kigoma	49.1	4.3	39.2
Shinyanga	36.8	2.4	19.9
Kagera	44.6	5.6	27.8
Mwanza	37.6	5.6	24.8
Mara	27.7	2.7	18.7
Pemba	46.3	8.7	35.6
Rest of Zanzibar	26.3	3.4	16.4
n=2,582	p<0.001	p<0.001	p<0.001
Overall	42.6	5.4	28.9

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

Appendix 2
WHO/CDC/NCHS International Reference Population Compared with the Distribution of Malnutrition in Tanzania

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 very overweight for their age or very overweight 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 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 slightly to the left of the normal curve. Therefore, the proportion of malnourished children according to this index is somewhat larger than that which would be expected in the reference population. Height-for-age and weight-for-age are largely to the left of the standard curve indicating that there is a large number of malnourished children. In addition, a similarly large number of children are somewhat short and/or thin for their age. The implications are that interventions are needed to address malnutrition and undernutrition 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 Tanzania