AFRICA NUTRITION

Nutrition and Health Status Of Infants and Young Children in Ghana

Findings from the 1993 Ghana Demographic and Health Survey

U.S. Agency for International Development
AFR/SD/HRD and G/PHN/HN

Macro International Inc.

Food Security and Nurtition Monitoring Project

Nutrition and Health Status of Infants and Young Children in Ghana

Findings from the 1993 Ghana Demographic and Health Survey

Rosanna Agble, B.Sc., Ministry of Health, Accra
Philomena Nyarko,B.Sc., Ghana Statistical Service
Patricia Haggerty, Ph.D., Macro International Inc.
Shea O. Rutstein, Ph.D., Macro International Inc.

Macro International Inc.
11785 Beltsville Drive
Calverton, MD 20705

September 1995

Prepared with support from the U.S. Agency for International Development, Bureau for Global Program, Field Support and Research, Office of Health and Nutrition under the Food Security and Nutrition Monitoring Project (IMPACT), contract No. DAN-5110-Q-00-0013-00, Delivery Order No. 1.

CONTENTS

Page

Tables v

Figures vii

Acronyms ix

Acknowledgments xi

Summary xiii

Map of Ghana xvi

1 Introduction 1

1.1 Geography and Population 1
1.2 Climate and Economy 1
1.3 Food Production 2
1.4 Food Marketing 4
1.5 Diet 4
1.6 National Food and Nutrition Policy 4
1.7 Data Source and Type of Information Collected 6

2 Basic Indicators of Nutritional Status 7

2.1 Levels of Undernutrition 7
2.2 Nonbiological Factors 9
2.3 Biological Factors 12
2.4 Change in Nutrition Indicators Since 1988 15

3 Infant and Child Feeding Practices 17

3.1 Initiation of Breastfeeding 17
3.2 Exclusive Breastfeeding 18
3.3 Introduction of Complementary Solid Foods 20
3.4 Bottle Use 21
3.5 Full Weaning 23

4 Mortality and Health 27

4.1 Infant and Under-Five Mortality 27
4.2 Morbidity and Use of Health Facilities 28
4.3 Biological and Nonbiological Factors Associated with Diarrhoea 32

Page

4.4 Diarrhoea and Wasting 35
4.5 Age-related Patterns of Fever and Cough 36

5 Nutrition and Caring Capacity of the Family 37

5.1 Stunting 38
5.2 Underweight 41
5.3 Wasting 42
5.4 Summary 42

6 Recommendations 45

References 47

Appendix A Sample Design 49

Appendix B Household and Respondent Background Characteristics 51

Appendix C Anthropometric Data Verification 65

Appendix D Regional, Residential, and Gender Differences in Prevalence of Undernutrition by Child's Age 67

Appendix E Feeding Practices by Age 71

Appendix F Logistic Regression Models 73

Appendix G List of Country Nutrition Reports and Nutrition Chartbooks Produced under Africa Regional DHS Nutrition and Family Health Analytical Initiative 75

TABLES

Page

Table 1.1 Production of Major Food Crops and Nutritional Adequacy in Ghana, 1970-1993 2

Table 1.2 Livestock Production (in thousands), 1985-1990 3

Table 1.3 Annual Fish Production by Source, 1987-1991 3

Table 2.1 Moderate and Severe Stunting, Underweight, and Wasting, by Region and Residence 8

Table 2.2 Stunting, Underweight, and Wasting, by Nonbiological Factors 11

Table 2.3 Stunting, Underweight, and Wasting, by Biological Factors 12

Table 2.4 Parturition Time and Type of Delivery for Children under 3 Years 13

Table 2.5 Birth Weight and Size at Birth for Children under 3 Years 14

Table 3.1 Initial Breastfeeding 18

Table 3.2 Prevalence and Net Relative Risk of Bottle Use 23

Table 3.3 Median Duration of Breastfeeding 24

Table 3.4 Reason for Fully Weaning Last-Born Child 25

Table 4.1 Infant and Under-Five Mortality Rates 27

Table 4.2 Prevalence and Treatment of Diarrhoea, Fever, and Cough 28

Table 4.3 Source for Treatment of Fever and Cough 30

Table 4.4 Source for Treatment of Diarrhoea 30

Table 4.5 Use of Oral Rehydration Therapy for Treatment of Diarrhoea 31

Table 4.6 Changes in Feeding Practices among Children with Diarrhoea 32

Table 4.7 Prevalence and Net Relative Risk of Diarrhoea among Children under 3 Years 33

Table 5.1 Net Relative Risk of Stunting, Underweight, and Wasting 39

Table B.1 Children Weighed and Measured in the Ghana DHS 51

Table B.2 Duration of Residence 52

Table B.3 Mean and Standard Deviation for Living and Dead Children 52

Page

Table B.4 Mother's Age 53

Table B.5 Mother's Education 54

Table B.6 Mother's Occupation 55

Table B.7 Presence of Child at Work 55

Table B.8 Usual Caretaker of Children of Working Mothers 56

Table B.9 Residence of Mother's Husband 56

Table B.10 Mother's Marital Union 57

Table B.11 Husband's Education 57

Table B.12 Husband's Occupation 58

Table B.13 Toilet Facilities 59

Table B.14 Source of Drinking Water 59

Table B.15 Type of Floor 60

Table B.16 Exposure to Radio and Television 61

Table B.17 Transport Owned 61

Table B.18 Possession Score 62

Table B.19 Antenatal Care Provider 63

Table C.1 Imputed and Valid Z-Scores 65

Table C.2 Verification of Anthropometric Data 66

Table C.3 Digit Preference in Anthropometric Data 66

Table D.1 Undernutrition by Region and Age Group 67

Table D.2 Undernutrition by Gender, Residence, and Age Group 69

Table E.1 Feeding Practices by Age 71

FIGURES

Page

Figure 2.1 Undernutrition among Children Age 0 to 35 Months 8

Figure 2.2 Undernutrition among Children Age 0 to 35 Months by Region 9

Figure 2.3 Undernutrition among Children Age 0 to 35 Months by Residence 9

Figure 2.4 Stunting, Underweight, and Wasting among Children Aged 0 to 35 Months 15

Figure 2.5 Undernutrition among Children Age 3 to 35 Months, 1988 and 1993 16

Figure 3.1 Breastfeeding Practices by Age 19

Figure 3.2 Full Breastfeeding among Infants under 4 Months by Region and Residence 20

Figure 3.3 Breastfeeding with Complementary Solid Foods among Infants Age 6 to 9 Months by Region and Residence 21

Figure 3.4 Bottle Feeding Practices by Age 21

Figure 4.1 Diarrhoea by Age 34

Figure 4.2 Diarrhoea and Wasting by Age 35

Figure 4.3 Fever and Cough by Age 36

ACRONYMS

ARI	Acute Respiratory Infection
CDC	Centers for Disease Control
CDD	Control of Diarrhoeal Disease
EA	Enumeration Area
FAO	Food and Agriculture Organisation of the United Nations
GDHS	Ghana Demographic and Health Survey
GNP	Gross National Product
GSS	Ghana Statistical Service
IDD	Iodine-Deficiency Disorder
IMPACT	Food Security and Nutrition Monitoring Project
LBW	Low Birth Weight
NCHS	National Center for Health Statistics
OAU	Organisation of African Unity
ORS	Oral Rehydration Salts
ORT	Oral Rehydration Therapy
PEM	Protein-Energy Malnutrition
RHF	Recommended Home Fluids
SD	Standard Deviation
TBA	Traditional Birth Attendant
UNDP	United Nations Development Program
UNICEF	United Nations Children Fund
USAID	U.S. Agency for International Development
WHO	World Health Organisation

ACKNOWLEDGMENTS

The completion of this report was made possible with the assistance of Ken Williams of UNICEF, Ghana. Thanks are also due to Albert Marckwardt, Kaye Mitchell, and Jonathan Dammons of Macro International, Inc.

SUMMARY

The nationally representative 1993 Ghana Demographic and Health Survey (GDHS) provides information on the nutritional status of Ghanaian children between the ages of 0 and 35 months at the national, regional, and urban/rural levels. Overall, 26 percent of these children are stunted (or chronically undernourished), 12 percent are wasted (or acutely undernourished), and 28 percent are underweight. Undernutrition is significantly higher in the northern than in the southern part of the country. It also is higher in rural areas than urban areas. National levels of undernutrition have not improved significantly since the 1988 GDHS; more children are wasted now than in 1988. In urban areas, the prevalence of stunting has declined by about one-third since 1988.

Infant and child feeding practices are far from optimal in Ghana, resulting in high levels of undernutrition from the age of 3 months onward. The prevalence of stunting, or chronic undernutrition, increases rapidly from 3 to 21 months, when it peaks at about 50 percent. It remains at a high level (40 to 50 percent) throughout the third year of life. Wasting, or acute undernutrition, also rises during infancy until it peaks at a level of 20 percent at age 12 months. It remains at this level throughout the second year, after which it declines to about 7 percent. Thus, children's acute, but not chronic, nutritional status improves in the third year of life.

Only 16 percent of all newborns are put to the breast immediately after birth and thus receive the full benefit of colostrum. Mothers delay breastfeeding by at least 24 hours for more than half of newborns. Delayed breastfeeding is more common in rural areas and when a traditional attendant assists at the birth. By the age of 2 months, one-third of all infants have been fed water or other liquids with a bottle. Bottle use is more common among women who receive antenatal care from a doctor or nurse, who make more than 3 antenatal visits, who are not farmers, and who do not work. Bottles are used mainly in the first year, with infants age 0 to 5 months twice as likely to receive them as infants age 6 to 11 months. Although still problematic, bottle use has declined by about half since 1988. Only 8 percent of infants under 4 months of age are exclusively breastfed, a practice recommended by the World Health Organisation (WHO). This is an improvement over 1988 levels, however, when just 2 percent of these infants were exclusively breastfed.

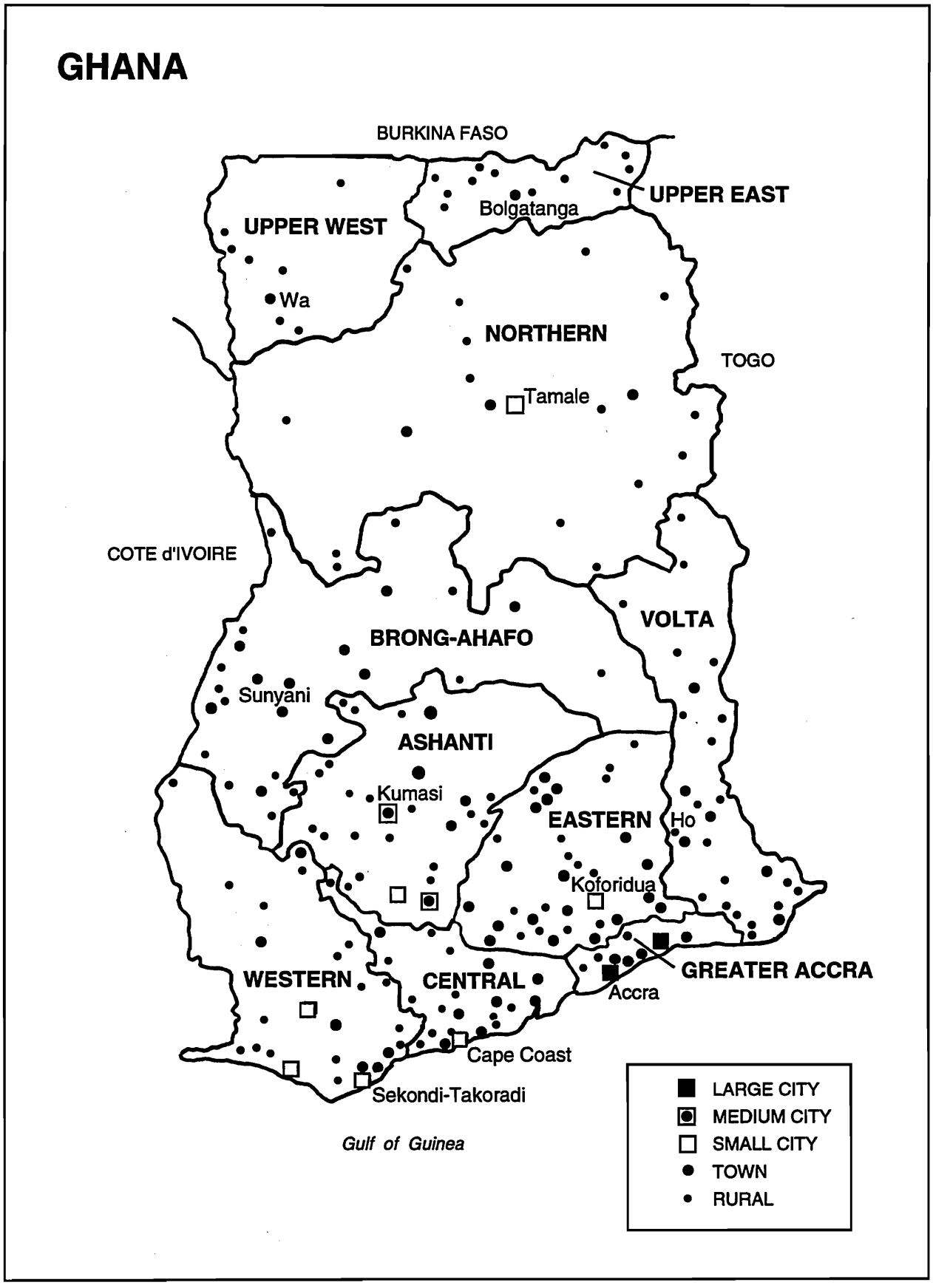
While nearly all infants receive water and other liquids too early, most infants also receive complementary solid foods too late. Breastfed infants 6 months of age and older should be receiving complementary foods. In Ghana, however, nearly two-thirds of infants age 6 to 9 months are not given complementary foods.

Approximately one-fourth of children under three years of age experienced diarrhoea, fever, or cough in the 2 weeks preceding the survey. Diarrhoea follows the same age-specific pattern as wasting, with the risk of diarrhoea declining as the mother makes more antenatal visits. The prevalence of cough and fever rises during infancy, peaks at 12 months, and then declines gradually over the next two years.

Multivariate analysis shows that undernutrition in Ghana is determined by a number of factors besides wealth. Children face the highest risks of undernutrition when they are 6 to 17 months of age, born small, born within 2 years of a previous birth, have mothers who made few antenatal visits, are weaned because of a new pregnancy or because the mother returned to work, are not immunised against measles, have a recent history of diarrhoea, and have mothers who do not listen to radio or watch television regularly. Wealth-related factors associated with undernutrition include region of residence and the number of dead children of the mother. In addition, having a flush toilet and a finished floor, amenities enjoyed by a very small proportion of the population, are associated with a lower risk of being underweight. Other factors reflecting a household's economic status, including parental education and occupation, possession score, type

of transport owned, religious denomination, and the number of children at home, are not significant or consistent predictors of undernutrition. In fact, children of women with the highest possession scores have a 50 percent higher risk of being underweight.

Efforts to improve nutrition in Ghana need to focus on pregnant women and on children during the first two years of life, when undernutrition takes its greatest toll. Public health efforts are needed to promote family planning and antenatal care, to encourage breastfeeding immediately after birth and exclusive breastfeeding for the first 4 to 6 months of life, to discourage bottle feeding of infants, to encourage the introduction of appropriate complementary foods at 4 to 6 months, to advise mothers on the content of complementary solid foods and the frequency with which they should be given, to discourage early weaning, and to assist mothers in the management of infant feeding while they work. Efforts to control diarrhoea and immunise children against measles should also be strengthened.



PREVIOUS PAGE BLANK

CHAPTER 1

INTRODUCTION

1.1 Geography and Population

The Republic of Ghana is located on the west coast of Africa. It is bounded on the north by Burkina Faso, on the east by the Ivory Coast, on the west by the Republic of Togo, and on the south by the Atlantic Ocean. The country covers 238,533 square kilometres, and its coastline stretches 554 kilometres (GSS, 1992).

Administratively, the country is divided into ten regions, which are further subdivided into 110 districts. These districts serve as the basic units of political administration. There are three distinct ecological zones: low-lying coastal plains covered by shrubs and mangrove swamps along the southeast seacoast of the country, tropical and semi-deciduous forest fed by high rainfall in the middle belt, and dry savannah plains with a sub-Sahelian climate in the north.

Ghana's population is very young. In 1993 the country had an estimated population of 16.1 million. Forty-six percent of the population is under age 15, and 17 percent are children under age 5. The population, which is largely rural, is now estimated to be growing at an annual rate of 3.1 percent (GSS, 1994b). According to the 1984 census, 68 percent of the people live in rural communities, while the remaining 32 percent reside in urban areas, that is, communities of 5,000 persons or more (GSS, 1987). With a population density of 69 people per square kilometre, the land appears to be sparsely populated, but there are pockets of dense population scattered across the country, mostly in the southern half of the country. Of the ten regions, the Greater Accra and Central regions have the highest population densities (GSS, 1992).

1.2 Climate and Economy

Ghana is a tropical country with little variation in temperature. The northern part of the country is generally hotter and drier than the south. The south has two rainy seasons, lasting from May to August and from September to October, while the north has just a single rainy season, which runs from May to November. The remaining months are hot and dry.

The country's economy consists of a small, capital-intensive modern sector involving mining, lumbering, and manufacturing and a large, labour-intensive agricultural sector. The agricultural sector, which provides a livelihood to about 70 percent of the population, includes the cultivation of food and cash crops, livestock, and fish (Ministry of Finance, 1994). The major food crops are maize, rice, guinea corn, millet, sorghum, cassava, yam, and plantain; cocoa, coffee, and timber are the main cash crops. Prevailing weather conditions largely determine crop yields since the country's agriculture is mainly rain-fed. The economy also depends heavily on the export of mineral commodities such as gold, diamonds, manganese, and bauxite.

In the late 1970s, the economy suffered a severe decline which reached its nadir in 1983. During that period the average growth rate of Ghana's gross national product (GNP) was -1.2 percent (GSS, 1988). Both agricultural and industrial output declined, in large part because of a severe drought and poor monetary and fiscal policies. Lack of foreign exchange led to a shortage of raw materials and prevented the replacement of worn-out and aged industrial equipment. High world oil prices and the return of two million Ghanaians from Nigeria also contributed to the poor performance of the economy. The outcome was inflation, declining per capita income, rising unemployment, and minimal capacity to save or invest.

In order to resuscitate the economy, the government launched an Economic Recovery Programme in 1983. Among the policies adopted were trade liberalisation and exchange rate policies. These policies succeeded in revitalising both domestic and foreign investment, and since 1986 the economy has been growing at an average annual rate of 5 percent. The rate of inflation also dropped substantially from about 123 percent in December 1983 to about 28 percent in December 1993 (GSS, 1994c). The agricultural sector has also recovered and is now growing at an annual rate of 2.5 percent (Ministry of Finance, 1994). Despite these achievements, about a third of the population still lives below the poverty line (GSS, 1995). Thus the adjustment programme appears to have had little impact on the poor.

1.3 Food Production

Owing to the poor performance of the economy in the late 1970s, food production fell to a very low level; per capita food availability in the period 1981-83 was 30 percent below the 1975 level (Van den Boom et al., 1995). Since the introduction of the Economic Recovery Programme, overall food production has risen due to better weather conditions as well as an improved incentive framework.

Production of Staples

Production figures for the major staple foods from 1970 to 1993 indicate that available calories do not yet meet recommended daily requirements despite increasing output (see Table 1.1).

Table 1.1 Production of major food crops and nutritional adequacy in Ghana, 1970-1993

Crop	1970-74	1984-86	1987	1988	1989	1990	1991	1992	1993
				THOUSAND METRIC TONNES					
Maize	452	509	598	600	715	553	932	731	961
Rice	62	75	81	95	74	81	151	132	157
Millet	127	123	173	190	180	75	113	133	198
Sorghum	171	163	206	178	215	136	241	259	328
Cassava	2,836	3,339	726	3,300	3,320	2,717	5,702	5,662	5,973
Yam	791	790	1,185	1,200	1,280	877	2,632	2,331	2,720
Cocoyam	1,210	1,580	1,012	1,115	1,200	815	1,297	1,202	1,236
Plantain	1,829	1,224	1,079	1,200	1,040	799	1,178	1,082	1,322
				CALORIES AVAILABLE AS PERCENT OF REQUIREMENTS					
Nutrition	87	76				93			

Source: PPMED, Ministry of Food and Agriculture, Accra; FAO Production Yearbooks (1970-1993)

Livestock Production

The major types of livestock reared in Ghana are cattle, sheep, goats, pigs, and poultry. Since 1985 the production of sheep, goats, and pigs has increased. In contrast, the production of cattle and poultry has been stagnant, with the estimated number of poultry in 1990 still below 1985 levels (Table 1.2).

According to the Food and Agricultural Organisation (FAO), total meat production in Ghana equals only about 23 percent of the estimated national demand of 195 thousand metric tonnes (FAO, 1993).

Table 1.2 Livestock population (in thousands), 1985-1990

Livestock	1985	1987	1988	1989	1990
Cattle	1,064	1,170	1,145	1,136	1,158
Sheep	1,990	1,989	2,046	2,212	2,555
Goats	2,017	1,901	1,991	2,363	2,834
Pigs	413	399	478	559	677
Poultry	10,024	8,214	8,040	8,738	9,986

Source: PPMED, Ministry of Food and Agriculture, Accra; FAO Production Yearbooks (1970-1993)

Fisheries

Domestic fish production has fluctuated over the years (Table 1.3). The total domestic catch fell from 386 thousand metric tonnes in 1987 to 347 thousand metric tonnes in 1989, picked up in 1990, and then fell back to 347 thousand metric tonnes in 1991. Marine fish make up about 84 percent of the annual domestic fish output of about 350 thousand metric tonnes (Republic of Ghana, 1992b). About 46 thousand metric tonnes of the total inland fish catch is from Volta Lake. Overall, the country is only able to meet 60 percent of its total fish requirements, which are estimated to be 600 thousand metric tonnes (GSS, 1994b).

Table 1.3 Annual fish production by source (thousand metric tonnes), 1987-1991

Source	1987	1988	1989	1990	1991
Marine	331	303	289	319	290
Inland	55	58	58	58	57
Total	386	361	347	377	347

Source: Fisheries Department (Republic of Ghana, 1992b)

Food Imports

Ghana continues to offset the shortfall in food production by importing cereals, fish, meat, and live animals. Together these form nearly 5 percent of the country's total imports (Republic of Ghana, 1992b). Rice, wheat, fish, meat, and poultry are the main food imports. In 1990, cereal imports equalled 17 percent of domestic cereal production. They included 135.6 thousand metric tonnes of rice, 11.5 thousand metric tonnes of wheat, 3.1 thousand metric tonnes of maize, and 1.6 thousand metric tonnes of sorghum and millet.

In 1990, 6.6 thousand metric tonnes of meat were imported to supplement domestic production. The proportion of fish imports to local production also increased from 1 percent in 1986 to 7 percent in 1989 with the actual figure rising from 500 metric tonnes in 1987 to 23,400 metric tonnes in 1989 (Republic of Ghana, 1992b). Despite the inadequacy of its food supplies, Ghana continues to export some food products such as yam, cocoyam, pineapple, and fish (particularly tuna species). In 1992, agricultural exports constituted about 30 percent of the total value of non-traditional exports.

1.4 Food Marketing

Both the formal and informal sectors handle the distribution of locally produced food. The informal sector consists of a large number of small-scale private traders. Most farmers sell their produce at local market centres. From there food is moved in bulk to the major urban centres, where it is sold wholesale to the women who dominate the retail trade. These women, who are known as "market queens," retail the food. During transport there are substantial losses due to the traditionally poor quality of post-harvest management. Such losses account for an estimated 20 to 30 percent of total food production (Ministry of Food and Agriculture, 1990).

Staples, fish, and meat are also marketed by a host of government and privately owned agencies such as the Ghana Food Distribution Corporation, the State Fishing Corporation, Mankoadzie Fisheries, Beyeeman, Afko, and the Meat Marketing Board. These products are distributed by a network of depots, shops, and kiosks.

1.5 Diet

The local diet reflects the various foods produced in Ghana's three ecological zones. In the northern savannah zone, the diet is based on cereals—mainly millet, sorghum, and maize—which typically are served with sauces prepared from oil seeds and green vegetables that are in season. The savannah also is noted for the cultivation of groundnuts and cowpeas, but these foods are mostly sent south for sale. Although residents keep cattle and small animals such as guinea fowls, chickens, and goats, little meat is eaten on a daily basis. Instead, these animals are kept for sale or eaten only on special occasions. Small amounts of smoked fish also are eaten. Food production in this zone is inadequate, which accounts for the low intake of food throughout the year. Food shortages are worst and food intake is lowest during the "lean" season, which lasts from January to June.

In the forest zone, the diet is based on maize and starchy staples, including plantain, cocoyam, and cassava. Cereals are seldom eaten. While more meat and fish are eaten than in the savannah, the quantities consumed are still below recommended levels. Green vegetables are abundant, particularly during the rainy seasons.

In the coastal zone, the main staples grown and eaten are maize, cassava, and plantain. The diet in this area is comparatively rich in fish. There are seasonal variations in the intake of staples and fish, with consumption at its lowest during the lean season from March to June.

Even though there are a variety of fruits in Ghana, they are not part of the regular diet. Rather they are eaten as and when they become available to the household. In the savannah, where fruits are scarce, mothers occasionally pick wild fruits for their children. Palm fruits are mainly cultivated in the southern part of the country and are a common feature of the local diet.

1.6 National Food and Nutrition Policy

Ghana has yet to finalise and adopt a food and nutrition policy. As a result of the International Conference on Nutrition held in Rome in 1992, however, a multidisciplinary task force has developed a National Plan of Action for Food and Nutrition.

The major nutritional problem in Ghana is protein-energy malnutrition (PEM) of which various forms exist throughout the country. Efforts to reduce the high incidence of PEM include growth monitoring programmes, nutrition rehabilitation, a community-based weaning food project, supplementary feeding

programmes, attempts to promote breastfeeding, and public education. Micronutrient deficiencies, notably of vitamin A, iron, and iodine, are also widespread. Anaemia was identified as a problem among preschool children and pregnant and lactating women by the 1961 National Nutrition Survey. In the years since, widespread iron-deficiency anaemia among all sexes and age groups has been reported. While studies to assess the magnitude of anaemia continue, efforts to alleviate the problem via supplementation, treatment of parasitic infestation (especially malaria), and public education are being undertaken.

It has long been noted that vitamin A deficiency is endemic in northern Ghana. Vitamin A supplementation trials (VAST) conducted in 1988 in the Upper East region showed that, while the prevalence of xerophthalmia averaged 1.6 percent, nearly 65 percent of the children examined had low serum retinol levels (Arthur et al., 1992). A 1994 study in Kintampo district also found that 51 percent of the children sampled had low serum retinol levels (personal communication from Rosanna Agble). In another study carried out in 1988 in a rural coastal population, low serum retinol levels were found in 85 percent of preschool children and 59 percent of primary school children (Takyi et al., 1994).

The VAST studies also found that periodic supplementation with large doses of vitamin A could reduce mortality by 19 percent among children age 6 months to 5 years. Supplementation also significantly reduced the severity of illnesses in these children. Ghana is committed to eliminating vitamin A deficiency by the mid-1990s and recently developed a framework for controlling vitamin A deficiency.

A nationwide study of iodine-deficiency disorders (IDDs) in Ghana, conducted between 1991 and 1994, found that serious IDDs affect at least 33 percent of the districts in the country, with traces of the problem found in all the remaining districts (Aisbey-Berko and Orraca-Tetteh, 1995). This has prompted the Ministry of Health both to administer oil-based iodine capsules and to move towards salt iodisation by the end of 1995 in accordance with mid-decade goals.

The National Plan on Food and Nutrition, if implemented, is expected to help improve the nutritional status of Ghanaians in many ways. It is designed to:

- Assure adequate food/nutrient intake for individuals,
- Improve household food security,
- Sensitise policymakers about nutrition-related issues,
- Improve and sustain environmental sanitation and water supply,
- Strengthen coordination among agencies involved in food and nutrition,
- Increase and sustain institutional capacity to deliver food and nutrition-related education and services,
- Put in place effective preventive measures against nutrition-related diseases,
- Adopt a participatory approach in planning food and nutrition projects,
- Encourage individuals to adopt ideal breastfeeding and appropriate weaning practices, and
- Encourage individuals to adopt good hygienic practices.

1.7 Data Source and Type of Information Collected

The data for this report is drawn from the 1993 Ghana Demographic and Health Survey (GDHS), which was conducted by the Ghana Statistical Service (GSS) with technical assistance from Macro International Inc. and funding from the U.S. Agency for International Development (USAID) through the Food Security and Nutrition Monitoring Project (IMPACT). The 1993 GDHS was a nationally representative sample survey designed to provide information on fertility, mortality, family planning, and maternal and child health.

Sample selection was based on the 1984 census list of 13,000 enumeration areas (EAs). The frame was first stratified into three ecological zones and then into urban and rural EAs. The EAs were selected with probability proportional to the number of households. Households within selected EAs were listed, and a systematic sample of households was selected for the survey. A total of 4,562 women between the ages of 15 and 49 years were interviewed. The GDHS sampling frame is described in Appendix A.

Data were collected at both the household and individual levels. Data collected at the household level included background information on all household members, their health, disability status, migration history, and survival status, and the residence of natural parents of children. Also collected were data on source of water supply, type of toilet facility, number of sleeping rooms available to the household, flooring, and ownership of specified durable goods. At the individual level, detailed information was sought on women's reproductive history, contraceptive knowledge and use, pregnancy and breastfeeding, marital status, fertility preferences, maternal mortality, husband's background, women's work, and knowledge of sexually transmitted diseases. Appendix B presents the background characteristics of the households and respondents included in this report.

Data were also gathered on all living children age 0 to 35 months of the women interviewed. Of these 2,055 children, 1,818 were included in the nutrition and health analyses presented in this report. Nutritional data collected on these children include weight, height, age, breastfeeding history, and feeding patterns. Information on the occurrence of diarrhoea, fever, and cough in the previous two weeks, birth weight and size, and immunisation status was also obtained.

CHAPTER 2

BASIC INDICATORS OF NUTRITIONAL STATUS

Three indicators using measures of weight and height in combination with age are commonly used to determine nutritional status. The first, stunting,[1] is the failure to grow adequately in height in relation to age and reflects past or chronic undernutrition. It results from inadequate food intake over a long period of time and may be exacerbated by chronic or repeated episodes of illness. The second, wasting,[2] is the failure to gain weight adequately in relation to height and reflects recent or acute undernutrition. Wasting results from a recent shortage of adequate nutrition and is worsened by acute illness, especially diarrhoea. The third, underweight,[3] is low weight in relation to age; it is a combined indicator that reflects either chronic or acute nutritional status or both. Underweight is often used as a general indicator of the health status of a population. The three indicators are compared with those obtained from an international reference population.[4] Appendix C discusses some aspects of the quality of nutrition data from the GDHS.

This chapter examines the associations between the nutritional status of infants and children 0 to 35 months of age and a number of nonbiological (geographic, demographic, social, and economic) and biological (health and age-related) factors.

2.1 Levels of Undernutrition

According to the 1993 GDHS, 26 percent of children age 0 to 35 months are stunted, 28 percent are underweight, and 12 percent are wasted (Figure 2.1).[5] In other words, more than one-fourth of children are too short and too light, and more than one in ten is too thin. These are 13, 14, and 6 times, respectively, the levels expected in a healthy, well-nourished population.

The 1993 GDHS data show that over half of the stunted children (i.e., below -2 SD of the reference median) are severely stunted (i.e., below -3 SD of the reference median). Likewise, 40 percent of the underweight children are severely underweight, and one-fourth of the wasted children are severely wasted (Table 2.1). In a healthy, well nourished population only one in 1,000 children is expected to be severely undernourished. Thus, the level of severe stunting in Ghana is 91 times that expected in a healthy, well nourished population; severe underweight is 80 times healthy levels; and severe wasting is 23 times healthy levels.

---

[1] Stunted children are those whose height-for-age Z score is less than -2 standard deviations of the median based on the NCHS/CDC/WHO reference population.

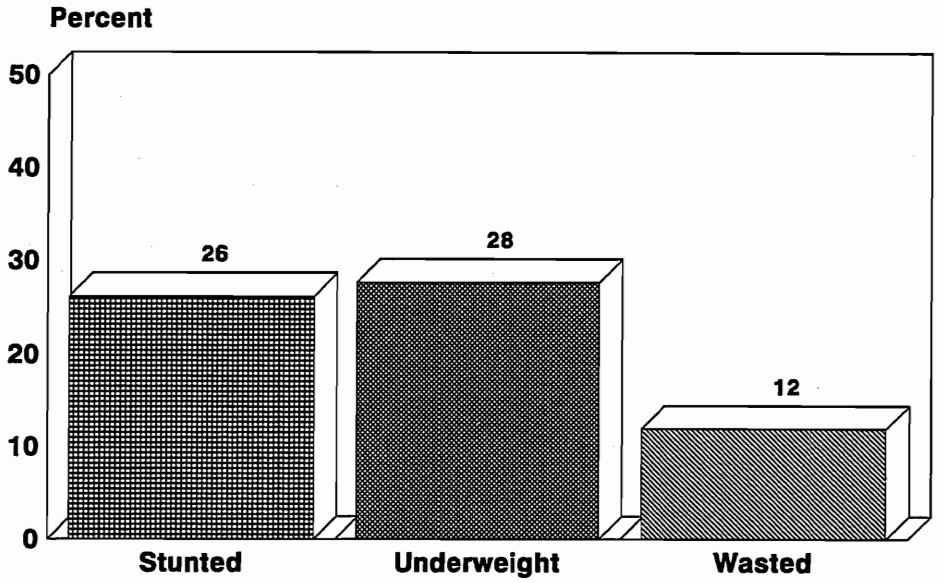
[2] Wasted children are those whose weight-for-height Z score is less than -2 standard deviations of the median based on the NCHS/CDC/WHO reference population.

[3] Underweight children are those whose weight-for-age Z score is less than -2 standard deviations of the median based on the NCHS/CDC/WHO reference population.

[4] The NCHS/CDC/WHO international reference population is useful for comparative purposes because all populations have similar genetic potential for growth.

[5] Children born in the month of interview are included. Only children for whom there are complete data on height, weight, and age are included in the analyses presented in this report. Forty-seven children whose ages were unavailable or incompletely reported were excluded. When these children were included, there were no differences in the results of the analyses conducted.

Figure 2.1 Undernutrition among children age 0 to 35 months, Ghana, 1993



GDHS 1993

Table 2.1 Moderate and severe stunting, underweight, and wasting, by region and residence

Among children age 0 to 35 months, the percentage moderately undernourished and the percent severely undernourished, by region and residence, Ghana 1993

Region and residence	Stunted			Underweight			Wasted		
	Moderate[1]	Severe[2]	Number	Moderate[1]	Severe[2]	Number	Moderate[1]	Severe[2]	Number
Region									
Western	25.4	7.7	169	24.9	9.5	169	11.2	1.8	169
Central	16.2	7.3	191	15.2	6.3	191	8.9	2.6	191
Greater Accra	10.7	5.1	178	14.0	3.4	178	7.3	.6	178
Volta	13.5	6.3	192	16.7	7.3	192	9.4	1.0	192
Eastern	17.2	8.4	203	17.2	3.4	203	5.9	-	203
Ashanti	17.6	10.5	323	16.1	6.5	323	6.5	1.9	323
Brong-Ahafo	15.8	8.7	184	25.5	8.7	184	10.9	2.2	184
Northern	20.7	15.2	184	22.3	19.6	184	11.4	7.6	184
Upper West	19.0	14.3	63	38.1	9.5	63	15.9	4.8	63
Upper East	16.0	9.9	131	23.7	9.2	131	12.2	3.1	131
	p<.003			p<.0001			p<.0001		
Residence									
Urban	11.1	4.6	521	15.0	3.1	521	6.7	1.9	521
Rural	19.5	10.9	1,297	21.6	10.0	1,297	10.2	2.5	1,297
	p<.0001			p<.0001			p<.05		
Overall	17.1	9.1	1,818	19.7	8.0	1,818	9.2	2.3	1,818

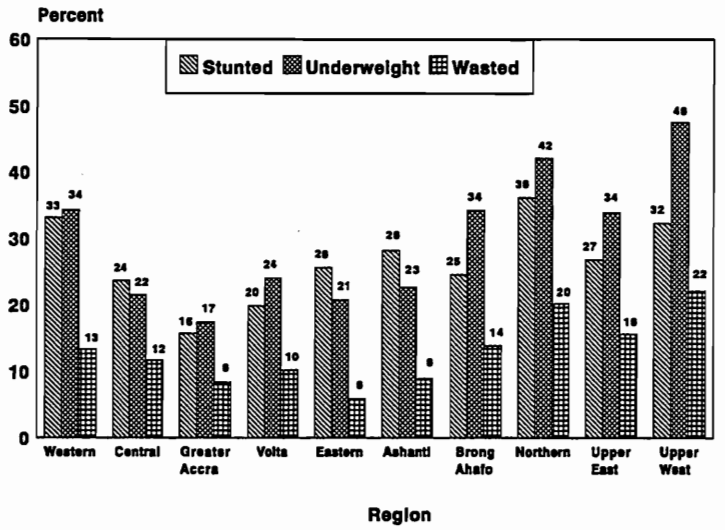
Note: Level of significance determined using Chi-square test.
[1] Between -2 and -3 standard deviations of the median NCHS/WHO/CDC reference population.
[2] Below -3 standard deviations of the median NCHS/WHO/CDC reference population.

2.2 Nonbiological Factors

Geographic Characteristics

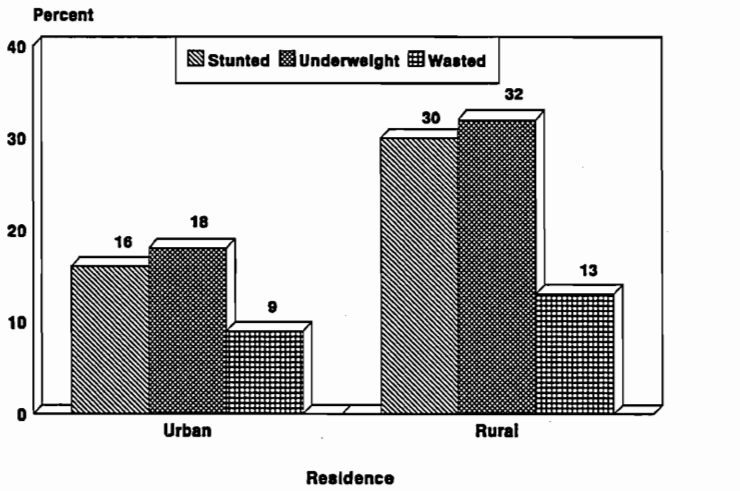
There are noticeable regional differences in nutritional status (Figure 2.2). Undernutrition is highest in the Northern and Upper West regions. In these arid, agriculturally poor areas where households have access to few resources, about one-third of the children are stunted, nearly half are underweight, and one-fifth are wasted.

Figure 2.2 Undernutrition among children age 0 to 35 months by region, Ghana



Both chronic and acute undernutrition are more prevalent among rural children than urban children (Figure 2.3). Compared with urban areas, the prevalence of stunting and underweight is twice as high in rural areas, while wasting is about 40 percent higher in rural areas.

Figure 2.3 Undernutrition among children age 0 to 35 months by residence, Ghana



The Northern region has the highest levels of severe undernutrition (Table 2.1). Here the percentage of severely underweight children is nearly equal to the percentage who are moderately underweight. The Upper West region has the second highest levels of severe stunting and wasting. Severely undernourished children are at much greater risk of morbidity and subsequent

death. Indeed, mortality rates are highest in the Northern, Upper West, and Upper East regions and are higher in rural than in urban areas; these findings are discussed in Chapter 4.

Social and Economic Characteristics

The social and economic data collected in the GDHS that are associated with undernutrition are presented in Table 2.2. Children are less likely to be stunted, that is, chronically undernourished, if their mothers are educated (especially with secondary schooling or more), watch television and listen to the radio regularly, and work outside of the home in a non-farming occupation. They are also less likely to be stunted if their fathers are educated and are not farmers. While parents' occupations are associated with stunting, the net effect depends on two opposing factors: additional income has a positive impact on nutrition, while the loss of time for child care (particularly the mother's) has a negative effect. Thus a child's nutritional status benefits from a job as a professional, clerk, or salesperson, compared to not working. In contrast, working in farming has a negative effect on nutritional status.

Chronic undernutrition is also associated with the number of deceased children a mother has. Children of mothers with two or more dead children are more likely to be stunted than those of mothers with one or no dead children. This reflects the association between poverty, mortality, and malnutrition. The deceased siblings of these stunted children may well have been undernourished.

Factors that affect stunting also affect levels of underweight and wasting, with the exception of whether the mother works away from home. In addition, children of Christian mothers have lower levels of underweight and wasting, and lower levels of wasting are found among children whose mothers are between 20 and 24 years old and who live in single-child homes. Religion and the number of children at home may be proxy variables reflecting a family's economic status.

Other indicators reflecting higher social and economic status and associated with better nutrition include the possession of appliances and availability of electricity (which are measured by the possession score), ownership of a car or motorcycle, having a finished floor (made of ceramic tile or polished wood), having a flush toilet, and having a private tap. Improved pit latrines are also associated with better nutrition as compared to traditional pit latrines or no latrines at all. While improved water and sanitation facilities may reflect higher income, they also have a direct impact on nutritional status because they reduce levels of infectious disease, as discussed in Chapter 4.

Table 2.2 Stunting, underweight, and wasting, by nonbiological factors

Percentage of children age 0 to 35 months who are stunted, underweight, and wasted, by nonbiological factors, Ghana 1993

Nonbiological factor	Stunted	Under-weight	Wasted
Mother's age			
15-19	31.3	25.0	10.2
20-24	28.5	26.1	7.6
25-29	24.2	26.9	11.4
30-34	24.5	27.6	13.7
35-49	26.3	31.7	14.0
n=1818	NS	NS	p<.04
Mother's education			
None	30.7	34.0	14.3
Primary	24.9	25.2	10.3
Secondary+	10.1	11.0	4.6
n=1818	p<.0001	p<.0001	p<.003
Watches TV weekly			
Yes	19.5	19.7	9.3
No	29.4	31.6	12.6
n=1812	p<.0001	p<.0001	p<.05
Listens to radio weekly			
Yes	23.1	22.9	9.4
No	29.2	32.5	13.6
n=1818	p<.004	p<.0001	p<.006
Mother's occupation			
Not working	20.6	23.6	10.2
Professional[1]	19.8	21.9	9.5
Farming	34.3	35.0	13.5
Services/manual	22.2	23.3	11.1
n=1813	p<.0001	p<.0001	NS
Mother works away from home			
Yes	23.3	27.0	13.4
No	29.1	29.5	11.3
n=1437	p<.04	NS	NS
Husband's occupation			
Not working	22.4	22.4	14.3
Professional[1]	16.5	17.9	10.0
Farming	30.7	33.4	13.4
Services/manual	23.7	24.6	9.1
n=1768	p<.0001	p<.0001	NS
Husband's education			
None	31.6	35.0	16.7
Primary	26.0	27.5	9.8
Secondary+	19.2	18.9	9.7
n=1690	p<.0004	p<.0001	p<.0004
Husband lives at home			
Yes	26.4	29.9	12.2
No	23.7	23.2	10.3
n=1663	NS	p<.004	NS
Religion			
None/traditional	29.2	33.3	13.9
Christian	24.8	24.8	10.1
Muslim	29.1	34.7	16.0
n=1813	NS	p<.0004	p<.02

Table 2.2—*Continued*

Percentage of children age 0 to 35 months who are stunted, underweight, and wasted, by nonbiological factors, Ghana 1993

Nonbiological factor	Stunted	Under-weight	Wasted
No. of children at home			
1	27.1	24.0	8.5
2	25.3	27.5	11.4
3	26.5	32.7	16.9
4	28.6	26.9	9.3
5+	24.7	32.0	11.6
n=1818	NS	NS	p<.003
No. dead children			
0	24.5	25.8	10.8
1	24.8	25.4	11.5
2	35.2	42.2	18.0
3+	56.0	56.0	14.0
n=1818	p<.0001	p<.0001	NS
Possession score[2]			
0	31.9	31.7	11.9
1	25.0	27.9	12.1
2+	13.6	17.4	9.6
n=1817	p<.0001	p<.0001	NS
Transport owned			
None	25.4	25.8	10.6
Bicycle	32.5	37.6	16.1
Car/motorcycle	9.1	16.7	6.1
n=1817	p<.0001	p<.0001	p<.006
Drinking water source			
Private tap	11.0	13.6	7.9
Public tap	20.5	21.3	11.7
Protected well	29.7	31.4	10.5
Unprotected well	28.2	32.6	12.8
Surface	30.7	31.3	12.5
n=1817	p<.0001	p<.0001	NS
Type of toilet			
Flush	9.6	4.8	2.4
Improved pit	19.5	21.2	7.4
Traditional pit	28.4	29.3	11.7
None	27.8	31.0	14.0
n=1817	p<.001	p<.0001	p<.003
Type of floor material			
Natural[3]	31.0	30.4	12.4
Cement	27.7	30.6	12.6
Finished[4]	14.2	12.0	5.8
n=1815	p<.0001	p<.0001	p<.006
Overall	26.2	27.7	11.8

Note: Level of significance determined using Chi-square test.
NS = Not significant
[1] Includes professional, clerical, and sales occupations
[2] Score of one for availability/ownership of electricity, radio, television, or refrigerator. Maximum score of 4.
[3] Baked earth/mud
[4] Polished wood, ceramic tile, linoleum, carpet

2.3 Biological Factors

Health Characteristics

Ghanaian children whose mothers received no antenatal care, who were born small or very small at birth, who were born as twins, or who were born less than 3 years after a previous child are more likely to be undernourished than other children (Table 2.3). Antenatal care can prevent low birth weight, birth complications, and poor foetal and maternal health while, at the same time, providing mothers with valuable information about child care, health, and nutrition which can have a long-term positive impact. Infants born small at birth (which include premature births and twins) are vulnerable from the start and are more susceptible to chronic undernutrition and disease than other children. As for long birth intervals, they not only increase the likelihood that children may be breastfed for up to two years but, by limiting family size, also improve the chances that available household resources will meet the family's needs.

Another important factor is whether the child has recently had a fever or a bout of diarrhoea; the GDHS asked about illness during the two weeks preceding the survey. Children with a recent illness, especially with diarrhoea lasting 7 or more days, are more likely to be underweight or acutely undernourished. These results reflect the negative impact of disease on nutritional status. Isolated episodes of illness usually affect short-term, or acute, nutritional status because children catch up in growth. Repeated episodes of disease, however, erode the child's ability to catch up and adversely affect long-term growth.

Overall, among children age 9 months[6] and older, those who have been vaccinated against measles are better nourished than those who are not immunised. The positive association between measles vaccination and nutritional status may reflect the impact of disease on nutrition. Alternatively, it may reflect the quality of maternal care and access to health services, since mothers who immunise their children may be more likely to practise good child care generally or may have better access to health services. It is also possible that measles vaccine has an independent protective effect on child growth.

Table 2.3 Stunting, underweight, and wasting, by biological factors

Percentage of children age 0 to 35 months who are stunted, underweight, and wasted, by biological factors, Ghana 1993

Biological factor	Stunted	Underweight	Wasted
Size of child			
Very small	34.7	52.0	17.3
Small	32.2	32.2	14.7
Average+	25.2	26.2	11.0
n=1816	p<.05	p<.0001	NS
Singleton/Twin			
Singleton	25.3	26.9	11.4
Twin	50.0	50.0	14.7
n=1818	p<.0001	p<.0001	NS
Reason for full weaning			
Maternal factors[1]	44.4	39.1	9.9
Child refused	31.5	33.3	9.3
Age to wean	28.6	22.9	5.5
Currently breastfed	22.6	27.6	13.9
n=1801	p<.0001	p<.002	p<.0001
Diarrhoea (2 weeks)			
None	25.7	25.6	9.7
1-6 days	27.0	33.3	15.8
7+ days	31.1	43.3	26.7
n=1816	NS	p<.0001	p<.0001
Fever (2 weeks)			
Yes	28.3	35.5	15.1
No	25.3	24.7	10.1
n=1812	NS	p<.0001	p<.003
Health card			
Yes	25.6	26.1	11.0
No	28.8	35.0	13.8
n=1816	NS	p<.001	NS
Measles immunisation[2]			
Yes	31.7	31.1	11.4
No	37.6	42.5	16.7
n=1258	p<.04	p<.0001	p<.009
No. antenatal visits			
None	37.5	42.1	17.9
1,2,3	26.8	31.1	12.9
4,5	27.7	28.8	10.3
6,7	24.3	24.3	8.4
8+	16.9	14.5	9.5
n=1818	p<.0001	p<.0001	p<.004
Birth interval (months)[3]			
9-23	32.7	34.7	11.3
24-35	32.7	33.2	12.3
36+	20.3	24.9	12.6
n=1437	p<0.0001	p<.002	NS
Overall	26.2	27.7	11.8

Note: Level of significance determined using Chi-square test.
NS = Not significant
[1] Ill, nipple/breast problem, no milk, working, became pregnant
[2] Children 9 months and older only
[3] Excludes first-born children

[6] Nine months is the age by which a child should be immunised with measles vaccine.

Children are more likely to be undernourished if they were weaned because of maternal factors: because their mothers were pregnant, sick, had breastfeeding problems, or had to return to work. These children are weaned too early and thus are deprived of the full nourishment and protection of breast milk. Children weaned early are unlikely to receive adequate food to replace their mothers' milk.

Table 2.4 Parturition time and type of delivery for children under 3 years

Percentage of children born prematurely and the percentage delivered by caesarean section, by region and residence, Ghana 1993

Region and residence	Born prematurely	Caesarean section
Region		
Western	1.8	2.4
Central	1.6	3.2
Greater Accra	1.7	12.4
Volta	0	1.1
Eastern	2.0	4.0
Ashanti	1.2	4.6
Brong-Ahafo	7.6	6.0
Northern	.5	3.4
Upper West	0	1.6
Upper East	0	2.3
	p<.0001	p<.0001
Residence		
Urban	2.9	8.5
Rural	1.3	2.7
	p<.03	p<.0001
Overall	1.8	4.3
Number	1,814	1,795

Note: Level of significance determined using Chi-square test.

Gestational Age and Birth Weight

Less than two percent of children are reported to have been born prematurely (that is, born before 28 weeks of gestation), and 4 percent were delivered by caesarean section (Table 2.4). Data indicate both regional and residential differences in the prevalence of prematurity and caesarean sections. Prematurity is higher in the Brong-Ahafo region than elsewhere, and caesarean sections occur far more often in Greater Accra than in any other region. Both premature births and caesarean sections are more common in urban than rural areas.

Although about 40 percent of the births included in the GDHS took place in health facilities (GSS and Macro, 1994), mothers were able to report birth weights for only 20 percent of the children (Table 2.5). The mean birth weight for those children is 3.1 ± 0.6 kg. There are regional and residential differences in the proportion of children weighed at birth, with the highest proportion of newborns weighed in the Greater Accra region and five times as many newborns weighed in urban as in rural areas.

Among children weighed at birth, the rate of low birth weight (defined as less than 2.5 kg) is only 1.6 percent. Since this rate is based on only 20 percent of all births, however, it must be interpreted with caution. In Greater Accra, where 69 percent of newborns were weighed, the rate of low birth weight (LBW) is 7.3 percent. LBW is higher among female than male newborns. In full-term infants, LBW is a direct result of poor maternal nutrition during pregnancy.

Twelve percent of the children were perceived by their mothers to be small or very small at birth, and there are regional, residential, and gender differences in reported birth size (Table 2.5). Mothers in the Central, Greater Accra, and Volta regions are less likely to report that their children were small or very small at birth compared to other regions. The Northern region has the highest proportion of newborns reported to be small (17 percent), and the Western region has the highest proportion reported to be very small (10 percent). Mothers in rural areas reported more small or very small newborns than mothers living in urban areas, and twice as many female infants as males were reportedly born small or very small.

Table 2.5 Birth weight and size at birth for children under 3 years

Among children under 3 years, the percentage weighed at birth, mean birth weight, the percentage of low birth weight (LBW) births, and the percentage of births that were average+, small, and very small, Ghana 1993

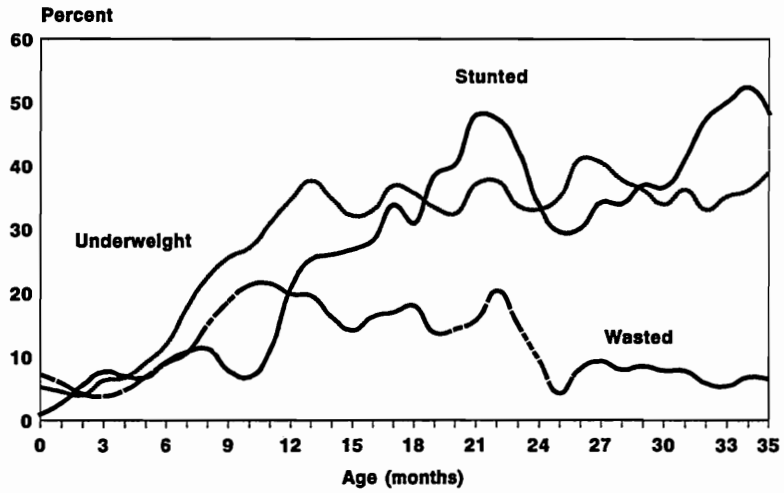
Region, residence, and sex of child	Weighed at birth	Mean weight (kg) and (SD)	LBW[1] births	Size at birth: Average+	Small	Very small	Number
Region							
Western	18.9	3.2 (.8)	2.4	85.2	4.7	10.1	169
Central	12.0	3.2 (.4)	.5	90.6	6.8	2.6	191
Greater Accra	68.5	3.1 (.6)	7.3	93.3	5.6	1.1	178
Volta	5.7	3.4 (.6)	0	95.8	3.1	1.0	192
Eastern	21.7	3.0 (.6)	2.0	89.2	8.9	2.0	203
Ashanti	24.1	3.1 (.6)	1.5	85.4	9.0	5.6	323
Brong-Ahafo	20.7	3.1 (.5)	1.1	82.6	9.8	7.6	184
Northern	6.0	3.2 (.5)	0	80.9	16.9	2.2	184
Upper West	7.9	3.6 (1.3)	0	98.4	1.6	0	63
Upper East	9.2	3.1 (.6)	0	86.3	6.9	6.9	131
	p<.0001		p<.0001			p<.0001	
Residence							
Urban	47.6	3.1 (.6)	3.6	90.6	6.9	2.5	521
Rural	9.9	3.1 (.6)	.8	87.0	8.3	4.8	1,297
	p<.0001		p<.0001			p<.05	
Sex of child							
Male	21.4	3.2 (.6)	1.0	91.4	5.5	3.2	916
Female	20.0	3.0 (.6)	2.2	84.6	10.3	5.1	900
	NS		p<.05			p<.0001	
Overall	20.7	3.1 (.6)	1.6	88.0	7.9	4.1	
Number	1,818	376	1,818	1,598	143	75	1,816

Note: Level of significance determined using Chi-square test.
NS = Not significant
[1] Low birth weight (less than 2.5 kg)

Age-specific Patterns of Undernutrition

GDHS data show a clear age-specific pattern in the prevalence of undernutrition. Stunting, underweight, and wasting each affect 5 to 6 percent of infants during the first six months of life (Figure 2.4 and Appendix Table D.1). The prevalence of stunting continues to rise steadily through the second year of life, peaking at almost 50 percent at the age of 21 months. Wasting follows a different pattern, rising rapidly through infancy and peaking earlier, before the end of the first year, at about 20 percent. It remains at this high level through the second year before declining to about 7 percent in the third year. Underweight (which reflects both chronic and acute nutritional status) follows roughly the same pattern as stunting but peaks earlier, at about 12 months, due to the rapid rise in wasting. Nutritional deprivation and illness experienced during infancy clearly results in long-term growth failure, manifested by the sustained high level of stunting throughout the third year of life. Wasting, in contrast, falls to a low level during the third year due perhaps to physiological adaptation, lessened vulnerability to disease, and children's improved ability to feed themselves and partake in the family diet.

Figure 2.4 Stunting, underweight, and wasting among children age 0 to 35 months, Ghana



GDHS 1993

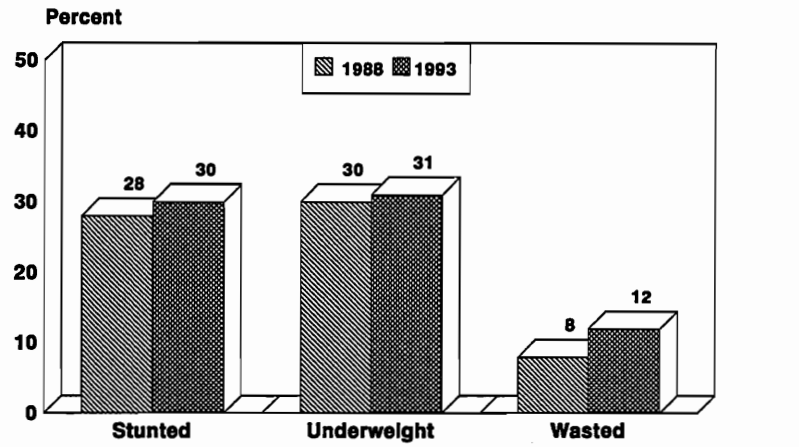
Although chronic undernutrition is a greater nutritional problem in Ghana than acute undernutrition, the prevalence of acute undernutrition is also high: 12 percent among all children age 0 to 35 months and 20 percent among children age 12 to 23 months. Despite significant differences in the prevalence of stunting and wasting between regions and residential areas (Figures 2.2 and 2.3), the age-specific pattern of undernutrition is similar throughout Ghana (Appendix Table D.2). These data indicate that the most critical period of nutritional vulnerability for Ghanaian children is between age 3 months and 2 years. Inappropriate infant and child feeding practices (especially bottle feeding in early infancy), delaying the introduction of complementary solid foods beyond the recommended 4 to 6 months, weaning because of pregnancy and other maternal factors, and feeding too infrequently are strongly associated with the high levels of undernutrition seen in young children.

2.4 Change in Nutrition Indicators Since 1988

Anthropometric results of the 1993 GDHS can be compared with those of the 1988 Ghana Demographic and Health Survey, taking into account some minor differences in methodology between the two surveys. The surveys were conducted at different times of year. Data for the earlier survey was collected during a hot, rainy period (February to June 1988), while the later survey was conducted during a relatively dry period following the harvest (September 1993 to February 1994). In addition, the 1988 survey collected anthropometric data only for children age 3 to 35 months (GSS, 1988). Lastly, hanging spring balance scales were used to weigh children in 1988, whereas electronic walk-on scales were used in 1993. Both surveys used a similar sampling frame.

Figure 2.5 compares 1988 and 1993 levels of stunting, underweight, and wasting among children age 3 to 35 months (that is, among comparable age groups). Since 1988, little change has occurred in the prevalence of stunting and underweight nationwide, but wasting has increased, rising from 8 percent in 1988 to 12 percent in 1993. The trends differ, however, in urban as compared to rural areas. In urban areas, stunting has declined substantially, falling from 25 percent in 1988 to 16 percent in 1993. The level of wasting in urban areas in 1993 (9 percent) remains close to 1988 levels (7 percent). While stunting also has declined in Greater Accra, wasting has almost doubled over the five-year period, rising to a level of 8 percent

Figure 2.5 Undernutrition among children 3 to 35 months, Ghana 1988 and 1993



GDHS 1988, 1993

in 1993. In rural areas, where over two-thirds of the Ghanaian population lives, stunting and underweight have not changed since the 1988 GDHS, but wasting has increased from 8 percent in 1988 to 13 percent in 1993.

The four percentage point increase in the overall prevalence of wasting between 1988 and 1993 deserves attention. Wasting, or acute undernutrition, reflects a recent shortage in available nutrients due either to illness or to insufficent food intake. On a population level, data on wasting must be interpreted with caution. Because the availability of food and the prevalence of illness fluctuate seasonally as well as annually, the level of wasting may vary considerably. In Ghana, the increase in wasting cannot be explained by an increase in diarrhoea, since the 1993 survey found diarrhoea to be almost half as prevalent as in 1988 (see Chapter 4). Moreover, food production appears to have increased in 1993 (Table 1.1). It is also unlikely that the change in the type of scales used to weigh children accounts for the difference, since there is no parallel increase in the prevalence of underweight children (i.e., using weight-for-age data). While an outbreak of disease may have occurred prior to the 1993 survey, it would have had to have been widespread to account for the magnitude of the change recorded. Another possible explanation for the rise in wasting is that malnourished children are more likely to survive today than they were five years ago. Because the surveys did not collect information on cause of death, however, GDHS data cannot determine whether such a change has taken place. Further investigation is warranted to decide whether the apparent increase in the level of wasting is a real trend or whether it reflects problems in data quality or expected fluctuations in acute undernutrition.

CHAPTER 3

INFANT AND CHILD FEEDING PRACTICES

3.1 Initiation of Breastfeeding

The GDHS found that the initiation of breastfeeding in Ghana is almost universal. Fully 99.8 percent of all children under age 3 have been breastfed, and this figure does not differ by region, urban/rural residence, maternal age, occupation, education, source of antenatal care, type of personnel assisting at delivery, or place of delivery (Table 3.1).

Although nearly all women breastfeed their infants, initial breastfeeding practices are far from optimal. Only 16 percent of infants are put to the breast immediately after birth; over half wait 24 hours or more after birth. The remainder, about 30 percent, are put to the breast sometime within the first 24 hours. Children are more likely to be put to the breast immediately if they live in urban areas or in the Central, Greater Accra, Upper West, and Upper East regions. Children are more likely to wait at least 24 hours after delivery before being put to the breast in rural areas and in the Western, Northern, and Upper West regions. Mothers who have no education, deliver at home, are assisted at birth by a traditional birth attendant or a relative, and receive no antenatal care also are more likely than others to delay breastfeeding for 24 hours.

Both cultural practices and information provided by health workers influence the timing of the first breastfeed. There is a negative attitude toward feeding colostrum to infants in Ghana, especially in the north where colostrum is believed to be harmful to the baby. Some Ghanaians believe that anyone who advises a mother to give colostrum wishes the baby ill. In some areas in the north, colostrum is given to a newborn only after a test is performed to show that it is not bitter and that it is healthy. In the forest and coastal regions, many mothers delay breastfeeding until their full milk flow is established, not because they are against feeding colostrum, but because they do not want the child to suck air. Misinformed health workers sometimes reinforce these practices. A study by the Nutrition Division of the Ministry of Health, for example, revealed that health workers believe that nothing should be administered by mouth to newborn babies for at least six hours after delivery (Ministry of Health, 1989a). Health workers may also advise mothers to give their infants sugar water during the first few days of life (Ministry of Health, 1989b).

The proportion of Ghanaian children who are not breastfed for 24 hours after delivery and do not receive colostrum is unacceptably high. Many newborns do not receive colostrum at all, and only a small percentage receive its full nutritional and immunological benefits by being put to the breast immediately after birth. Liquids and foods given to newborns before breastfeeding is initiated put them at great risk of diarrhoeal infection from pathogen exposure. Efforts to correct these practices need to address both cultural beliefs and the quality of services offered to mothers during the perinatal period.

Table 3.1 Initial breastfeeding

Percentage of children under 3 years who were ever breastfed and the percentage who started breastfeeding immediately, within 24 hours, and after 24 hours or more, by background factors, Ghana 1993

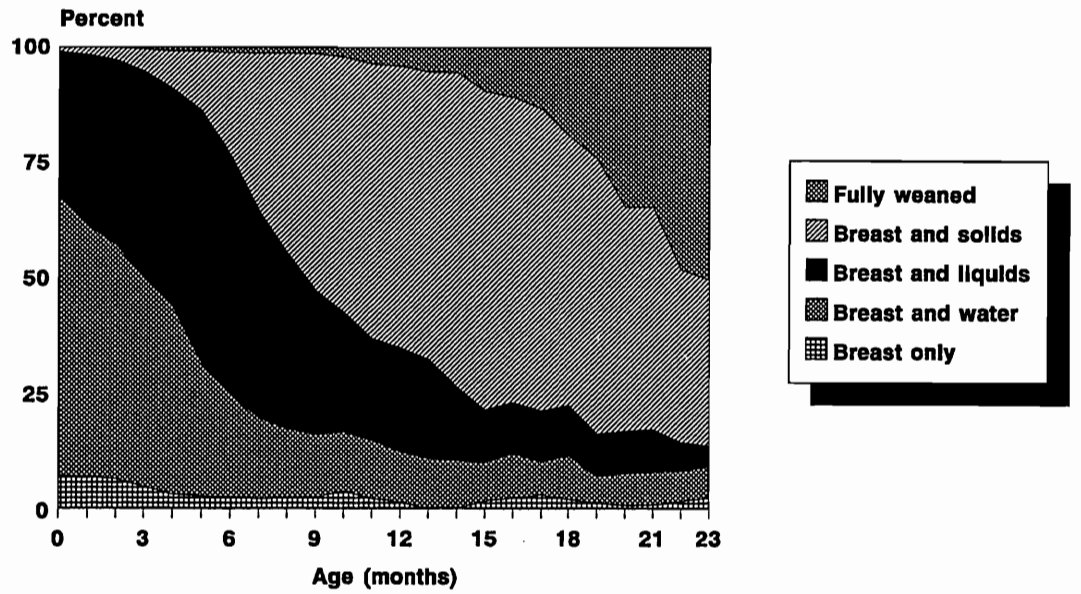
Background factor	Ever breastfed	Started breastfeeding: Immediately	First 24 hours	After 24 hours	Number
Region					
Western	100.0	15.6	14.4	70.1	167
Central	100.0	30.9	29.3	39.8	191
Greater Accra	99.4	22.4	39.1	38.5	174
Volta	100.0	13.1	54.5	32.5	191
Eastern	100.0	10.8	36.5	52.7	203
Ashanti	100.0	13.3	28.8	57.9	323
Brong-Ahafo	99.5	16.6	28.2	55.2	181
Northern	99.5	5.5	23.5	71.0	183
Upper West	100.0	20.6	11.1	68.3	63
Upper East	100.0	22.1	20.6	57.3	131
	NS		p<.0001		
Residence					
Urban	99.8	20.0	33.7	46.2	519
Rural	99.8	14.9	28.9	56.2	1,288
	NS		p<.0004		
Mother's education					
None	99.9	15.0	25.1	59.9	688
Primary	99.9	17.5	33.6	48.9	1,011
Secondary+	99.1	14.8	31.5	53.7	108
	NS		p<.0004		
Place of birth					
At home	99.9	14.7	26.0	59.3	1,019
Public facility	99.7	18.7	37.3	44.0	582
Private facility	100.0	18.0	31.6	50.5	206
	NS		p<.0001		
Assistance at delivery					
Nurse/doctor	100.0	21.0	30.9	48.1	291
Midwife	99.6	17.8	38.6	43.6	505
Trained TBA[1]	100.0	7.9	32.1	60.0	265
Untrained TBA[1]	100.0	15.5	22.4	62.0	245
Relative	99.8	18.0	24.8	57.1	399
No one/other	100.0	13.7	22.5	63.7	102
	NS		p<.0001		
Source of antenatal care					
Doctor	99.8	21.4	31.4	47.3	491
Nurse	99.8	15.2	29.8	54.9	650
Midwife	99.8	13.8	33.6	52.7	429
Other/No one	100.0	13.9	23.2	62.9	237
	NS		p<.0005		
Overall	99.8	16.4	30.3	53.3	1,813

Note: Level of significance determined using Chi-square test.
NS = Not significant
[1]Traditional birth attendant

3.2 Exclusive Breastfeeding

WHO recommends that all infants be exclusively breastfed during the first 4 to 6 months of life. Even though breastfeeding is universal in Ghana, only 8 percent of infants under age 4 months are exclusively breastfed (Figure 3.1 and Appendix E). While this percentage is low, it is four times the 1988 level of exclusive breastfeeding, which was 2 percent. Over half of all infants are given water in addition to breast milk (a combination known as full breastfeeding), while another 40 percent receive other liquids in addition to water.

Figure 3.1 Breastfeeding Practices by Age, Ghana

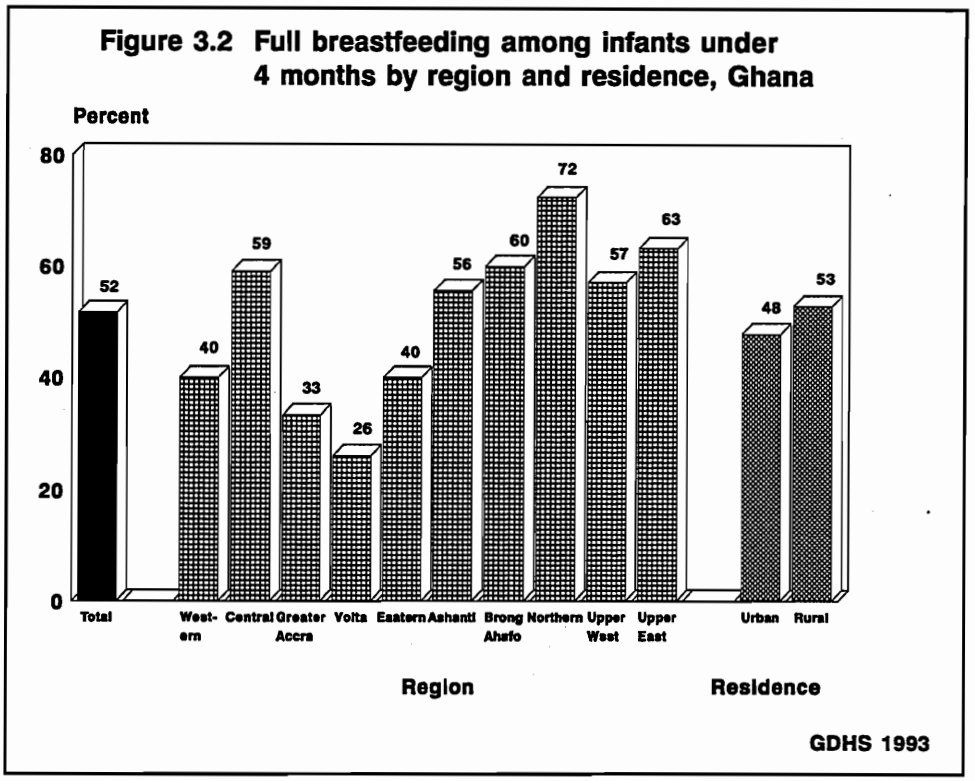


GDHS 1993

The proportion of infants who are fully breastfed ranges from 26 percent in the Volta region to 72 percent in the Northern region and is slightly higher in rural than in urban areas (Figure 3.2). Many mothers are opposed to the idea that breast milk is a complete food and that the infant does not need additional water. They believe that a baby should be given water when it is thirsty, especially after a nap. Because it is customary in Ghana to give water to welcome a visitor to the home, newborn babies are often given water as a welcoming gesture. People in the north commonly believe that a person who advises against giving water to a baby must not have the welfare of the baby at heart. Many health workers believe that mothers will resist the recommendation to give breast milk only, without any additional water, during the first four months of life.

There are several possible reasons why infants may not be fully breastfed. Some mothers believe that the child needs other liquids or foods in addition to breast milk and water. Others want to accustom the child to foods other than breast milk before returning to work. Some mothers feel they do not have enough milk to satisfy a child. Still others want to be able to leave food for their babies when they go out and leave their babies at home.

The introduction of plain water, other liquids, or complementary solid foods to breastfed infants under the age of 4 months spurs three major nutritional concerns. First, the liquid and solid foods offered are nutritionally inferior to breast milk. Second, infants take less breast milk when other liquids and solid foods are introduced; this reduces the mother's milk supply since the frequency and intensity of suckling determines, in part, the amount of breast milk produced. Third, feeding young children liquids other than water and solid foods increases their exposure to pathogens and consequently puts them at higher risk of diarrhoeal disease.



Giving plain water to young infants in tropical climates is not only an established cultural pattern, but also has been an accepted medical practice. Recent research, however, has conclusively established that healthy infants who are exclusively breastfed do not need additional water (Sachdev et al., 1992).

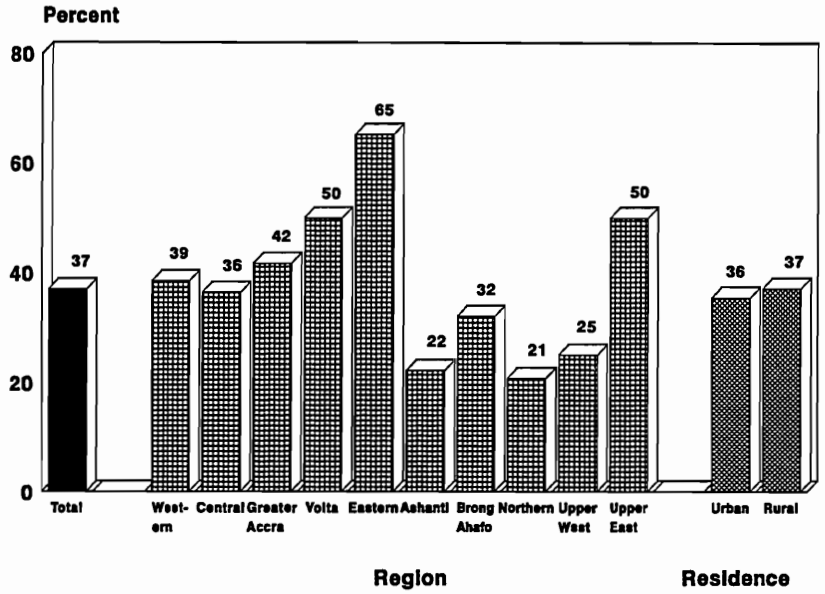
3.3 Introduction of Complementary Solid Foods

WHO recommends that solid foods be introduced to infants between the ages of 4 and 6 months because breast milk alone is no longer sufficient for optimal growth. In Ghana, only 37 percent of infants age 6 to 9 months are fed according to these recommendations: 43 percent are given breast milk and other liquids, while 20 percent receive only breast milk and water (Figure 3.1 and Appendix E). These results represent a considerable change in feeding practices since the 1988 GDHS. In 1988, 57 percent of infants 6 to 9 months of age were fed according to WHO recommendations, while 23 percent were given breast milk and other liquids (Macro International, 1993). It is possible that an increased emphasis on exclusive breastfeeding has led women to introduce solid foods later in infancy.

Considerable regional variations exist in feeding practices for infants 6 to 9 months old, but there is no difference between urban and rural areas (Figure 3.3). In the Ashanti, Northern, and Upper West regions only one-fourth or fewer infants are fed according to the current WHO recommendations, compared to half or more in the Volta, Upper East, and Eastern regions.

Mothers all over Ghana generally begin complementing their infants' diets with a watery porridge made from millet in the northern savannah zone and from maize in the forest and coastal zones. Mothers offer solid foods when the child shows interest in foods that others are eating, reaches for food, is old enough, is able to eat solids, or refuses to eat the porridge. Recently, the Ministry of Health, with support from UNICEF, the World Bank, and WHO, introduced a cereal-legume mixture for young children which has a better energy and protein content than maize porridge.

Figure 3.3 Breastfeeding with complementary solid foods among Infants age 6 to 9 months by region and residence, Ghana

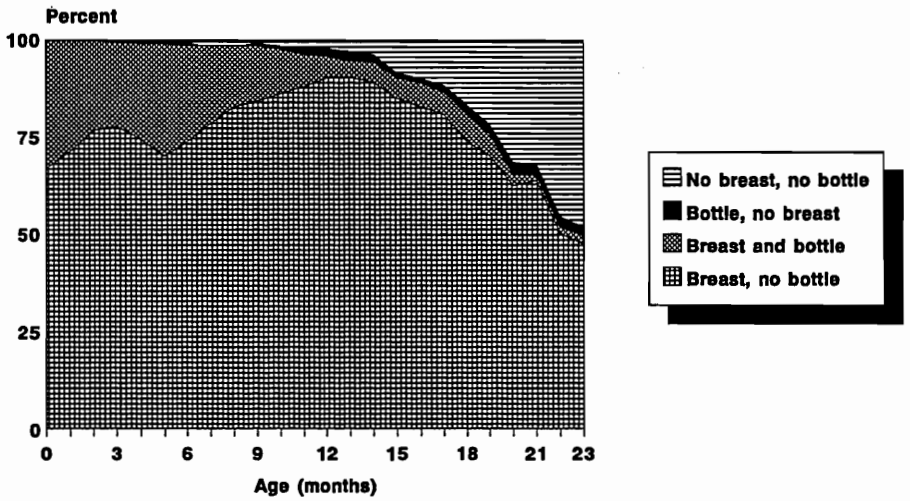


GDHS 1993

3.4 Bottle Use

GDHS data show that bottle feeding is practised widely in infancy, especially during the first 6 months of life. One-third of infants less than 2 months old are fed with a bottle (Figure 3.4). Bottle use diminishes with increasing age but, even in the second half of infancy, 16 percent of children receive a bottle.

Figure 3.4 Bottle Feeding Practices by Age, Ghana



GDHS 1993

As shown in Table 3.2, bottle use is most common among infants in the Central, Greater Accra, Eastern, and Ashanti regions and in rural areas. Children are most likely to receive a bottle if their mothers are educated, either do not work or hold a professional, clerical, or sales job, are Christian, have a possession score of 2 or more, received antenatal care from a doctor, made numerous antenatal visits, were assisted at birth by a "modern" attendant (especially a doctor or nurse), or were delivered in a modern health facility. These results reflect the association between wealth and bottle use as well as the influence of the modern health sector in encouraging the bottle use.

All the factors associated with bottle feeding were considered together in order to develop a logistic regression model to predict the risk of bottle use in children under 12 months of age (see Appendix F for an explanation of logistic regression models). The likelihood of bottle use is shown as "net relative risk" in Table 3.2. When the regression estimate of relative risk is greater than one, children with that background factor are more likely to be fed a bottle than children from the reference category (whose risk is set at 1.0). Thus, in Ghana, infants age 0 to 5 months are twice as likely to be fed a bottle as infants age 6 to 11 months. Children in the Central, Eastern, Greater Accra, and Ashanti regions are up to 3 times more likely to be fed a bottle than children elsewhere. A mother's primary education doubles a child's risk of being fed a bottle compared to children of uneducated or highly educated mothers. Also, the risk is 40 percent higher for children of non-working women relative to children of women working in farming or other occupations and 45 to 70 percent higher among children whose mothers made 4 or more antenatal visits relative to those who made between 1 and 3 visits. Children of mothers who receive no antenatal care are 90 percent less likely to receive a bottle than when a doctor provides antenatal care; risk is also significantly reduced, by about 35 percent, when a midwife provides antenatal care. The 25 percent decline in risk when a nurse provides antenatal care is not significant.

These results indicate that bottle use is highest among the youngest infants; in more affluent regions; among mothers with some, but not a lot of, education; among non-working women who may have the time and money to feed with bottles; and among women with more exposure to modern health sector personnel who, apparently, encourage bottle use. Women with primary education may be swayed by the marketing and promotion of bottles as a status symbol. In contrast, women with higher education, who know that breast milk is best, may resist these influences. Benefo and Parnell (1991) have reported that education and rural/urban residence are measures of social status and exposure to modernising influences, suggesting that the general phenomenon of "modernisation" or "westernisation" may have a stronger influence on infant feeding than the day-to-day demands of the mother's work schedule. Child care and living arrangements are other factors that influence infant feeding.

As for regional differences, many mothers in the coastal and forest zones use bottles to give water or porridge when the babies are very young or to carry food when they go out with their babies (Ministry of Health, 1989a). Mothers usually have one bottle, which they generally rinse with soap and water before each use.

Table 3.2 Prevalence and net relative risk of bottle use

Percentage of children 0 to 11 months using a bottle and the net relative risk of using a bottle, by background factors, Ghana 1993[1]

Background factor	Bottle use	Net relative risk
Age of infant		
0-5 months	26.3	1.000[a]
6-11 months	16.3	.549
	p<.01	
Wasted		
Yes	11.9	
No	22.4	
	p<.05	
Region		
Western	22.0	2.018
Central	30.8	2.936[b]
Greater Accra	35.3	2.280
Volta	17.1	1.729
Eastern	31.3	3.008[b]
Ashanti	26.7	2.322[b]
Brong-Ahafo	15.5	1.311
Northern	4.9	.617
Upper West	4.8	.459
Upper East	10.7	1.000[a]
	p<.0001	
Residence		
Urban	36.2	
Rural	16.0	
	p<.0001	
Mother's education		
None	11.5	1.000[a]
Primary	27.8	2.167[b]
Secondary+	26.8	1.243
	p<.0001	
Mother's occupation		
Farmer	13.2	1.000[a]
Not working	30.1	1.438
Professional[2]	27.1	1.108
Services/manual	18.0	.881
Religion		
None/traditional	13.7	
Christian	24.9	
Muslim	16.3	
	p<.0008	

Table 3.2—*Continued*

Percentage of children 0 to 11 months using a bottle and the net relative risk of using a bottle, by background factors, Ghana 1993

Background factor	Bottle use	Net relative risk
Possession score[3]		
0	17.4	
1	19.6	
2+	35.3	
	p<.002	
Antenatal care		
Doctor	32.7	1.000[a]
Nurse	22.2	.769
Midwife	18.2	.636[b]
Other/No one	6.9	.094[b]
	p<.0001	
Number of antenatal visits		
1,2,3	16.5	1.000[a]
4,5	28.2	1.719[b]
6,7	18.1	.972
8+	33.3	1.449
Assistance at delivery		
Nurse/doctor	32.0	
Midwife	26.5	
Trained TBA[4]	20.4	
Untrained TBA[4]	14.1	
Relative	14.1	
No one/Other	17.5	
	p<.003	
Place of delivery		
At home	15.9	
Public facility	29.4	
Private facility	27.6	
	p<.003	

Note: Level of significance determined using Chi-square test.
[1] Analysis based on 665 children
[2] Includes professional, clerical, and sales occupations
[3] Score of one for availability/ownership of electricity, radio, television, or refrigerator. Maximum score of 4.
[4] Traditional birth attendant
[a] Overall p<0.05
[b] p<0.05 compared with reference category

3.5 Full Weaning

The median duration of full breastfeeding in Ghana is two months (Table 3.3). There are wide regional differences, with duration ranging from a low of 0.5 months in the Volta and Brong-Ahafo regions to a high of 6.1 months in the Northern region. A child is likely to be fully breastfed for a longer period of time if it is female, lives in a rural area, has an uneducated mother, or was delivered with the assistance of an untrained traditional birth attendant (TBA) or relative.

The median duration of any breastfeeding (whether full or partial) of children under 3 years of age is 21 months. Female children and children living in rural areas are likely to be breastfed for longer. There are also regional differences, with the median duration ranging from less than 20 months in the Greater Accra and Volta regions to almost 30 months in the Upper West and Upper East regions. As the mother's level of education increases, the duration of breastfeeding declines. Children are also likely to be breastfed longer if their mothers were assisted at delivery by a TBA or relative rather than a nurse, doctor, or midwife.

Among the 1,678 last-born children under 3 years of age in the GDHS, one-third are fully weaned (Table 3.4). Nearly one-fourth of the weaned children are less than 2 years old, contrary to the international recommendation that children should be breastfed through the first two years of life. About 15 percent of children between 2 and 3 years of age are not fully weaned; thus they are breastfed longer than is recommended.

Mothers cite various reasons for fully weaning their children. Mothers of one-fourth of children stopped breastfeeding their last child because of maternal factors, including pregnancy, the need to return to work, illness, or problems with the breast or nipple (Table 3.4). Nine percent of children refused the breast. For the majority of children (66 percent), however, weaning came when mothers felt their children were at the appropriate age. Mothers are less likely to cite the child's age and more likely to cite maternal reasons if they live in the Upper West and Upper East regions. Conversely, mothers in the Western, Central, Volta, Eastern, and Ashanti regions are more likely than mothers elsewhere to wean their children because they are at the appropriate age.

Education and the child's nutritional status are also associated with the mother's reason for weaning. Mothers with no education or with a secondary education are less likely to cite the child's age than mothers with primary education. Children who are stunted or underweight also are less likely to be weaned because they are at the appropriate age; they are more likely to be weaned for maternal reasons.

Table 3.3 Median duration of breastfeeding

Median duration of breastfeeding among children under 3 years, by selected background factors, Ghana 1993

Background factor	Median duration of breastfeeding (months)		Number
	Any	Full[1]	
Sex of child			
Male	21.0	1.9	1131
Female	22.0	2.1	1072
Region			
Western	20.3	1.5	206
Central	20.5	3.2	231
Greater Accra	15.8	1.2	199
Volta	21.8	0.5	239
Eastern	18.7	2.0	238
Ashanti	21.3	3.2	399
Brong-Ahafo	22.8	0.5	211
Northern	23.3	6.1	255
Upper West	29.7	5.3	77
Upper East	28.8	4.7	148
Residence			
Urban	18.9	1.5	613
Rural	22.8	2.3	1590
Mother's education			
None	23.2	3.5	876
Primary	21.1	1.6	1105
Secondary+	16.5	.6	122
Assistance at delivery			
Nurse/doctor	19.7	1.1	551
Midwife	19.5	2.0	413
Trained TBA[2]	23.1	2.7	341
Untrained TBA	23.6	4.9	335
Relative	23.1	3.1	431
No one/other	21.3	.8	107
Overall	21.4	2.0	2203

Note: Medians are based on current status.
[1]Full breastfeeding includes exclusively breastfed children and those who received water in addition to breastfeeding. Medians for exclusive breastfeeding are not shown due to very few children being exclusively breastfed.
[2]Traditional birth attendant

Source: Ghana Statistical Service, 1994

Undernutrition in Ghana is manifested very early in life. Much of the problem is associated with poor infant and child feeding practices. Efforts to improve these practices need to focus on:

- Ensuring that breastfeeding is initiated immediately after birth,
- Prolonging the duration of exclusive breastfeeding,

Table 3.4 Reason for fully weaning last-born child

Among last-born children under 3 years, the percentage fully weaned because of maternal factors, the percentage fully weaned because of child factors, and the percentage weaned because mother considered it time to wean, by selected background factors, Ghana 1993

Background factor	Maternal factors[1]	Child refused	Time to wean	Number
Region				
Western	19.0	4.8	76.2	63
Central	24.3	2.7	73.0	74
Greater Accra	32.9	11.4	55.7	79
Volta	19.3	7.0	73.7	57
Eastern	19.3	6.8	73.9	88
Ashanti	20.8	10.8	68.3	120
Brong-Ahafo	33.3	10.0	56.7	60
Northern	31.4	17.1	51.4	35
Upper West	50.0	10.0	40.0	10
Upper East	35.3	23.5	41.2	17
		p<.02		
Child's age (months)				
0-11	50.0	25.0	25.0	4
12-17	58.3	16.7	25.0	24
18-23	27.8	5.6	66.7	108
24-29	24.2	8.6	67.2	244
30-35	20.6	9.9	69.5	223
		p<.001		
Mother's education				
None	28.5	14.5	57.0	179
Primary	22.7	6.7	70.7	375
Secondary+	30.6	6.1	63.3	49
		p<.006		
Stunted				
Yes	33.8	8.6	57.6	198
No	20.7	9.1	70.1	405
		p<.002		
Underweight				
Yes	35.1	10.7	54.2	168
No	21.1	8.3	70.6	435
		p<.0005		
Overall	25.0	9.0	66.0	603

Note: Analysis is based on 1,678 last-born children. Level of significance determined using Chi-square test.
[1] Ill, nipple/breast problem, no milk, working, became pregnant

- Advising mothers and health personnel when to introduce complementary foods,
- Improving the nutritional content of complementary foods,
- Discouraging the use of bottle feeding,
- Revising the pre-service curricula of health and other allied institutions (such as agricultural colleges and teacher training colleges) to include child feeding practices, and
- Instituting periodic in-service training on child feeding practices for existing health and extension workers.

CHAPTER 4

MORTALITY AND HEALTH

4.1 Infant and Under-five Mortality

Infant and child mortality in Ghana have declined in recent years. According to the 1993 GDHS, 75 out of every 1,000 children born die before reaching their first birthday, and 133 out of every 1,000 die before reaching the age of five (Table 4.1). Infant mortality has fallen 7 percent since 1988, when it stood at 81 per 1,000, and under-five mortality has fallen by 14 percent from the 1988 rate of 154 per 1,000. Despite this decline, Ghana still has one of the highest mortality rates in the world and is far from achieving the targets set by the 1990 World Summit for Children: the reduction of infant mortality to 50 per 1,000 live births and of under-five mortality to 70 per 1,000 live births by the year 2000. Most of these infant and child deaths have been attributed to malaria, measles, tetanus, acute respiratory infections, diarrhoea, low birth weight, and malnutrition (Republic of Ghana, 1992a).

Infant and under-five mortality rates vary widely by region and by urban-rural residence. Mortality rates generally are higher in the north than in the south. The Northern region has the highest rates: 114 infant deaths and 237 under-five deaths per 1,000 live births. These are more than 50 percent higher than the national figures. Mortality rates in the Upper East and Upper West regions are also significantly higher than those in the rest of the country. In contrast, the Brong-Ahafo and Eastern regions have the lowest infant and under-five mortality rates in Ghana. As for urban-rural residence, infants and young children in rural areas experience mortality rates that are one and a half times higher than those in urban areas.

Differentials in infant and under-five mortality rates also exist for mother's education, mother's age, child's birth order, preceding birth interval, and child's sex. Mortality rates are higher for infants and children whose mothers are under age 20 or over age 40, whose mothers have at most a primary education, who are of seventh or higher birth order, who were born within two years of the preceding birth, and who are male. These findings are consistent with other studies associating young maternal age, low maternal education, high parity, and birth intervals of less than two years with an increased risk of infant and under-five mortality (Batse, 1986; GSS, 1989).

Table 4.1 Infant and under-five mortality rates

Infant and under-five mortality rates for the ten-year period preceding the survey, by selected background factors, Ghana 1993

Background factor	Mortality rates (per 1000) Infant	Under-five
Region		
Western	76.3	131.8
Central	71.6	128.0
Greater Accra	58.4	100.2
Volta	77.8	116.4
Eastern	55.9	93.2
Ashanti	65.2	97.6
Brong-Ahafo	48.7	94.6
Northern	113.7	237.0
Upper West	(84.5)	(187.7)
Upper East	105.0	180.1
Residence		
Urban	54.9	89.9
Rural	82.2	149.2
Mother's education		
None	87.1	165.7
Primary	85.8	141.2
Middle/JSS	55.4	89.0
Secondary+	(28.2)	(40.7)
Mother's age at birth		
<20	91.3	160.9
20-29	69.2	126.6
30-39	70.3	124.1
40-49	(122.1)	(174.5)
Birth order		
1	77.0	136.9
2-3	69.1	118.6
4-6	63.8	132.0
7+	115.3	171.1
Previous birth interval		
<2 years	117.3	197.4
2-3 years	67.9	123.3
4 years+	50.7	88.0
Sex of child		
Male	79.2	137.5
Female	70.1	127.9
Overall	74.7	132.8

Note: *Infant mortality rate:* the probability of dying before the first birthday; *under-five mortality rate:* the probability of dying before the fifth birthday. Rates based on fewer than 500 cases (exposed persons) are enclosed in parentheses.

4.2 Morbidity and Use of Health Facilities

Common childhood diseases such as diarrhoea, malaria, acute respiratory infection (ARI), and measles have been shown to worsen nutritional status by diminishing food intake and impairing nutrient utilization (Martorell, 1982). Both the incidence and severity of infectious diseases affect a child's nutritional status. Moreover, the extent to which infection and undernutrition interact is influenced by season. Undernutrition in Ghana increases during the lean season stretching from February to July when food availability is lowest. During the rainy season (approximately May to November in the north and May to September/October in the south), the increased prevalence of diarrhoea and malaria exacerbates undernutrition. Acute respiratory infections erode nutritional status in the cool, dry months from December through March when they are most prevalent.

Twenty-one percent of the children had diarrhoea, 28 percent had fever, and 23 percent had cough in the two weeks preceding the GDHS (Table 4.2). Similar findings have been reported by the Ministry of Health (1994); outpatient statistics for the whole country indicate that malaria (the most frequent cause of fever) is the most common cause of morbidity, followed by acute respiratory infection and diarrhoeal disease. GDHS data show significant regional and urban/rural differences in the prevalence of these diseases.

Mothers were more likely to seek treatment for their children for fever or cough than for diarrhoea. As Table 4.2 shows, treatment was sought for just over half of the children with a recent history of diarrhoea but for 64 percent of those with fever or cough. The use of oral rehydration therapy (ORT) and home remedies may explain why mothers seek treatment less frequently for diarrhoea than for other illnesses. It

Table 4.2 Prevalence and treatment of diarrhoea, fever, and cough

Percentage of children under 3 years with diarrhoea, fever, and cough in the two weeks preceding the survey and whether treatment was sought, by region and residence, Ghana 1993

Region and residence	Percentage of children with:				Advice/treatment sought for:			
	Diarrhoea	Fever	Cough	Number	Diarrhoea	Number	Fever/ Cough	Number
Region								
Western	21.3	29.0	16.0	169	65.7	35	80.6	67
Central	17.8	14.7	12.6	191	41.2	34	54.5	44
Greater Accra	16.9	15.7	28.1	178	56.7	30	61.9	63
Volta	19.8	48.4	43.8	192	31.6	38	45.2	126
Eastern	14.8	27.7	16.7	203	63.3	30	76.1	71
Ashanti	17.0	18.0	15.2	323	56.4	55	74.7	87
Brong-Ahafo	20.2	17.7	23.5	183	59.5	37	69.2	65
Northern	40.4	40.8	29.9	183	47.3	74	50.5	99
Upper West	14.3	24.6	11.1	63	37.5	8	70.6	17
Upper East	24.4	48.9	38.2	131	56.3	32	80.0	75
	p<.0001	p<.0001	p<.0001		NS		p<.0001	
Residence								
Urban	17.5	20.7	22.3	521	54.9	91	66.9	178
Rural	21.9	30.2	23.7	1295	51.1	282	63.6	536
	p<.04	p<.0001	NS		NS		NS	
Overall	20.6	27.5	23.3		52.0		64.4	

Note: Level of significance determined using Chi-square test.
NS = Not significant

is also possible that mothers do not perceive diarrhoea to be an illness; according to a study conducted by the Ministry of Health (1989b), mothers commonly believe that diarrhoea is caused by teething or bad food. Once the food is withdrawn or the teething stage is passed, mothers assume the child will be well. Other mothers believe that diarrhoea is transitory and part of the process of introducing complementary foods to infants and young children. Regional variations exist in the proportion of children who are brought for treatment for childhood fever and cough, but not for diarrhoea. Rural-urban residence had no impact on the likelihood of seeking treatment for any illness.

UNICEF (1995) reports that only 60 percent of Ghanaians had access to health services between 1985 and 1993. The distribution of health facilities, however, does not parallel GDHS figures on the proportion of mothers seeking treatment for their children's cough or fever. For example, Volta has the largest number of health service institutions in the country, but the proportion of mothers seeking treatment there for fever and cough (45 percent) is the lowest of all regions. This disparity may be due to the lack of financial resources in this region; households may be unable to pay for medical care.

Economic pressures and the mother's perception of a disease episode may explain the failure of mothers to take their sick children to a health facility. As mentioned above, some women view diarrhoea, fever, and cough as minor illnesses associated with teething and bad food. Due to the high cost of living, mothers also need to spend more time on economic activities to ensure the survival of their families. The introduction in 1992 of the "cash and carry" system raised additional economic barriers for patients; patients are now expected to pay the full cost of prescribed drugs in order to ensure a continuous supply of essential drugs to health facilities. In the past, drugs were supplied to patients free of charge in all government health service institutions; patients only paid for drugs that were not available at the health facility.

The distribution of sick children by source of treatment shows that eight out of ten children treated for fever or cough obtain care from modern health care facilities (that is, public and private hospitals, clinics, health centres, pharmacies, community health workers, and mobile clinics) (Table 4.3). Health services in Ghana are provided by the Ministry of Health, quasi-government agencies, non-governmental organisations, and private individuals. The government is the largest provider of health services, so it is not surprising that nearly half the sick children (48 percent) receive care from public health facilities. Dependence on traditional practitioners is very low (6 percent), especially in urban areas.

The source of treatment for fever and cough varies by region and by urban/rural residence. Generally, children living in the southern part of Ghana are more likely to be taken to modern health care facilities and less likely to be taken to traditional practitioners than children in the north. This may reflect differences in the availability of modern health care facilities. Urban children are also more likely to be taken to modern health care facilities for treatment than rural children.

Children were less likely to be treated at a modern health facility if they suffered from diarrhoea than if they suffered from fever or cough: 69 percent of all children treated for diarrhoea received care at a modern facility, compared with 85 percent of all children treated for fever or cough (Tables 4.3 and 4.4). While there were no significant regional differences, urban children (84 percent) were more likely than rural children (63 percent) to attend modern health care facilities for treatment of diarrhoea. Not surprisingly, rural children were seven times as likely as urban children to be sent to traditional practitioners for treatment of diarrhoea.

Table 4.3 Source for treatment of fever and cough

Percentage of children under 3 years sick with fever/cough whose mothers sought treatment/advice from various sources, by region and residence, Ghana 1993

Region and residence	Public facility[1]	Private facility[2]	Traditional practitioner	Other private[3]	Number	Inter-region/ residence difference
Region						
Western	27.8	51.9	3.7	16.7	54	
Central	45.8	45.8	4.2	4.2	24	
Greater Accra	64.1	33.3	NA	2.6	39	
Volta	52.6	35.1	5.3	7.0	57	
Eastern	70.4	24.1	1.9	3.7	54	
Ashanti	49.2	27.7	9.2	13.8	65	
Brong-Ahafo	31.1	44.4	11.1	13.3	45	
Northern	32.0	56.0	6.0	6.0	50	
Upper West	58.3	25.0	8.3	8.3	12	
Upper East	51.7	33.3	10.0	5.0	60	p<.002
Residence						
Urban	61.3	26.9	5.0	6.7	119	
Rural	42.8	41.6	6.5	9.1	341	p<.007
Overall	47.6	37.8	6.1	8.5	460	

Note: Level of significance determined using Chi-square test.
[1] Public hospital, health center, clinic, health post, community health worker
[2] Private hospital, doctor, clinic, pharmacy
[3] Shop, store

Table 4.4 Source for treatment of diarrhoea

Percentage of children under 3 years with diarrhoea whose mothers sought treatment/advice from various sources, by region and residence, Ghana 1993

Region and residence	Public facility[1]	Private facility[2]	Traditional practitioner	Other private[3]	Number
Region					
Western	21.7	30.4	8.7	39.1	23
Central	50.0	28.6	7.1	14.3	14
Greater Accra	41.2	29.4	11.8	17.6	17
Volta	25.0	25.0	16.7	33.3	12
Eastern	26.3	52.6	10.5	10.5	19
Ashanti	38.7	19.4	12.9	29.0	31
Brong-Ahafo	36.4	31.8	13.6	18.2	22
Northern	22.9	57.1	5.7	14.3	35
Upper West	66.7	NA	NA	33.3	3
Upper East	44.4	33.3	16.7	5.6	18
		NS			
Residence					
Urban	52.0	32.0	2.0	14.0	50
Rural	27.1	36.1	13.9	22.9	144
		p<.004			
Overall	33.5	35.1	10.8	20.6	194

Note: Level of significance determined using Chi-square test.
NS = Not significant
[1] Public hospital, health center, clinic, health post, community health worker
[2] Private hospital, doctor, clinic, pharmacy
[3] Shop, store

Two of every five children who had diarrhoea during the two weeks preceding the survey were given oral rehydration therapy (ORT) (Table 4.5). This is well below the target of 60 percent set by the Ministry of Health (1992). Mothers gave oral rehydration salts (ORS) to 31 percent and recommended home fluids (RHF) to 15 percent of children suffering from diarrhoea.[7] There are regional and urban/rural differences in the use of ORS and ORT, but not in the use of RHF. Children in the Brong-Ahafo, Ashanti, Upper East, and Eastern regions are more likely to be given ORT than children elsewhere. The use of ORS and ORT is significantly higher in urban than rural areas.

Table 4.5 Use of oral rehydration therapy for treatment of diarrhoea

Percentage of children under 3 years who had diarrhoea in the preceding two weeks whose mothers treated them with oral rehydration therapy (ORT): solution prepared from oral rehydration salts (ORS) and/or recommended home fluids (RHF), by region and residence, Ghana 1993

Region and residence	Gave ORS[1]		Gave RHF[2]		Gave ORT[3]	
	Percent	Number	Percent	Number	Percent	Number
Region						
Western	21.9	32	15.2	33	33.3	33
Central	28.1	32	8.8	34	31.3	32
Greater Accra	36.7	30	13.3	30	43.3	30
Volta	15.8	38	7.9	38	23.7	38
Eastern	35.7	28	21.4	28	50.0	28
Ashanti	44.9	49	13.7	51	53.1	49
Brong-Ahafo	41.2	34	20.0	35	54.5	33
Northern	20.5	73	16.2	74	30.1	73
Upper West	37.5	8	NA	8	37.5	8
Upper East	41.9	31	19.4	31	51.6	31
	p<.04		NS		p<.04	
Residence						
Urban	46.5	86	15.9	88	55.8	86
Rural	26.0	269	14.2	274	34.9	269
	p<.0004		NS		p<.0006	
Overall	31.0	355	14.6	362	40.0	355

Note: Level of significance determined using Chi-square test.
NS = Not significant
[1] Solution prepared from ORS packet (oral rehydration salts)
[2] Recommended home fluids (e.g., sugar/salt/water solution)
[3] Oral rehydration therapy (ORS and/or RHF)

Dehydration from diarrhoea is a major cause of infant and child death, so that lost fluids must be replaced as quickly as possible during a diarrhoeal episode. Table 4.6 shows that during recent episodes of diarrhoea only 15 percent of children received more breast milk or other fluids than usual. Eighteen percent of breastfed children actually had the number of their feeds reduced, and 21 percent of children had other fluids reduced. Regional differences are significant only for increased intake of breast milk and other fluids. Breastfed children with diarrhoea are more than three times as likely to be suckled more frequently in the Upper East region than in other regions. Children living in Greater Accra are twice as likely to receive increased fluids during diarrhoeal episodes as children in other regions. There are no differences in feeding practices during diarrhoeal episodes between urban and rural areas.

[7] The slight differences in the proportions reported here and those found in the main 1993 GDHS report are due to the fact that this nutrition report excluded children with incomplete age data.

Table 4.6 Changes in feeding practices among children with diarrhoea

Among children under 3 years with diarrhoea, the percentage of those breastfeeding who received the same, increased, or decreased feeds and the percentage of those who received the same, more, or less fluids, by region and residence, Ghana 1993

Region and residence	Frequency of breastfeeding				Amount of other fluids given			
	Same	Increased	Decreased	Number	Same	More	Less	Number
Region								
Western	70.0	5.0	25.0	20	47.2	8.3	44.4	36
Central	81.8	9.1	9.1	22	76.5	14.7	8.8	34
Greater Accra	76.9	15.4	7.7	13	56.7	30.0	13.3	30
Volta	70.0	13.3	16.7	30	63.2	15.8	21.1	38
Eastern	62.5	12.5	25.0	16	48.3	20.7	31.0	29
Ashanti	66.7	10.0	23.3	30	58.5	15.1	26.4	53
Brong-Ahafo	69.0	6.9	24.1	29	62.9	NA	37.1	35
Northern	67.2	12.5	20.3	64	76.1	11.3	12.7	71
Upper West	66.7	11.1	22.2	9	33.3	55.6	11.1	9
Upper East	43.3	53.3	3.3	30	78.1	18.8	3.1	32
		p<.0007				p<.0001		
Residence								
Urban	70.6	13.7	15.7	51	60.2	18.2	21.6	88
Rural	65.6	16.0	18.4	212	64.5	14.3	21.1	279
		NS				NS		
Overall	66.6	15.6	17.9	263	63.5	15.3	21.3	367

Note: Level of significance determined using Chi-square test.
NS = Not significant

4.3 Biological and Nonbiological Factors Associated with Diarrhoea

Because diarrhoea is one of the most common causes of morbidity and mortality among young Ghanaian children, further analyses have been undertaken to identify the nonbiological and biological factors associated with diarrhoea. Table 4.7 shows that urban residence, better quality flooring, a flush toilet, a private tap, a high possession score, better educated parents, a Christian mother, a father holding a professional, clerical, or sales job, and bottle feeding all reduce the risk of diarrhoea for young children. Household characteristics associated with the highest rates of diarrhoea include no toilet, a surface source of drinking water, and no parental education. The lower rates of diarrhoea associated with bottle use and Christianity probably reflect the inverse association between diarrhoea and wealth, rather than a protective effect of bottles or religion per se, since it is generally the wealthiest mothers who can afford bottles and who are Christian.

Many biological variables also influence the likelihood of having diarrhoea. Children are less likely to have diarrhoea if they are younger than 6 months, older than 29 months, have mothers who made at least 6 antenatal visits, have been immunised against measles,[8] have not had recent fever or cough, or are neither stunted nor wasted. The prevalence of diarrhoea rises rapidly through infancy, peaking at 12 months at about 32 percent, and then gradually declines to 20 to 25 percent during the second year (see Figure 4.1). Children age 6 to 17 months have the highest rate of diarrhoea (26 percent), followed closely by children age 18 to 23 months (22 percent). Children are most vulnerable to diarrhoea during the second half of infancy because they learn to crawl and walk then and because faecal contamination from hand-to-mouth contact is common.

[8] Includes only children 9 months of age and older, since children younger than 9 months would not be expected to have received measles vaccine.

Table 4.7 Prevalence and net relative risk of diarrhoea among children under 3 years

Percentage of children 0-35 months who have diarrhoea and the net relative risk of having diarrhoea, by selected background factors, Ghana 1993

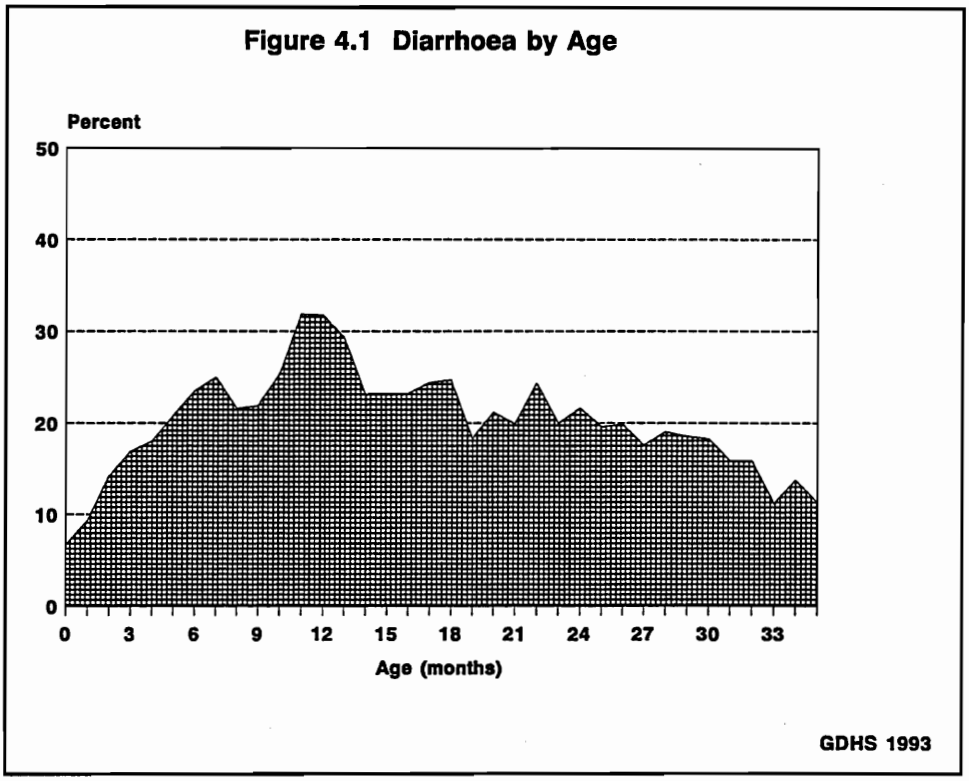
Background factor	Diarrhoea	Net relative risk
Region		
Western	21.3	1.243
Central	17.8	1.076
Greater Accra	16.9	.944
Volta	19.8	.806
Eastern	14.8	.913
Ashanti	17.0	1.026
Brong-Ahafo	20.2	1.085
Northern	40.4	1.524[b]
Upper West	14.3	.635
Upper East	24.4	1.000
n=1816	p<.0001	
Residence		
Urban	17.5	
Rural	21.9	
n=1816	p<0.04	
Floor material		
Finished[1]	13.8	
Cement	21.4	
Natural[2]	23.2	
n=1815	p<0.009	
Type of toilet		
Flush	10.8	
Improved pit	17.7	
Traditional pit	18.6	
None	25.9	
n=1816	p<0.0003	
Source of drinking water		
Private tap	15.2	
Public tap	19.3	
Protected well	19.8	
Unprotected well	16.8	
Surface	24.6	
n=1816	p<0.02	
Possession score[3]		
0	20.7	1.000
1	23.9	1.240[b]
2+	15.1	1.084
n=1816	p<0.006	
Denomination		
Christian	18.4	
Muslim	27.2	
None/traditional	24.5	
n=1813	p<.002	
Mother's education		
Secondary+	10.1	
Primary	18.9	
None	25.0	
n=1816	p<.0002	
Husband's occupation		
Professional[4]	16.0	
Not working	18.4	
Farming	22.9	
Services/manual	20.1	
n=1768	p<.05	

Table 4.7—*Continued*

Percentage of children 0-35 months who have diarrhoea and the net relative risk of having diarrhoea, by selected background factors, Ghana 1993

Background factor	Diarrhoea	Net relative risk
Husband's education		
Secondary+	15.3	
Primary	18.4	
None	28.5	
n=1690	p<.0001	
Bottle use		
Yes	14.7	
No	21.5	
n=1816	p<.02	
Child's age (months)		
0-5	15.6	1.000
6-11	25.7	1.423[b]
12-17	25.7	1.393[b]
18-23	21.7	1.308
24-29	18.9	1.209
30-35	15.7	1.049
n=1816	p<.002	
Fever (2 weeks)		
Yes	30.7	1.551
No	16.8	1.000[a]
n=1812	p<.0001	
Cough (2 weeks)		
Yes	30.5	1.521
No	17.7	1.000[a]
n=1816	p<.0001	
Nutritional status		
Neither stunted nor wasted	18.9	1.000[a]
Wasted only	30.1	1.340
Stunted only	19.3	.969
Wasted and stunted	39.4	1.663[b]
n=1816	p<.0001	
No. antenatal visits		
None	31.8	1.000[a]
1,2,3	22.0	.713[b]
4,5	20.5	.712[b]
6,7	15.5	.576[b]
8+	15.7	.645[b]
n=1816		
Measles immunisation[5]		
Yes	18.4	
No	27.8	
n=1258	p<.0002	
Overall	20.6	

Note: Level of significance determined using Chi-square test.
[1] Polished wood, ceramic tile, linoleum, carpet
[2] Baked earth/mud
[3] Score of one for availability/ownership of electricity, radio, television, and/or refrigerator. Maximum score of 4.
[4] Includes professional, clerical, and sales occupations
[5] Includes only children 9-35 months.
[a] overall p <0.05
[b] p<0.05 compared with reference category



Another factor is the introduction of supplementary foods, which may be contaminated during preparation or feeding. The teething stage also occurs, and mothers often attribute diarrhoea to this.

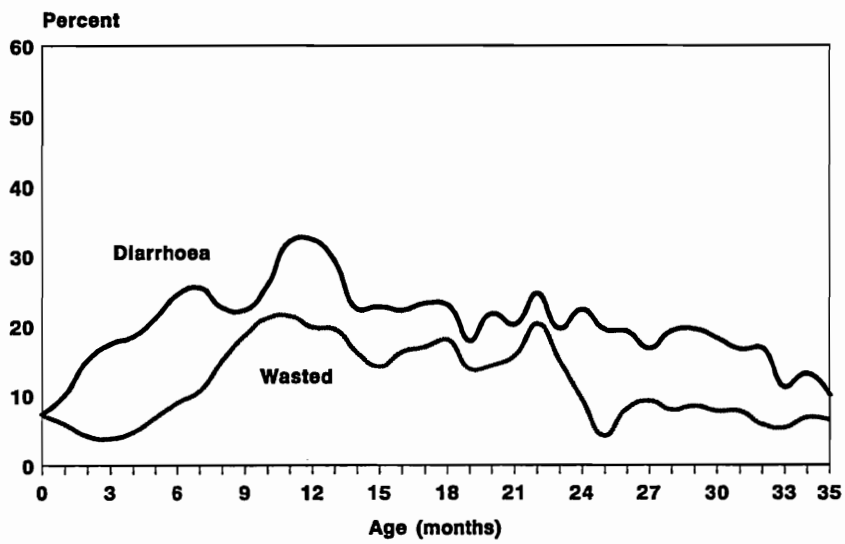
Frequent antenatal visits may lessen the risk of childhood diarrhoea because children are healthier at birth or because mothers receive important information about child care, including immunisation, managing illness, and feeding practices. Mothers who make frequent antenatal visits may also be more likely to make post-natal visits, thus providing better health care to their children. Accordingly, children immunised against measles may be less likely to have diarrhoea because they receive more health care, because their mothers manage or prevent diarrhoea more effectively in the home, or because they do not experience the diarrhoea normally associated with the aftermath of measles. It is not surprising that children with recent fever or cough have a higher rate of diarrhoea, because diarrhoea is a common symptom of these and other childhood illnesses. Undernourished children may suffer from diarrhoea more frequently because their resistance to infection is weakened; alternatively, they may be undernourished (especially wasted) because of diarrhoeal illness.

The factors associated with a recent history of diarrhoea have been used to develop a logistic regression model to predict diarrhoea among children less than 3 years of age (see Appendix F for an explanation of logistic regression models). Children 6 to 17 months of age have a 40 percent greater risk of having diarrhoea than the youngest children. Risk is also higher for children age 18 to 29 months, but that difference is not significant. Children with a recent history of fever or cough are 50 percent more likely to have diarrhoea than other children. Children who are both wasted and stunted have a two-thirds greater risk of having diarrhoea than children who are neither stunted nor wasted and than children who are stunted only, but it is not clear if being undernourished is a cause or consequence of diarrhoea. Risk was also higher, but not significantly so, for children who are wasted. Antenatal visits by the mother lower the risk of diarrhoea, with risk declining by 30 percent for 1 to 5 visits and by 40 percent for 6 or more visits.

Children in the Northern region face a 50 percent higher risk of diarrhoea than children in the Upper East region, which is the reference category. The risk appears to be 40 percent lower for children living in the Upper West region, but the difference is not significant. Surprisingly, a possession score of 1 heightens the risk of diarrhoea by 24 percent compared to a possession score of 0. This may reflect the net negative effect of other factors related to wealth, such as bottle feeding, young maternal age, maternal education, and mother's work away from home. It is difficult to interpret this finding, however, because of the many factors that may confound the possession score.

The results of the logistic regression confirm that weaker children (those who are ill and possibly undernourished), children age 6 to 17 months, children whose mothers made no antenatal visits, and children living in the Northern region are most vulnerable to diarrhoea. Many of the risk factors for diarrhoea are also risk factors for undernutrition, which is discussed in Chapter 5.

Figure 4.2 Diarrhoea and Wasting by Age, Ghana



GDHS 1993

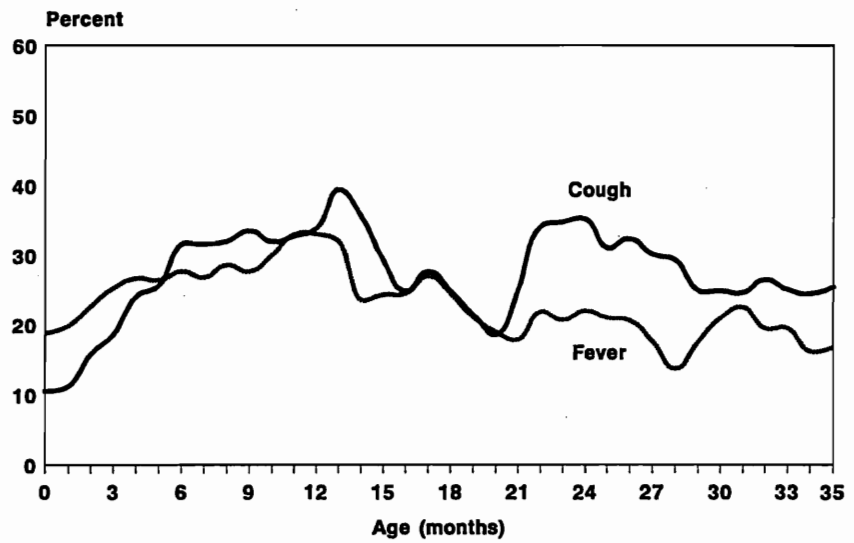
4.4 Diarrhoea and Wasting

The fluid loss and anorexia that typically accompany diarrhoea have a negative effect on children's nutritional status, particularly on short-term, or acute, nutritional status. The relationship between diarrhoea and acute undernutrition (wasting) is clearly evident in Figure 4.2, which shows that the age-specific pattern of wasting closely resembles that of diarrhoea; this will be seen again in Chapter 5. This pattern is similar for boys and girls. With adequate nutrition following diarrhoeal episodes, children's growth normally catches up. With repeated episodes or poor nutrition, however, diarrhoea may have an adverse effect on a child's long-term, or chronic, nutritional status.

4.5 Age-related Patterns of Fever and Cough

The prevalence rates of cough and fever across age groups are similar in the first two years of life in Ghana, as shown in Figure 4.3. Both rise gradually during infancy until one-third of children are affected at age 12 months. After the first year, both fever and cough begin to decline, and the prevalence of fever levels out at about 20 percent. The prevalence of cough rises again late in the second year, peaking at 24 months, when approximately one-third of children are again affected. This second peak in the prevalence of cough may reflect a flu or flu-like epidemic occurring among 2-year-old children around the time of the survey.

Figure 4.3 Fever and Cough by Age, Ghana



GDHS 1993

CHAPTER 5

NUTRITION AND CARING CAPACITY OF THE FAMILY

The social, economic, health, and child-related variables identified as important in the bivariate analyses in Chapter 2 have been used to build a logistic regression model to explain (or predict) the stunting, wasting, and underweight found among Ghanaian children age 0 to 35 months (see Appendix F for an explanation of logistic regression models). This model estimates the probability that stunting, underweight, or wasting will occur. Regression estimates greater than 1 indicate that the risk of undernutrition is greater than that for the reference category; estimates less than 1 indicate that the risk of undernutrition is less than that for the reference category.

The following variables have been used to develop the best model to explain childhood undernutrition in Ghana. Only those variables which are significant are discussed in the sections that follow.

Nonbiological variables:

1. Region (Western, Central, Greater Accra, Volta, Eastern, Ashanti, Brong-Ahafo, Northern, Upper West, Upper East)
2. Residence (urban, rural)
3. Mother's age (15-19, 20-24, 25-29, 30-34, 35-49)
4. Mother's education (secondary+, primary, none)
5. Mother's occupation (professional/clerical/sales, farming, services/manual, not working)
6. Whether mother watches television weekly (no, yes)
7. Whether mother listens to radio weekly (no, yes)
8. Whether mother works away from the home (no, yes)
9. Husband's education (secondary+, primary, none)
10. Husband's occupation (professional/clerical/sales, farming, services/manual, not working)
11. Whether husband lives at home (no, yes)
12. Possession score (maximum score of 4 based on the availability of electricity and ownership of a TV, radio, and refrigerator)
13. Transport owned (car/motorcycle, bicycle, none)
14. Source of drinking water (private tap, public tap, protected well, unprotected well, surface water)
15. Toilet facilities (flush, improved pit, traditional pit, none)
16. Type of floor material (finished, cement, natural)
17. Religion (Christian, Muslim, none/traditional)
18. Number of antenatal visits (0, 1-3, 4-5, 6-7, 8+)
19. Number of children at home (1, 2, 3, 4, 5+)

Biological variables:

1. Diarrhoea (none, 1-6 days, 7+ days)
2. Fever (no, yes)
3. Cough (no, yes)
4. Number of dead children of mother (0, 1, 2, 3+)
5. Preceding birth interval (24 months+, <24 months)
6. Reason for stopping breastfeeding (maternal factors, child factors, appropriate age to wean, not yet weaned)
7. Possession of a health card (no, yes)

8. Twin birth (no, yes)
9. Size at birth (average+, small, very small)
10. Child immunised against measles (no, yes)
11. Diet:
    (a) 0 to 3 months[9] (exclusively or fully breastfed, partially breastfed)
    (b) 4 to 6 months[10] (breastfed, fully weaned)
    (c) 7 to 11 months[11] (breastfed with complementary foods, breastfed but no complementary foods)
    (d) 12 to 23 months[12] (breastfed with complementary foods, fully weaned)
    (e) 24 to 35 months[13] (fully weaned, breastfed with complementary foods)

Initially, separate analyses were conducted for individual age groups since appropriate feeding patterns depend on age. Risks of undernutrition were compared with optimal feeding practices for each of the dietary age groups listed above. Age-specific bivariate analyses between diet and stunting, diet and underweight, and diet and wasting show an association only for children 12 to 35 months old. Breastfed children in this age group, especially those 24 to 35 months old, are more likely to be stunted, underweight, and wasted, indicating that they do not receive sufficient complementary solid foods. Because diet was not found to be a sufficiently specific predictor of nutritional status in each age group, the model presented here includes all children.

5.1 Stunting

The important determinants of stunting among Ghanaian children age 0 to 35 months are the age of the child, whether the child is a twin, the reason for full weaning, the length of the preceding birth interval, measles immunisation, the number of antenatal visits made by the mother, the number of dead children of the mother, and region (Table 5.1). The risk of stunting increases with age: As children's nutrient needs for growth and recovery after illness continue to be unmet, linear growth is compromised. Children between 0 and 5 months of age face the lowest risk of stunting because their needs are completely met by breast milk. Those age 6-11 months have twice the risk of younger infants, and beyond 12 months the risk of stunting continues to rise until it is 13 times that of the youngest infants at age 30-35 months. This dramatic rise with age reflects the cumulative effects of repeated illness and inadequate nutrient intake.

Children born within 35 months of an older sibling are more likely to be stunted and underweight than those born later. The risk is especially great for children born within 2 years of a previous sibling; they are one-third more likely to be stunted than those born after a 3-year interval. Short birth intervals can result in low-birth-weight babies who, unless they are well fed, will grow more slowly than children born with a

---

[9] The optimal practice has been taken to be exclusive and full breastfeeding. Full breastfeeding is included because so few infants are exclusively breastfed.

[10] The recommended practice is to introduce infants to solid foods between the ages of 4 and 6 months. Thus, all children in this age group should still be breastfed.

[11] By the age of 6 months, all infants should be receiving complementary solids in addition to breast milk, so this is used as the reference category.

[12] It is recommended that children be breastfed beyond the age of 12 months even if they are receiving complementary foods.

[13] Beyond the age of two years, breast milk does not contribute significantly to the energy and nutrient requirements for growth. For this reason, the reference category is "fully weaned."

Table 5.1 Net relative risk of stunting, underweight, and wasting

Net relative risk of stunting, underweight, and wasting for children under 3 years, by background factors, Ghana 1993

Background factor	Stunting	Under weight	Wasting
Region			
Western	1.538	0.981	
Central	1.152	0.538[b]	
Greater Accra	1.450	0.824	
Volta	0.930	0.574[b]	
Eastern	1.482	0.610	
Ashanti	1.478	0.660	
Brong-Ahafo	1.064	0.959	
Northern	1.645[b]	1.082	
Upper West	1.144[a]	0.963	
Upper East	1.000	1.000[a]	
Mother's education			
None		1.000	
Primary		1.246	
None		1.129	
Mother's age			
15-19			1.734
20-24			1.000
25-29			1.544
30-34			1.909[b]
35-49			2.134[b]
No. of children at home			
1			1.000
2			1.277
3			1.878[b]
4			0.709
5+			0.904
Watches TV			
Yes		0.777[b]	
No		1.000	
Listens to radio			
Yes		0.776[b]	0.702[a]
No		1.000	1.000
Possession score[1]			
0		1.000[a]	
1		1.117	
2+		1.565[b]	
Type of toilet			
None		1.000[a]	
Traditional pit		1.251	
Improved pit		1.036	
Flush		0.239[b]	
Type of floor material			
Cement		1.000[a]	
Finished[2]		0.559[b]	
Natural[3]		0.840	

Table 5.1—*Continued*

Net relative risk of stunting, underweight, and wasting for children under 3 years, by background factors, Ghana 1993

Background factor	Stunting	Under weight	Wasting
No. dead children			
0	1.000[a]	1.000[a]	
1	0.936	0.831	
2	1.490[b]	1.559[b]	
3+	2.009[b]	1.905[b]	
No. antenatal visits			
None	1.000[a]	1.000[a]	
1,2,3	0.741[b]	0.826	
4,5	0.846	0.898	
6,7	0.761	0.720[b]	
8+	0.590[b]	0.542[b]	
Child's age (months)			
0-5	1.000[a]	1.000[a]	1.000[a]
6-11	2.001[b]	2.862[b]	2.086[b]
12-17	7.628[b]	4.747[b]	1.917
18-23	11.092[b]	5.481[b]	1.943
24-29	10.793[b]	5.425[b]	0.853
30-35	13.431[b]	5.874[b]	0.847
Reason for full weaning			
Currently breastfed	1.000[a]	1.000[a]	
Maternal factors	0.809	0.672	
Child refused	0.537	0.562	
Age to wean	0.406[b]	0.308[b]	
Birth interval (months)			
9-23	1.341[b]		
24-35	1.274		
36+	1.000		
Measles immunisation			
Yes	0.732		0.853
No	1.000[a]		1.000[a]
Singleton/Twin			
Twin	1.000[a]	1.000[a]	
Singleton	0.288[b]	0.355	
Size of child at birth			
Average+		1.000[a]	
Small, very small		1.424	
Diarrhoea			
None			1.000[a]
1 to 6 days			1.350
7+ days			2.279[b]
Has health card			
Yes		0.732	
No		1.000[a]	

[1] Score of one for availability/ownership of electricity, radio, television, and/or refrigerator. Maximum score of 4.
[2] Polished wood, ceramic tile, linoleum, carpet
[3] Baked earth/mud
[a] Overall $p<.05$
[b] $p<.05$ compared with reference category

normal weight. While the greater risk of stunting among children born after a 24- to 35-month interval was not statistically significant, the data suggest that 3 years is the optimal birth interval. In Ghana, birth intervals of less than 3 years may strain a household's economic resources as well as place excessive demands on the mother's ability to care for her children, including adequate, appropriate feeding of the younger child.

Twins are more than three times as likely to be stunted as singletons. Mothers may not be able to meet the additional child care demands of two young children, and these small newborns may not be able to catch up in growth.

Whether or not a child is fully weaned and the mother's reason for weaning is associated with chronic undernutrition. Children who are currently breastfed face the greatest risk of stunting. Most of these breastfed children are more than six months old and require appropriate supplementary foods, but the high risk of stunting strongly suggests that they are not receiving them. Children fully weaned because they were considered to be at the appropriate age or because they refused to suckle are 50 to 60 percent less likely to be stunted than currently breastfed children. Children weaned because of maternal factors, presumably at a generally earlier age, do not gain the same advantage. About half these children were weaned because of pregnancy, one-third were weaned because the mother had breast or nipple problems or was ill, and the remainder were weaned because the mother had to return to work. Mothers must be made aware of the risks associated with fully weaning a child because of pregnancy. They also need advice on how to deal with breast problems and illness while breastfeeding and on how to manage infant feeding while they work.

The more antenatal visits made by a mother, the less is her child's risk of being stunted. Making 1 to 7 antenatal visits leads to a 25 percent drop in the risk of stunting compared to no antenatal care. Eight or more visits has an even greater effect, with risk falling by 40 percent. Antenatal care benefits long-term nutritional status in three ways, by reducing the risk of pregnancy and delivery complications, by lowering the risk of low birth weight and related nutritional and health problems, and by informing mothers about good child care practices.

Children whose mothers have had two or more children die face a greater risk of stunting if their mothers have had multiple children die. The risk of stunting increases by 50 percent when mothers report two dead children and by 100 percent when mothers report 3 dead children as compared to mothers who report one or no dead child. These data probably reflect the combined negative effects of poverty, illness, and inadequate child care practices on a child's growth.

Regional differences also determine chronic undernutrition. Children living in the Northern region are 65 percent more likely to be stunted than children in the Upper East, the reference region. The Northern region is economically and agriculturally one of the poorest in Ghana, and the climate is dryer and hotter than regions farther south. Children in the Western, Greater Accra, Eastern, and Ashanti regions have a 40 to 50 percent higher risk of being stunted than those in the Upper East, although these differences are not statistically significant. Children from the Central, Volta, Brong-Ahafo, and Upper West regions have about the same risk of stunting as children in the Upper East. While living in a particular region does not by itself cause undernutrition, region probably acts as a proxy for other factors associated with nutritional status that were not measured by the GDHS, such as feeding practices and access to food, wealth, and child care.

Apart from region and the number of dead children, none of the nonbiological factors that might be proxies for wealth (such as parental education, occupation, possession score, type of floor, toilet, and transport) are good predictors of stunting in Ghana. Nor are factors that indicate exposure to information, such as listening to the radio or watching television. While the number of dead children indirectly reflects wealth, it is unlikely that this single factor would override the effects of other wealth-related factors on stunting. In contrast, biological factors, including child age, reason for weaning, birth interval, and being a twin, all are strong predictors of stunting. The number of antenatal visits, which may be considered a biological factor because of its effect on pregnancy outcome, is also

significant. These results suggest that economic factors are less important determinants of long-term nutritional status than practices surrounding birth and child care, in particular, adequate antenatal care, weaning at the appropriate age, feeding weaned children properly, and spacing births widely.

5.2 Underweight

In contrast to the predominance of biological factors in predicting stunting, or chronic undernutrition, both biological and nonbiological factors are important determinants of underweight among young Ghanaian children. Significant factors include region, weekly exposure to radio and television, possession score, type of toilet, type of floor, the number of dead children of the mother, the number of antenatal visits, the child's age, the reason for full weaning, being a twin, being small at birth, having a health card, and measles immunisation.

Children living in the Central and Volta regions are about half as likely to be underweight as children from the Upper East region. The risk of being underweight is also lower, by 35 to 40 percent, in the Eastern and Ashanti regions, but the differences are not statistically significant. Risk levels are the same in the Western, Greater Accra, Brong-Ahafo, Northern, and Upper West regions as in the Upper East.

Several factors reflecting socioeconomic status and exposure to information are good predictors of underweight. Children whose mothers regularly listen to the radio and watch television are 25 percent less likely to be underweight than other children. While this may reflect wealth (these households may own a radio and television), more likely it demonstrates the beneficial effect of exposure to health, nutrition, and child care messages broadcast by the mass media. Surprisingly, high possession scores are associated with a 50 percent greater risk of underweight, possibly because these mothers work outside the home for money and have less time for child care. Underweight, like stunting, is also related to the number of their children mothers report have died. The risk of being underweight is 55 percent greater when 2 children have died and almost double when 3 children have died as compared to when just one or no child has died.

Findings on the type of floor material and toilet show the influence of wealth on nutrition. Children are about half as likely to be underweight if their home has a finished floor rather than a cement floor; there is no significant difference in risk regardless of whether the floor is made of cement or dried mud. Similarly, children are almost 80 percent less likely to be underweight if there is a flush toilet in the home than if there is no toilet. The traditional pit latrine is associated with a 25 percent greater risk of being underweight than having no toilet at all; although not statistically significant, this difference reflects the negative effect of poor sanitation on nutritional status. It is noteworthy that only a small proportion of mothers in the sample had either a finished floor or a flush toilet.

A number of the same biological factors that influence stunting are good predictors of underweight. The number of antenatal visits made by the mother is positively associated with the child's nutritional status, that is, more visits lowers the risk of undernutrition. The age of the child is negatively associated with nutritional status; by the age of 2 years, children's risk of being underweight is more than 5 times that of infants 0-6 months old. Children weaned because their mother thought they were at the appropriate age are 70 percent less likely to be underweight than children currently breastfed. The risk is also about 30 percent lower for children weaned for maternal reasons, although the difference is not significant; this again points to the vulnerability of breastfed children. Twins are three times as likely to be underweight as singletons, and children who are small or very small at birth are 40 percent more likely to be underweight than other children. These results highlight the importance of good antenatal care, birth weights above 2,500g, and appropriate child feeding and weaning practices.

Children are 30 percent less likely to be underweight if their mothers have a health card for them, compared to children without a health card. The health card shows the mother has seen a health care worker for vaccinations and/or treatment of the child's illnesses. Measles vaccination is also important, with vaccinated children 30 percent

less likely to be underweight than unvaccinated children after age 9 months. Measles immunisation may well decrease the risk of underweight by reducing the incidence of diarrhoea and respiratory illness, both of which can be especially severe after the measles.

5.3 Wasting

Determinants of wasting, or acute undernutrition, among Ghanaian children include the child's age, mother's age, the number of children at home, listening to the radio, recent diarrhoea, and measles immunisation. Infants age 6 to 11 months are twice as likely to be wasted as infants 0 to 6 months old. The second half of infancy is an extremely vulnerable period, both because children need complementary foods in addition to breast milk and because the introduction of these foods is often accompanied by diarrhoea. Infant foods should be rich in nutrients and given frequently in small quantities. Too often, mothers give foods of poor quality and insufficient quantity and prepare them unhygienically. All of these factors contribute to diarrhoea and weight loss. Children age 12 to 23 months also have twice the risk of wasting as the youngest infants, but these differences were significant only at the $p<.10$ level, probably because there are more confounding factors that influence the risk of having diarrhoea at this age. In the third year of life, the risk of diarrhoea declines to the level of 0- to 6-month-old infants or slightly lower. This may reflect older children's ability to adapt to undernutrition and infection, as well as to feed themselves better.

A recent episode of diarrhoea increases the risk of being wasted by 35 percent if the episode lasts 1 to 6 days ($p<.10$) and by over 100 percent if the episode lasts a week or more ($p<.05$). Diarrhoea is typically associated with acute undernutrition because of the loss of fluid; the longer the diarrhoeal episode, the more severe the weight loss. Diarrhoea also explains the 15 percent decrease in risk associated with measles vaccination, since diarrhoea following measles is often prolonged and severe. Measles vaccine may have an independent protective effect apart from reducing diarrhoea, but this is not certain.

The risk of wasting almost doubles when the mother is age 30 to 34 years, compared to mothers age 20 to 24, and increases still more when the mother is age 35 or older. Older mothers are more likely to have several children and less time for child care; they frequently leave young children in the care of siblings who are only slightly older. Risk also increases by about 70 percent for the children of the youngest mothers (age 19 or less), but this is not significant. These children are more likely to have lower birth weights, and their mothers lack the maturity and experience to provide adequate child care.

Finally, the risk of wasting is determined by the number of children in the home. When there are 3 children in the home, the risk of wasting increases by almost 90 percent compared to homes with a single child. This probably reflects the lack of time for adequate child care, including appropriate feeding, in resource-poor households. The risk of being wasted does not increase when there are 4 or more children in the home, perhaps because older siblings are available to help with child care.

5.4 Summary

In summary, nutritional status is largely determined by the child's age, birth interval, antenatal care, size at birth, reason for weaning, diarrhoeal disease, and factors generally associated with an impoverished environment. Because infants and young children are not being fed optimally, undernutrition manifests itself soon after birth. The situation is exacerbated by high levels of diarrhoea at a very young age. The prevalence of wasting increases dramatically in the first year and remains high until peaking at 23 months, when almost 30 percent of children are affected. Stunting also rises rapidly, most dramatically in the second year of life, until it peaks at 21 months when nearly 50 percent of children are affected. The age pattern of underweight follows roughly that of stunting. After 2 years of age, the level of wasting declines, reflecting the fact that most children are weaned, have adapted to undernutrition, and are better able to partake in the family diet. Furthermore, the most undernourished children have died.

These findings clearly indicate that efforts to improve child nutrition in Ghana need to focus on:

- Family planning to lengthen birth intervals to two years or longer;
- The 9 months before birth, when antenatal care is of the utmost importance to promote healthy births and convey child care information; and
- The first two years of life, when dietary intake and feeding practices have their greatest impact on children's growth.

CHAPTER 6

RECOMMENDATIONS

The 1993 GDHS was the second attempt to gather nationally representative data on the nutritional status of Ghanaian children under the age of three years. Despite vast improvements in the Ghanaian economy, lower infant and child mortality rates, and a lower fertility rate in 1993 compared to 1988, the nutritional status of young children has not improved significantly.

The associations between a child's age and risks of undernutrition and illness, coupled with infant feeding patterns, point to the following major areas that need attention if child nutrition in Ghana is to be improved:

1. Family planning efforts should be undertaken in order to increase mother's age at first birth and to lengthen the intervals between births.

2. Efforts to improve child nutritional status need to focus on the 9 months before the child is born. Mothers must be encouraged to attend antenatal care visits. Frequent antenatal visits lower the risk that a child will be small at birth, will have a low birth weight, will be more vulnerable to illness, and will be unable to catch up in growth. By conveying important information to mothers, frequent antenatal visits also improve a mother's child care practices.

3. Optimal breastfeeding practices should be promoted at birth and during the first 4 to 6 months of life. In particular, efforts should be made to:

   - Ensure that health workers encourage mothers to put the newborn to the breast immediately after birth.

   - Eliminate the promotion by health personnel of bottles for feeding water or other liquids to healthy newborns.

   - Discourage the use of bottles by mothers during the first year of life, particularly during the first 6 months.

   - Encourage the practice of exclusive breastfeeding through the age of 4 to 6 months.

4. Mothers should be encouraged to introduce appropriate complementary foods when infants are 4 to 6 months old. Health workers and mothers need advice on the appropriate nutritional content of complementary foods at different ages and on the frequency with which they should be fed. The community-based weaning food project is an ideal vehicle to achieve these objectives.

5. Children should be breastfed for the first two years of life. To accomplish this, mothers and health workers must be apprised of the dangers of early weaning and advised on the appropriate age to wean a child. Health workers should be taught to discourage breastfeeding mothers from weaning their children because of a new pregnancy and to help mothers with breast problems and maternal illnesses so that they can continue breastfeeding.

6. Mothers need to be advised on the appropriate feeding of fully weaned children, both in terms of quality and quantity.

PREVIOUS PAGE BLANK

7. Programmes and policies need to be devised to assist and advise working mothers in the management of infant and child feeding, both for weaned children and those still breastfed.

8. Measles immunisation efforts should be strengthened in order to reduce undernutrition and the rate of diarrhoea.

9. Policymakers, administrators, health professionals, and the public at large should be made more aware of the nutritional problems in Ghana.

REFERENCES

Aisbey-Berko, E. and R. Orraca-Tetteh, eds. 1995. *Proceedings of National Workshop on Iodine Deficiency Disorders in Ghana*, Golden Tulip Hotel, July 27-28, 1994. Department of Nutrition and Food Science, University of Ghana, Accra, Ghana.

Arthur, P., B. Kirkwood, D. Ross, J. Gyapong, A. Tomkins, and H. Addy. 1992. Impact of vitamin A supplementation on childhood morbidity in northern Ghana. *Lancet* 339:361-62.

Batse, Z.M.K. 1986. Interrelationships between infant/child mortality and reproductive behaviour: An examination of evidence from Ghana. Ph.D. thesis. University of North Carolina, Chapel Hill, North Carolina.

Benefo, K. F. and A.M. Parnell. 1991. Women's work and infant feeding: Analysis of the 1988 Ghana Demographic and Health Survey. Presented at the Demographic and Health Surveys World Conference, August 5-7, 1991, Washington, D.C.

Food and Agriculture Organisation of the United Nations (FAO). 1970-1993. *Production Yearbooks*.

Food and Agriculture Organisation of the United Nations (FAO). 1993. Development of a Rural Agro-Industries Programme for Ghana, UNDP/FAO TSS-1 Mission. FAO, Accra, Ghana.

Ghana Statistical Service (GSS). 1987. *1984 Population Census of Ghana, Demographic and Economic Characteristics, Total Country*. Accra, Ghana.

Ghana Statistical Service (GSS). 1988. *Quarterly Digest of Statistics*, Vol. 3, No. 4. Accra, Ghana.

Ghana Statistical Service (GSS). 1989. *Ghana Demographic and Health Survey, 1988*. Accra, Ghana.

Ghana Statistical Service (GSS). 1992. *'92 Ghana in figures*. Accra, Ghana.

Ghana Statistical Service (GSS). 1994a. *Infant, child and maternal mortality Study in Ghana*. Accra, Ghana.

Ghana Statistical Service (GSS). 1994b. International Conference on Nutrition: Towards the preparation of national action plans. Draft report on food availability and household food security in Ghana. Accra, Ghana.

Ghana Statistical Service (GSS). 1994c. *Quarterly Digest of Statistics*. Vol. 12, No. 2. Accra, Ghana.

Ghana Statistical Service (GSS). 1995. The pattern of poverty in Ghana, 1988-1992. Accra, Ghana.

Ghana Nutritional Service (GSS) and Macro International Inc. 1994. *Ghana Demographic and Health Survey 1993*. Calverton, Maryland: GSS and Macro International.

Macro International Inc. 1993. *Nutrition of infants and young children in Ghana: Findings from the 1988 Ghana DHS Survey*. Columbia, Maryland: Macro International Inc.

Martorell R. 1982. *Nutrition and health status indicators*. Living Standards Measurement Study Working Paper No. 13.

Ministry of Finance. 1994. *Public Investment Programme, 1994-1996*. Vol.1, Main Report. Accra, Ghana.

Ministry of Food and Agriculture. 1990. *Food balance sheet*. Accra, Ghana.

Ministry of Health, Nutrition Division. 1989a. Improving young child feeding practices in Ghana. Assessment field activity: Focus group discussion. Accra, Ghana.

Ministry of Health, Nutrition Division. 1989b. Improving young child feeding practices in Ghana. Assessment field activity: Ghana household interviews and observations. Accra, Ghana.

Ministry of Health, Technical Coordination and Research Division. 1992. *Annual report: Maternal and child health and family planning*. Accra, Ghana.

Ministry of Health. 1994. *Report on the third monitoring of progress of Health for All by the Year 2000*. Accra, Ghana.

Republic of Ghana. 1992a. *The child cannot wait: A national programme of action on the follow-up to the World Summit for Children*. Accra, Ghana.

Republic of Ghana. 1992b. Health, food, better life. Country paper presented at the International Conference on Nutrition, January 1992.

Sachdev, H.P., J. Krishna, R.K. Puri, L. Satyanarayana, and S. Kumar. 1992. Water supplementation in exclusively breastfed infants during summer in the tropics. *Lancet* 337: 929-933.

Takyi, E.E., T. Rikimaru, E. Harrison, and D.O. Kennedy. 1994. Vitamin A status and nutrient intake in a rural community in southern Ghana. *West African Journal of Medicine* 13(1): 34-37.

United Nations Children Fund (UNICEF). 1995. *The state of the world's children.*

Van den Boom, G. J. M., M. Nube, and W. K. Asenso-Okyere. 1995. Nutrition, labour productivity and labour supply of men and women in Ghana. Presented at the International Conference on Sustainable Food Security in West Africa, March 13-15, 1995, Accra, Ghana.

Waterlow, J.C. 1972. Classification and definition of protein-energy malnutrition. *British Medical Journal* 3:566-569.

APPENDIX A

SAMPLE DESIGN

The sampling frame used for selecting the GDHS sample was the 1984 census list of 13,000 enumeration areas (EAs). The EAs were first stratified into the three major ecological zones (coastal, forest, savannah) and then, within each ecological zone, into rural and urban EAs. The natural grouping of the EAs in the 10 regions was also taken into account.

A total of 400 EAs were selected with probability proportional to the number of households. Households within each selected EA were subsequently listed, and a systematic sample of 6,161 households was selected for the survey. This procedure was expected to yield a sample of 5,400 women aged 15-49 years. However, interviews were successfully completed with 4,562 women aged 15-49 years in the 5,822 households contacted. Fieldwork was conducted between September 1993 and February 1994.

APPENDIX B

HOUSEHOLD AND RESPONDENT BACKGROUND CHARACTERISTICS

Demographic Factors

A total of 1,818 children under the age of three years are included in the analyses presented in this report. Table B.1 shows the distribution of these children by region and urban/rural residence. The pattern of distribution reflects the general population distribution within the country. As expected, more children are found in the Ashanti and Eastern regions, while the Upper West region has the lowest share of the child population. Over 70 percent of the children surveyed are from rural areas; this closely matches the distribution of the total population. More boys than girls are included in the sample (the sex ratio was 102).

Table B.1 Children weighed and measured in the Ghana DHS

Percentage of male and female children under 3 years in the Ghana DHS nutrition sample, by region and residence, Ghana 1993

Region and residence	Children			
	Boys	Girls	Total	Number
Region				
Western	42.6	57.4	100.0	169
Central	46.6	53.4	100.0	191
Greater Accra	51.7	48.3	100.0	178
Volta	59.4	40.6	100.0	192
Eastern	50.2	49.8	100.0	203
Ashanti	54.2	45.8	100.0	323
Brong-Ahafo	46.7	53.3	100.0	184
Northern	53.8	46.2	100.0	184
Upper West	46.0	54.0	100.0	63
Upper East	45.8	54.2	100.0	131
Residence				
Urban	51.6	48.4	100.0	521
Rural	50.0	50.0	100.0	1,297
Overall	50.5	49.5	100.0	1,818

Only 29 percent of mothers are non-migrants. The rest have migrated from their birth place to their current place of residence at some time in the past (Table B.2). There are large regional differences in migration status. More than half of mothers living in the Upper West region, for example, are still living in their birth place. In contrast, only about one-fifth of mothers in Brong-Ahafo, Ashanti, and Eastern regions are non-migrants. Mothers living in urban areas are more likely than those in rural areas to be migrants.

An average of 2.6 children per household were found at home during the period of the survey, but this varied significantly by region and urban/rural residence (Table B.3). Thus mothers in the Upper West region had an average of 3.2 children at home compared to just 2.2 children in the Greater Accra region. More children were found at home in rural areas than in urban areas.

Table B.2 Duration of residence

Percent distribution of children under 3 years by number of years the mother has resided at the current location, according to region and residence, Ghana 1993

Region and residence	Duration of residence					Number
	< 5	5-9	10+	Always	Total	
Region						
Western	21.6	18.6	27.5	32.3	100.0	167
Central	25.7	13.1	28.8	32.5	100.0	191
Greater Accra	21.1	18.9	29.1	30.9	100.0	175
Volta	27.3	15.5	27.8	29.4	100.0	187
Eastern	31.0	18.2	28.6	22.2	100.0	203
Ashanti	29.7	19.2	30.0	21.1	100.0	323
Brong-Ahafo	32.0	22.7	24.3	21.0	100.0	181
Northern	16.9	15.3	31.7	36.1	100.0	183
Upper West	19.0	9.5	19.0	52.4	100.0	63
Upper East	14.5	15.3	32.8	37.4	100.0	131
		p<.0001				
Residence						
Urban	23.1	21.1	29.2	26.6	100.0	511
Rural	25.8	15.8	28.4	30.0	100.0	1,293
		p<.04				
Overall	25.1	17.3	26.6	29.0	100.0	1,804

Note: Levels of significance determined using Chi-square test.

Table B.3 Mean and standard deviation for living and dead children

Mean and standard deviation (SD) for number of children living at home, total number of children, and number of dead children per mother, among children under 3 years, by region and residence, Ghana 1993

Region and residence	Number of children at home	Total number of children	Number of dead children	Number
	Mean (SD)	Mean (SD)	Mean (SD)	
Region				
Western	2.65 (1.47)	3.75 (2.32)	.49 (.85)	169
Central	2.74 (1.73)	3.69 (2.43)	.40 (.68)	191
Greater Accra	2.23 (1.23)	2.88 (1.98)	.31 (.84)	178
Volta	2.72 (1.46)	3.73 (2.04)	.44 (.71)	192
Eastern	2.50 (1.47)	3.26 (2.09)	.28 (.60)	203
Ashanti	2.68 (1.57)	3.43 (2.25)	.26 (.62)	323
Brong-Ahafo	2.73 (1.54)	3.53 (2.14)	.34 (.70)	184
Northern	2.63 (1.39)	3.92 (2.33)	.75 (.98)	184
Upper West	3.22 (1.57)	4.21 (2.03)	.68 (.88)	63
Upper East	2.66 (1.36)	3.71 (1.94)	.66 (.93)	131
	p<.002	p<.0001	p<.0001	
Residence				
Urban	2.36 (1.35)	2.99 (1.82)	.25 (.59)	521
Rural	2.75 (1.54)	3.78 (2.29)	.49 (.83)	1,297
	p<.0001	p<.0001	p<.0001	
Overall	2.64 (1.50)	3.55 (2.20)	.42 (.78)	1,818

Note: Levels of significance determined using ANOVA.
NS = Not significant.

The mean number of children per woman is 3.5. Women in Upper West have the largest number of children (4.2) and those in Greater Accra the smallest (2.9). Urban households have fewer children (3.0) than rural households (3.8).

Each woman has lost, on average, 0.4 children. The proportion of children who have died is highest in the Northern, Upper West, and Upper East regions and lowest in the Ashanti and Eastern regions. Rural mothers are twice as likely to lose a child as urban mothers. The number of children who have died in a family is known to be associated with the risk of malnutrition of surviving siblings.

Maternal, Social, and Economic Factors

Table B.4 shows the mean age of mothers with children under three years old by region and urban/rural residence. The mothers sampled in the Upper West region tend to be older than those in other regions. The percentage of mothers age 30 years or older ranges from 39 percent in the Greater Accra region to 54 percent in the Upper West region. There is also a significant difference in age among mothers living in urban and rural areas. The rural mothers sampled are older than the urban mothers.

Table B.4 Mother's age

Percent distribution of mothers of children under 3 years by age group, according to region and residence, Ghana 1993

Region and residence	Mother's age group (years)						
	15-19	20-24	25-29	30-34	35-49	Total	Number
Region							
Western	9.5	26.0	22.5	29.6	12.4	100.0	169
Central	9.4	25.1	20.4	22.5	22.5	100.0	191
Greater Accra	8.4	18.5	34.3	19.7	19.1	100.0	178
Volta	3.6	20.3	28.6	24.0	23.4	100.0	192
Eastern	11.8	21.2	25.6	22.2	19.2	100.0	203
Ashanti	5.9	26.3	31.0	20.4	16.4	100.0	323
Brong-Ahafo	8.2	25.0	25.0	21.2	20.7	100.0	184
Northern	4.9	19.0	25.0	22.8	28.3	100.0	184
Upper West	3.2	9.5	33.3	31.7	22.2	100.0	63
Upper East	2.3	23.7	25.2	23.7	25.2	100.0	131
			p<.0009				
Residence							
Urban	9.2	19.2	30.1	24.4	17.1	100.0	521
Rural	6.2	23.9	25.8	22.4	21.8	100.0	1,297
			p<.003				
Overall	7.0	22.6	27.0	22.9	20.5	100.0	1,818

Note: Levels of significance determined using Chi-square test.

Almost 40 percent of the mothers have never been to school (Table B.5). Wide variations are observed when mother's education is examined by region and rural/urban residence. Mothers living in the southern part of the country are more likely to be educated than those living in the north. Most children living in the three northern regions (Northern, Upper East, and Upper West) have mothers who have never been to school, with figures ranging from 68 percent in the Upper West region to 85 percent in the Northern region. Mothers living in the Greater Accra region tend to be better educated than mothers elsewhere; 23 percent of mothers in Greater Accra have secondary or higher education compared to just 1 percent in the Northern

Table B.5 Mother's education

Percent distribution of mothers of children under 3 years by level of mother's education, according to region and residence, Ghana 1993

Region and residence	Mother's education				
	None	Primary	Secondary+	Total	Number
Region					
Western	33.7	61.5	4.7	100.0	169
Central	31.4	64.4	4.2	100.0	191
Greater Accra	14.6	62.9	22.5	100.0	178
Volta	24.5	70.8	4.7	100.0	192
Eastern	23.2	70.0	6.9	100.0	203
Ashanti	28.5	66.6	5.0	100.0	323
Brong-Ahafo	32.1	65.8	2.2	100.0	184
Northern	85.3	13.6	1.1	100.0	184
Upper West	68.3	25.4	6.3	100.0	63
Upper East	78.6	18.3	3.1	100.0	131
		p<.0001			
Residence					
Urban	18.6	65.1	16.3	100.0	521
Rural	45.8	52.4	1.9	100.0	1,297
		p<.0001			
Overall	38.0	56.0	6.0	100.0	1,818

Note: Levels of significance determined using Chi-square test.

region. Because Greater Accra is the seat of government, it is the most developed region in the country in terms of educational and social facilities. Rural mothers are less likely to have attended school than their urban counterparts. Forty-six percent of rural mothers have never been to school and only 2 percent have secondary or higher education. In contrast, just 19 percent of urban mothers have no education, and 16 percent have gone to secondary school or beyond.

About one out of five mothers are not employed (Table B.6). Half of working mothers are engaged in farming, while 29 percent are professional, clerical, or sales workers. Compared to other regions, a higher proportion of mothers in the Greater Accra do not work. Mothers in Northern, Upper West, Upper East, and Western regions are more likely to be farmers than mothers living elsewhere, while mothers in Greater Accra tend to be professional, clerical, or sales workers. Urban mothers are almost twice as likely as rural mothers not to work. Urban mothers are also more likely to be in non-farming occupations than rural mothers.

Most working mothers (61 percent) take their children to work with them on a regular basis (Table B.7). This is not surprising given that many of the women work in the informal sector and are largely engaged in farming or trading activities. Women farmers or traders in Ghana usually take an older child along to care for their babies while they work. They only disrupt their work periodically to feed the babies or to give them attention when they are crying or there is a problem. Women who do not have an older child or helper to care for their babies carry them on their backs while they work and lay them down in a cool shelter as soon as they fall asleep. This practice of bringing children to work is more prevalent in the Northern, Central, and Brong-Ahafo regions. Rural mothers are more likely than urban mothers to bring their children to work.

Table B.6 Mother's occupation

Percent distribution of mothers of children under 3 years by occupation category, according to region and residence, Ghana 1993

Region and residence	Mother's occupation: Not working	Professional/ clerical/ sales	Farming	Services/ manual	Total	Number
Region						
Western	18.5	19.6	47.6	14.3	100.0	168
Central	18.8	18.3	41.9	20.9	100.0	191
Greater Accra	30.9	42.7	2.8	23.6	100.0	178
Volta	16.7	28.6	41.7	13.0	100.0	192
Eastern	17.4	30.3	32.8	19.4	100.0	201
Ashanti	20.4	27.2	42.7	9.6	100.0	323
Brong-Ahafo	20.1	18.5	47.3	14.1	100.0	184
Northern	15.9	11.5	58.8	13.7	100.0	182
Upper West	25.4	3.2	55.6	15.9	100.0	63
Upper East	27.5	11.5	48.1	13.0	100.0	131
			p<.0001			
Residence						
Urban	29.5	42.2	6.8	21.5	100.0	516
Rural	17.0	15.6	54.4	13.0	100.0	1,297
			p<.0001			
Overall	20.6	23.2	40.9	15.4	100.0	1,813

Note: Levels of significance determined using Chi-square test.

Table B.7 Presence of child at work

Percent distribution of children of working mothers who are usually, sometimes, or never with the mother at her place of work, according to region and residence, Ghana 1993

Region and residence	Child at mother's workplace: Usually	Sometimes	Never	Total	Number
Region					
Western	64.2	17.5	18.2	100.0	137
Central	66.4	30.0	3.6	100.0	140
Greater Accra	50.4	15.4	34.1	100.0	123
Volta	60.6	28.8	10.6	100.0	160
Eastern	56.4	26.7	17.0	100.0	165
Ashanti	61.1	22.2	16.7	100.0	252
Brong-Ahafo	66.2	17.2	16.6	100.0	145
Northern	67.5	16.2	16.2	100.0	154
Upper West	63.8	23.4	12.8	100.0	47
Upper East	53.7	24.2	22.1	100.0	95
		p<.0001			
Residence					
Urban	58.0	17.4	24.6	100.0	362
Rural	62.3	23.9	13.8	100.0	1,056
		p<.0001			
Overall	61.2	22.2	16.6	100.0	1,418

Note: Levels of significance determined using Chi-square test.

Almost 40 percent of working mothers depend on family members or relatives to care for their children while they are at work (Table B.8). There are no significant differences by region or area of residence.

Fifty-nine percent of the mothers live with their husbands, but large differences occur among regions and by urban/rural residence (Table B.9). Mothers are more likely to live with their husbands in the Upper East, Northern, and Upper West regions (over 85 percent), and rural mothers are more likely than urban mothers to live with their husbands.

Ninety-two percent of the mothers are currently married or living with a partner; 6 percent are widowed, divorced, or separated (Table B.10). Mothers in the Western region are less likely currently to be in union than those in other regions. The highest proportions of never-married mothers are observed in the Eastern and Greater Accra regions. There are no differences in the proportion of rural or urban mothers who are currently in union.

Table B.8 Usual caretaker of children of working mothers

Percent distribution of children cared for by their mothers, or by family members or relatives, according to region and residence, Ghana 1993

Region and residence	Child's caretaker: Mother	Family/ relatives	Total	Number
Region				
Western	63.8	36.2	100.0	138
Central	66.4	33.6	100.0	140
Greater Accra	50.4	49.6	100.0	123
Volta	60.6	39.4	100.0	160
Eastern	56.4	43.6	100.0	165
Ashanti	60.9	39.1	100.0	253
Brong-Ahafo	65.8	34.2	100.0	146
Northern	67.5	32.5	100.0	154
Upper West	63.8	36.2	100.0	47
Upper East	53.7	46.3	100.0	95
	NS			
Residence				
Urban	58.0	42.0	100.0	362
Rural	62.1	37.9	100.0	1,059
	NS			
Overall	61.1	38.9	100.0	1,421

Note: Levels of significance determined using Chi-square test.
NS = Not significant.

Table B.9 Residence of mother's husband

Percent distribution of husbands of mothers of children under 3 years by whether husband resides at home or elsewhere, according to region and residence, Ghana 1993

Region and residence	Husband's residence: At home	Elsewhere	Total	Number
Region				
Western	45.5	54.5	100.0	167
Central	55.0	45.0	100.0	191
Greater Accra	45.5	54.5	100.0	178
Volta	45.3	54.7	100.0	192
Eastern	42.4	57.6	100.0	203
Ashanti	53.3	46.7	100.0	323
Brong-Ahafo	50.0	50.0	100.0	184
Northern	14.2	85.8	100.0	183
Upper West	14.3	85.7	100.0	63
Upper East	9.9	90.1	100.0	131
	p<.0001			
Residence				
Urban	48.4	51.6	100.0	521
Rural	38.3	61.7	100.0	1,294
	p<.0001			
Overall	41.2	58.8	100.0	1,815

Note: Levels of significance determined using Chi-square test.

Table B.10 Mother's marital union

Percent distribution of mothers of children under 3 years by type of marital union, according to region and residence, Ghana 1993

Region and residence	Marital union				
	Never married	Married/ living together	Widowed/ divorced/ separated	Total	Number
Region					
Western	4.1	83.4	12.4	100.0	169
Central	.5	88.5	11.0	100.0	191
Greater Accra	7.3	89.3	3.4	100.0	178
Volta		95.3	4.7	100.0	192
Eastern	7.4	88.2	4.4	100.0	203
Ashanti	.3	92.6	7.1	100.0	323
Brong-Ahafo	2.2	91.8	6.0	100.0	184
Northern		98.4	1.6	100.0	184
Upper West		95.2	4.8	100.0	63
Upper East	.8	96.2	3.1	100.0	131
		p<.0001			
Residence					
Urban	3.8	91.9	4.2	100.0	521
Rural	1.7	91.5	6.8	100.0	1,297
		p<.004			
Overall	2.3	91.6	6.1	100.0	1,818

Note: Levels of significance determined using Chi-square test.

Twenty-nine percent of all husbands have no formal education, but husbands, overall, are better educated than their female counterparts (Table B.11). Twenty percent of husbands have received secondary or higher education compared to only 10 percent of mothers. Most husbands in the Northern, Upper West, and Upper East regions have never been to school. The best educated husbands live in the Greater Accra region. Rural husbands are less likely to be educated than their urban counterparts.

Table B.11 Husband's education

Percent distribution of husbands of mothers of children under 3 years by husband's education, according to region and residence, Ghana 1993

Region and residence	Husband's education				
	None	Primary	Secondary+	Total	Number
Region					
Western	18.0	61.9	20.1	100.0	139
Central	13.2	68.4	18.4	100.0	174
Greater Accra	7.0	48.6	44.4	100.0	142
Volta	14.7	61.1	24.2	100.0	190
Eastern	9.8	67.8	22.4	100.0	183
Ashanti	19.0	61.6	19.4	100.0	315
Brong-Ahafo	31.3	51.1	17.6	100.0	176
Northern	84.1	7.1	8.8	100.0	182
Upper West	60.7	21.3	18.0	100.0	61
Upper East	68.8	23.4	7.8	100.0	128
		p<.0001			
Residence					
Urban	12.7	50.6	36.7	100.0	472
Rural	35.9	50.5	13.6	100.0	1,218
		p<.0001			
Overall	29.4	50.5	20.1	100.0	1,690

Note: Levels of significance determined using Chi-square test.

Just 3 percent of husbands are not employed. Like the women, most (54 percent) are farmers although the figures vary widely among regions and by urban/rural residence (Table B.12). Husbands in Greater Accra are mostly professional, clerical, sales, service, or manual workers while those in the other regions tend to farm. This is especially true for those living in the northern zone. Two out of three rural husbands were engaged in farming occupations, while 78 percent of urban husbands have some other kind of job.

Table B.12 Husband's occupation

Percent distribution of husbands of mothers of children under 3 years by husband's occupation, according to region and residence, Ghana 1993

	Husband's occupation					
Region and residence	Not working	Profes-sional/ clerical/ sales	Farming	Services/ manual	Total	Number
Region						
Western	3.7	18.5	56.2	21.6	100.0	162
Central	4.3	16.0	50.0	29.8	100.0	188
Greater Accra	4.3	36.2	14.1	45.4	100.0	163
Volta	2.6	27.6	55.7	14.1	100.0	192
Eastern	4.3	25.7	45.5	24.6	100.0	187
Ashanti	1.2	18.4	47.0	33.3	100.0	321
Brong-Ahafo	2.8	18.5	52.8	25.8	100.0	178
Northern	1.6	12.0	81.0	5.4	100.0	184
Upper West	4.8	7.9	77.8	9.5	100.0	63
Upper East		9.2	82.3	8.5	100.0	130
			p<.0001			
Residence						
Urban	4.0	34.3	18.5	43.2	100.0	498
Rural	2.3	14.2	67.6	16.0	100.0	1,270
			p<.0001			
Overall	2.8	19.9	53.7	23.6	100.0	1,768

Note: Levels of significance determined using Chi-square test.

About one-third of the households have no toilet facilities, and almost half depend on traditional pit toilets (Table B.13). Households in the Northern, Upper West, and Upper East regions are less likely to have toilet facilities than households elsewhere. Flush toilets are more common in the Greater Accra region and almost non-existent in the Northern, Central, Volta, and the Brong-Ahafo regions. Traditional pit toilets are by far the most common type of toilet facility in rural areas. In urban areas, however, all three types of toilet facilities are well-represented.

Half of the households obtain their drinking water from taps and protected wells (Table B.14). Private tap water is widely available in the Greater Accra region, while households are more likely to depend on unprotected well and surface water in the Northern, Eastern, Western, and Volta regions. The major source of drinking water in rural localities is surface water (48 percent), but most urban households (73 percent) have access to private or public taps.

Table B.13 Toilet facilities

Percent distribution of households with children under 3 years by availability of toilet facilities, according to region and residence, Ghana 1993

Region and residence	Type of toilet					Number
	Flush	Improved pit	Traditional pit	None	Total	
Region						
Western	5.9	9.5	66.3	18.3	100.0	169
Central	.5	8.4	66.0	25.1	100.0	191
Greater Accra	21.9	21.3	32.6	24.2	100.0	178
Volta	.5	15.6	52.1	31.8	100.0	192
Eastern	4.4	15.3	64.5	15.8	100.0	203
Ashanti	3.4	17.7	66.1	12.7	100.0	322
Brong-Ahafo	.5	16.8	60.9	21.7	100.0	184
Northern		1.1	9.2	89.7	100.0	184
Upper West	4.8	12.7	14.3	68.3	100.0	63
Upper East	6.1	1.5	1.5	90.8	100.0	131
		p<.0001				
Residence						
Urban	13.8	25.7	29.2	31.3	100.0	521
Rural	.8	7.5	56.2	35.5	100.0	1,296
		p<.0001				
Overall	4.6	12.7	48.4	34.3	100.0	1,817

Note: Levels of significance determined using Chi-square test.

Table B.14 Source of drinking water

Percent distribution of households with children under 3 years by source of drinking water, according to region and residence, Ghana 1993

Region and residence	Source of drinking water						Number
	Private tap	Public tap	Protected well	Unprotected well	Open/ surface	Total	
Region							
Western	9.5	9.5	15.4	20.7	45.0	100.0	169
Central	6.8	39.3	13.6	12.0	28.3	100.0	191
Greater Accra	46.1	37.1	2.2	4.5	10.1	100.0	178
Volta	2.6	15.6	16.7	9.9	55.2	100.0	192
Eastern	7.4	15.8	10.3	19.7	46.8	100.0	203
Ashanti	11.2	22.4	20.2	6.8	39.4	100.0	322
Brong-Ahafo	1.1	16.3	21.7	16.3	44.6	100.0	184
Northern	4.3	7.6	16.3	12.5	59.2	100.0	184
Upper West	3.2	4.8	66.7	6.3	19.0	100.0	63
Upper East	9.2	3.1	64.1	17.6	6.1	100.0	131
			p<.0001				
Residence							
Urban	33.6	39.0	3.3	11.7	12.5	100.0	521
Rural	1.2	10.7	27.2	12.8	48.0	100.0	1,296
			p<.0001				
Overall	10.5	18.8	20.4	12.5	37.8	100.0	1,817

Note: Levels of significance determined using Chi-square test.

Most homes (83 percent) have cement or finished floors, although the proportion varies by region and urban/rural residence (Table B.15). Forty-six percent of mothers in the Upper West region reside in houses with natural floors, while virtually all mothers in Greater Accra live in a home with a cement or finished floor. Natural floors are extremely rare in urban areas (1 percent) but are reported by 23 percent of rural mothers.

Table B.15 Type of floor

Percent distribution of households with children under 3 years by type of floor material, according to region and residence, Ghana 1993

Region and residence	Floor material				
	Natural[1]	Cement	Finished[2]	Total	Number
Region					
Western	21.3	59.8	18.9	100.0	169
Central	11.0	81.7	7.3	100.0	191
Greater Accra	.6	46.6	52.8	100.0	178
Volta	28.3	68.6	3.1	100.0	191
Eastern	15.3	71.4	13.3	100.0	203
Ashanti	13.7	64.0	22.4	100.0	322
Brong-Ahafo	19.0	70.1	10.9	100.0	184
Northern	15.3	81.4	3.3	100.0	183
Upper West	46.0	54.0		100.0	63
Upper East	20.6	76.3	3.1	100.0	131
		p<.0001			
Residence					
Urban	1.3	55.5	43.2	100.0	521
Rural	23.1	73.0	3.9	100.0	1,294
		p<.0001			
Overall	16.9	68.0	15.2	100.0	1,815

Note: Levels of significance determined using Chi-square test.
[1] Baked earth/mud
[2] Polished wood, ceramic tile, linoleum, carpet

About half the mothers listen to the radio at least once a week, and nearly one-third watch television that often (Table B.16). There are large differences between regions and by urban/rural residence, especially for viewing television. For example, only 34 percent of mothers in the Northern region listen to the radio weekly compared to 74 percent in the Greater Accra region. Likewise, less than 10 percent of mothers in the Upper West region watch television each week, compared to 69 percent of mothers in the Greater Accra region. While two-thirds of urban mothers listen to the radio and watch television each week, only 43 percent of rural mothers listen to the radio and only 19 percent watch television weekly.

Over three-quarters of the mothers belong to households that do not own any means of transportation (Table B.17). Households in the northern part of Ghana are most likely to own some kind of transport, usually a bicycle, because villages and farms are widely scattered over large expanses of land. Residents need a vehicle to move from one village to another or even from the house to the farm. Bicycles are far more common than cars and motorcycles, especially in the north where they are considered a status symbol. Urban households are more likely than rural households to own a car; the reverse is true for bicycles. Overall, a larger proportion of rural mothers than urban mothers live in households that own some means of transportation.

Table B.16 Exposure to radio and television

Percent distribution of mothers of children under 3 years who listen to the radio and watch television at least once a week, according to region and residence, Ghana 1993

Region and residence	Listen to radio weekly	Watch TV weekly	Number
Region			
Western	50.9	30.2	169
Central	35.6	24.6	191
Greater Accra	73.6	69.1	178
Volta	47.4	19.3	192
Eastern	65.5	36.0	203
Ashanti	44.9	40.2	323
Brong-Ahafo	59.2	39.1	184
Northern	34.2	17.0	184
Upper West	34.9	9.5	63
Upper East	42.7	15.5	131
	p<.0001	p<.0001	
Residence			
Urban	66.2	66.4	521
Rural	43.1	18.8	1,297
	p<.0001	p<.0001	
Overall	49.7	32.5	1,818

Note: Levels of significance determined using Chi-square test.

Table B.17 Transport owned

Percent distribution of households with children under 3 years by type of transport owned, according to region and residence, Ghana 1993

Region and residence	Type of transport owned				Number
	None	Bicycle	Car/ motorcycle	Total	
Region					
Western	90.5	6.5	3.0	100.0	169
Central	94.2	5.2	.5	100.0	191
Greater Accra	84.8	4.5	10.7	100.0	178
Volta	82.8	14.1	3.1	100.0	192
Eastern	90.1	7.4	2.5	100.0	203
Ashanti	89.8	7.5	2.8	100.0	322
Brong-Ahafo	77.7	20.1	2.2	100.0	184
Northern	37.0	59.8	3.3	100.0	184
Upper West	14.3	84.1	1.6	100.0	63
Upper East	51.9	40.5	7.6	100.0	131
		p<.0001			
Residence					
Urban	82.3	9.4	8.3	100.0	521
Rural	75.2	23.1	1.8	100.0	1,296
		p<.0001			
Overall	77.2	19.2	3.6	100.0	1,817

Note: Levels of significance determined using Chi-square test.

Devised as a proxy for wealth, the possession score sums up a household's assets, with one point each scored for the ownership of a radio, a refrigerator, and a television set and for the availability of electricity. A score of zero refers to the poorest households, while a score of 2 to 4 represents the wealthiest households. Table B.18 shows that 49 percent of mothers live in households that lack access to any of these amenities, while 32 percent possess one, and 19 percent possess two or more. The percentage of mothers with a possession score of at least one varies from 40 percent in the Northern region to 84 percent in the Greater Accra region. Rural mothers are almost four times as likely to have a score of zero as urban mothers. The fact that only half the mothers belong to households with a possession score of at least one suggests widespread poverty.

Table B.18 Possession score

Percent distribution of households with children under 3 years by possession score, according to region and residence, Ghana 1993

Region and residence	Possession score[1]				
	0	1	2+	Total	Number
Region					
Western	58.6	24.9	16.6	100.0	169
Central	50.3	34.0	15.7	100.0	191
Greater Accra	15.7	29.2	55.1	100.0	178
Volta	58.9	32.3	8.9	100.0	192
Eastern	41.9	34.5	23.6	100.0	203
Ashanti	47.8	30.7	21.4	100.0	322
Brong-Ahafo	50.5	34.8	14.7	100.0	184
Northern	59.8	34.8	5.4	100.0	184
Upper West	47.6	42.9	9.5	100.0	63
Upper East	58.0	32.8	9.2	100.0	131
		p<.0001			
Residence					
Urban	16.9	30.9	52.2	100.0	521
Rural	61.4	32.9	5.6	100.0	1,296
		p<.0001			
Overall	48.7	32.4	19.0	100.0	1,817

Note: Levels of significance determined using Chi-square test.
[1] Possession score: Score of 1 for household availability or ownership of electricity, radio, refrigerator, or television. Maximum score of 4.

Antenatal care

The use of antenatal services was quite high among the mothers interviewed. About 87 percent had consulted a trained medical practitioner during the pregnancy of their last born child, while 13 percent consulted a TBA, relative, or no one (Table B.19). The likelihood of receiving antenatal care from a doctor, nurse, or midwife was highest in the Greater Accra region (96 percent) and lowest in the Northern region (66 percent). Almost all urban mothers (97 percent) received care from a trained medical practitioner compared to 83 percent of rural mothers.

Table B.19 Antenal care provider

Percent distribution of mothers of children under 3 years, by type of antenatal care provider, according to region and residence, Ghana 1993

Region and residence	Antenatal care provider					Number
	Doctor	Nurse	Midwife	Other/ no one	Total	
Region						
Western	32.5	42.0	12.4	13.0	100.0	169
Central	31.9	26.7	28.8	12.6	100.0	191
Greater Accra	53.4	32.6	10.1	3.9	100.0	178
Volta	22.9	33.9	30.2	13.0	100.0	192
Eastern	31.0	40.4	18.2	10.3	100.0	203
Ashanti	22.9	35.3	33.7	8.0	100.0	323
Brong-Ahafo	25.0	39.7	25.0	10.3	100.0	184
Northern	9.2	22.3	34.2	34.2	100.0	184
Upper West	11.1	52.4	14.3	22.2	100.0	63
Upper East	24.4	50.4	12.2	13.0	100.0	131
			p<.0001			
Residence						
Urban	45.7	31.1	20.3	2.9	100.0	521
Rural	19.7	37.9	25.1	17.2	100.0	1,297
			p<.0001			
Overall	27.2	36.0	23.8	13.1	100.0	1,818

Note: Levels of significance determined using Chi-square test.

APPENDIX C

ANTHROPOMETRIC DATA VERIFICATION

Of the 2,056 children between the ages of 0 and 35 months who took part in this survey, 95.6 percent (1,966 children) were weighed and measured. Chronic and/or acute nutritional status could not be ascertained for 238 children; 37.8 percent were not weighed and measured, 32.8 percent did not have a valid date of birth, and the remaining 29.4 percent had invalid measurements—that is, at least one of their anthropometric measurements (age, weight, or height) was highly unlikely given the other two measurements. Invalid measurements are defined as: Z-scores for height-for-age and weight-for-age that fall below -6 standard deviations, Z-scores for weight-for-height below -4 standard deviations, or Z-scores for any index above 6 standard deviations.

Children with invalid anthropometric measurements tend to be less than 6 months of age. Taking accurate anthropometric measurements at this age is much more difficult than at older ages. There were no differences in the other background characteristics of children with invalid measurements.

Z-scores were imputed for children with invalid or missing Z-scores in order to determine whether the missing and outlying data in any way biased the results of the survey. This was done by assigning each child the Z-scores for the previous child in the data set who was born in the same year and whose mother had attained the same level of education. Table C.1 compares the distribution of the imputed Z-scores with that of valid Z-scores. Thirty percent of the imputed Z-scores for height-for age fall in the severe and moderately

Table C.1 Imputed and valid Z-scores

Percent distribution of children age 0 to 35 months by nutritional status, year of birth, and sex of child, by imputed and valid height-for-age, weight-for-age, and weight-for-height Z-scores, Ghana 1993

	Height-for-age		Weight-for-age		Weight-for-height	
	Imputed	Valid	Imputed	Valid	Imputed	Valid
Nutritional status						
Severe undernutrition	14.8	9.0	11.8	8.0	3.8	2.6
Moderate undernutrition	15.2	17.1	19.0	19.7	7.5	9.4
Mild undernutrition	21.1	26.2	24.5	30.1	25.6	27.1
Normal nutrition	39.2	41.8	34.6	36.7	44.6	53.0
Mild overnutrition	4.2	4.2	3.4	4.2	7.5	5.9
Moderate overnutrition	.4	1.2	.4	.9	1.3	1.4
Severe overnutrition	0.0	.4	1.3	.4	2.5	.7
Missing data	5.1	0.0	5.1	0.0	7.5	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Year of birth						
1990	5.5	2.2	5.5	2.2	5.0	2.4
1991	40.3	31.0	40.3	31.0	36.6	31.7
1992	24.4	33.2	24.4	33.2	23.6	32.9
1993	29.4	33.7	29.4	33.7	34.2	33.1
1994	.4	0.0	.4	0.0	.6	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sex of child						
Male	55.5	50.5	55.5	50.5	55.3	50.7
Female	44.5	49.5	44.5	49.5	44.7	49.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number	238	1,818	238	1,818	161	1,895

undernourished categories compared to 26.1 percent of the valid Z-scores. Comparable figures for weight-for-age are 30.8 percent of imputed Z-scores and 27.7 percent of valid Z-scores; for weight-for-height, the figures are 11.3 and 12 percent. In addition, more children born in 1991 or 1992, that is, a greater proportion of older children, have missing or invalid anthropometric scores, as do more boys than girls. To determine the extent of bias, if any, that may have occurred by excluding these children, a comparison was made between the data set used in this report (which excludes imputed Z-scores) and a data set including both valid and imputed Z-scores. The results in Table C.2 show that including children with missing or invalid data affects the reported prevalences of undernutrition by just a half percentage point or less. The differences are slight probably because children with invalid or missing data make up only a small proportion of the entire sample.

Table C.2 Verification of anthropometric data

Percentage of children under 3 years by nutritional status, by whether imputed anthropometric data are included or excluded, and the difference in undernutrition when imputed data are included, Ghana 1993

Nutritional status	Imputed values included: Yes	Imputed values included: No	Difference
Stunted	26.6	26.1	-0.5
Number	2,056	1,818	
Underweight	28.1	27.7	-0.4
Number	2,056	1,818	
Wasted	11.9	12.0	-0.1
Number	2,056	1,895	

Table C.3 Digit preference in anthropometric data

Percentage of weight and height data falling as specific integers, Ghana 1993

Decimal integer	Height	Weight
0	18.4	11.4
1	7.7	9.6
2	10.1	10.8
3	9.7	11.6
4	7.9	8.0
5	16.6	11.1
6	7.1	11.0
7	7.5	9.0
8	8.2	8.5
9	6.9	9.0
Total	100.0	100.0
Number	1,967	1,990

There is some evidence of digit preference in the height data (Table C.3). For height measurements, terminal digits ending in 0, 5, and, to a lesser extent, 2 were preferred. In order to determine whether these digit preferences affected the calculated prevalences of stunting, underweight, and wasting, children were grouped into three "digit preference groups," depending on whether their recorded heights ended in 0, 5, or some other digit. There are no differences in mean height-for-age, weight-for-age, or weight-for-height between these three groups.

Neither digit preferences nor excluding children with invalid or missing anthropometric data affects the calculated prevalences of undernutrition. However, both probably reduce the probability of finding significant associations between undernutrition and explanatory variables.

APPENDIX D

REGIONAL, RESIDENTIAL, AND GENDER DIFFERENCES IN PREVALENCE OF UNDERNUTRITION BY CHILD'S AGE

Table D.1 Undernutrition by region and age group

Percentage of children age 0 to 35 months who are undernourished, by region and age group, Ghana 1993

Region and age group (months)	Undernutrition			
	Stunted	Underweight	Wasted	Number
Ghana				
0-5	5.7	5.7	5.1	334
6-11	9.7	21.8	15.1	331
12-17	27.4	35.3	17.8	303
18-23	42.3	35.3	16.8	286
24-29	32.5	36.8	6.6	302
30-35	46.9	35.9	7.6	262
Total	26.2	27.7	11.5	1,818
Western				
0-5	10.3	10.3	10.3	29
6-11	16.7	30.0	6.7	30
12-17	25.0	53.6	28.6	28
18-23	48.1	48.1	29.6	27
24-29	41.7	29.2	0.0	24
30-35	58.1	35.5	3.2	31
Total	33.1	34.3	13.0	169
Central				
0-5	0.0	3.2	6.5	31
6-11	2.9	8.8	11.8	34
12-17	23.5	26.5	14.7	34
18-23	51.4	22.9	11.4	35
24-29	27.3	36.4	12.1	33
30-35	37.5	33.3	12.5	24
Total	23.6	21.5	11.5	191
Greater Accra				
0-5	9.1	9.1	6.1	33
6-11	11.4	8.6	11.4	35
12-17	12.9	12.9	6.5	31
18-23	22.6	22.6	12.9	31
24-29	33.3	44.4	3.7	27
30-35	4.8	9.5	4.8	21
Total	15.7	17.4	7.9	178
Volta				
0-5	2.7	5.4	0.0	37
6-11	0.0	9.1	3.0	33
12-17	17.5	25.0	20.0	40
18-23	22.2	25.9	18.5	27
24-29	38.7	51.6	12.9	31
30-35	50.0	33.3	8.3	24
Total	19.8	24.0	10.4	182

Table D.1—*Continued*

Percentage of children age 0 to 35 months who are undernourished, by region and age group, Ghana 1993

Region and age group (months)	Undernutrition			Number
	Stunted	Underweight	Wasted	
Eastern				
0-5	3.1	0.0	3.1	32
6-11	11.4	17.1	8.6	35
12-17	31.3	28.1	9.4	32
18-23	32.1	25.0	7.1	28
24-29	32.0	22.0	4.0	50
30-35	46.2	34.6	3.8	26
Total	25.6	20.7	5.9	203
Ashanti				
0-5	1.8	1.8	5.5	55
6-11	9.2	15.4	13.8	65
12-17	37.2	41.9	11.6	43
18-23	48.2	23.2	7.1	56
24-29	37.0	35.2	5.6	54
30-35	42.0	24.0	6.0	50
Total	28.2	22.6	8.4	323
Brong-Ahafo				
0-5	12.0	12.0	8.0	25
6-11	9.1	36.4	27.3	33
12-17	16.7	33.3	16.7	36
18-23	35.7	39.3	10.7	28
24-29	16.7	30.0	3.3	30
30-35	56.3	50.0	9.4	32
Total	24.5	34.2	13.0	184
Northern				
0-5	13.0	13.0	6.5	46
6-11	20.0	37.1	17.1	35
12-17	57.6	65.4	38.5	26
18-23	56.0	68.0	32.0	25
24-29	28.6	35.7	14.3	28
30-35	66.7	58.3	16.7	24
Total	35.9	41.8	19.0	184
Upper East				
0-5	0.0	0.0	0.0	14
6-11	14.3	71.4	71.4	7
12-17	23.1	30.8	23.1	13
18-23	60.0	70.0	40.0	10
24-29	45.5	81.8	0.0	11
30-35	75.0	62.5	12.5	8
Total	33.3	47.6	20.6	63
Upper West				
0-5	3.1	0.0	3.1	32
6-11	4.2	33.3	29.2	24
12-17	35.0	45.0	20.0	20
18-23	57.9	57.9	31.6	19
24-29	28.6	42.9	7.1	14
30-35	45.5	40.9	4.5	22
Total	26.0	32.8	15.3	131

Table D.2 Undernutrition by gender, residence, and age group

Percentage of children age 0 to 35 months who are undernourished, by gender, residence, and age group, Ghana 1993

Gender, residence, and age group (months)	Undernutrition			
	Stunted	Underweight	Wasted	Number
Ghana				
0-5	5.7	5.7	5.1	334
6-11	9.7	21.8	15.1	331
12-17	27.4	35.3	17.8	303
18-23	42.3	35.3	16.8	286
24-29	32.5	36.8	6.6	302
30-35	46.9	35.9	7.6	262
Total	26.2	27.7	11.5	1,818
Boys				
0-5	4.5	5.2	4.5	154
6-11	11.3	23.2	18.6	177
12-17	33.5	42.4	20.3	158
18-23	42.1	33.6	15.1	152
24-29	31.6	34.2	4.6	152
30-35	52.8	39.2	8.0	125
Total	28.1	29.2	12.2	918
Girls				
0-5	6.7	6.1	5.6	180
6-11	7.8	20.1	11.0	154
12-17	20.7	27.6	15.2	145
18-23	42.5	37.3	18.7	134
24-29	33.3	39.3	8.7	150
30-35	41.6	32.8	7.3	137
Total	24.2	26.2	10.8	900
Urban				
0-5	5.7	5.7	3.4	87
6-11	8.9	11.1	11.1	90
12-17	16.3	25.0	15.2	92
18-23	27.0	18.0	11.2	89
24-29	15.1	25.8	4.3	93
30-35	22.9	22.9	5.7	70
Total	15.7	18.0	8.6	521
Rural				
0-5	5.7	5.7	5.7	247
6-11	10.0	25.7	16.6	241
12-17	32.2	39.8	19.0	211
18-23	49.2	43.1	19.3	197
24-29	40.2	41.6	7.7	209
30-35	55.7	40.6	8.3	192
Total	30.4	31.6	12.6	1,297

APPENDIX E

FEEDING PRACTICES BY AGE

Table E.1 Feeding practices by age

Percent distribution of children under 24 months by feeding practices, according to age group, Ghana 1993

	Breastfed and:								
Age (months)	Nothing	Water	Other liquids	Milk	Solids	Milk and solids	Fully weaned	Total	Number
0-1	7.5	56.7	25.4	9.0	1.5	0.0	0.0	100.0	67
2-3	5.7	48.8	37.4	4.9	2.4	.8	0.0	100.0	123
4-5	2.1	33.3	44.4	8.3	7.6	2.8	1.4	100.0	144
6-7	2.8	18.9	42.7	4.9	27.3	2.1	1.4	100.0	143
8-9	2.1	13.4	30.9	5.2	36.1	11.3	1.0	100.0	97
10-11	3.3	13.2	16.5	3.3	50.5	9.9	3.3	100.0	91
12-13	0.0	10.2	19.4	5.1	55.1	6.1	4.1	100.0	98
14-15	0.0	10.9	10.9	2.2	57.6	12.0	6.5	100.0	92
16-17	3.5	8.8	8.8	2.7	55.8	6.2	14.2	100.0	113
18-19	1.9	6.6	7.5	1.9	51.9	6.6	23.6	100.0	106
20-21	0.0	5.3	9.5	0.0	44.2	5.3	35.8	100.0	95
22-23	2.4	7.1	3.5	1.2	30.6	5.9	49.4	100.0	85

PREVIOUS PAGE BLANK

APPENDIX F

LOGISTIC REGRESSION MODELS

Logistic regression analysis, as opposed to multiple regression analysis, is used when the dependent (or outcome) variable has only two values, that is, when an event can either occur or not occur. In this report logistic regression models have been developed to explain (or predict) five outcomes: bottle use, diarrhoea, stunting, underweight, and wasting. These models estimate the probability that an event occurs, in this case, being fed with a bottle, having diarrhoea in the previous two weeks, being stunted, being underweight, or being wasted.

For each variable, there is a reference category against which all other values are compared. The reference category for each variable may, for the most part, be arbitrary. For convenience, the reference category for each variable in this report usually is the "no" response for a dichotomous variable, the first value in an ordinal series, or the most common response in an otherwise categorical variable. By default, the values of these reference categories are given a regression estimate of 1.00. Regression estimates greater than 1.00 indicate increased odds for the outcome under study when compared to the reference category. Conversely, regression estimates of less than 1.00 indicate lower odds for the outcome when compared to the reference category.

In Table 4.7, for example, "0 to 5 months" is the reference category for child's age, so it is assigned a value of 1.00. The net relative risk of having diarrhoea for infants age 6 to 11 months is 1.42, that is, these children have a 42 percent greater risk of having diarrhoea than infants 0 to 5 months of age, a difference which is statistically significant. Similarly, children age 12 to 17 months are 39 percent more likely to have diarrhoea than infants age 0 to 5 months; this difference is also significant. Moving down the table, the net relative risk of having diarrhoea is 66 percent greater for children who are both wasted and stunted than for children who are neither wasted nor stunted (the reference category), and the difference is statistically significant.

PREVIOUS PAGE BLANK

APPENDIX G

LIST OF COUNTRY NUTRITION REPORTS AND NUTRITION CHARTBOOKS PRODUCED UNDER AFRICA REGIONAL DHS NUTRITION AND FAMILY HEALTH ANALYTICAL INITIATIVE[14]

Atinmo T., N. Grange, N. Onyezili, P. Nestel, C. Lutter, and S. Rutstein. 1993. *Nutrition and Health Status of Infants and Young Children in Nigeria: Findings from the 1990 Nigeria Demographic and Health Survey.* Columbia, Maryland: Macro International Inc.

Jitta J., M. Migadde, and J. Mudusu. 1992. *Determinants of Malnutrition in Under-Fives in Uganda: An In-Depth Secondary Analysis of the Uganda DHS (1988/89) Data.* Kampala, Uganda: Child Health and Development Centre, Makerere University.

Kaite C., P. Nestel, and S. Rutstein. 1993. *Nutrition and Health Status of Infants and Young Children in Zambia: Findings from the 1992 Zambia Demographic and Health Survey.* Calverton, Maryland: Macro International Inc.

Lowe J., P. Nestel, and S. Rutstein. 1993. *Nutrition and Health Status of Infants and Young Children in Cameroon: Findings from the 1991 Cameroon Demographic and Health Survey.* Columbia, Maryland: Macro International Inc. (In French and English.)

Macro International Inc. 1993-1995. *Africa Nutrition Chartbooks*. Calverton, Maryland: Macro International Inc. (Brief reports in chartbook form on DHS nutrition data from African countries including Burkina Faso, Burundi, Cameroon, Ghana, Kenya, Madagascar, Mali, Namibia, Niger, Nigeria, Senegal, Tanzania, Togo, Uganda, Zambia, and Zimbabwe (in French and English)).

Nestel P., C. Lutter, and S. Rutstein. 1993. *Nutrition and Health Status of Infants and Young Children in Mali: Findings from the 1987 Mali Demographic and Health Survey*. Columbia, Maryland: Macro International Inc. (In French and English.)

Oumarou M., P. Nestel, and S. Rutstein. 1993. *Nutrition and Health Status of Infants and Young Children in Niger: Findings from the 1992 Niger Demographic and Health Survey.* Columbia, Maryland: Macro International Inc. (In French and English.)

[14] All documents produced by Macro International with support from the U.S. Agency for International Development, Bureau for Global Programs, Field Support and Research, Office of Health and Nutrition, under the Food Security and Nutrition Monitoring Project, Contract No. DAN-5110-Q-00-0013-00, Delivery Order No. 1.