AFRICA NUTRITION

Nutrition and Health Status of Young Children and Their Mothers in Uganda

Findings from the 1995 Uganda Demographic and Health Survey

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Macro International Inc.

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CONTENTS

Page

Tables v
Figures vii
Contributors ix
Executive Summary xi
Map of Uganda xiv

Chapter 1 Introduction 1

1.1 Geography and Population of Uganda 1
1.2 Economy 1
1.3 Food Production and Availability 1
1.4 Production of Staples 2
1.5 Livestock Production 2
1.6 Fisheries 2
1.7 Overall Food Production 3
1.8 Food Imports 3
1.9 Food Marketing 3
1.10 Diet 3
1.11 Current Food and Nutrition Policy 4
1.12 Data Source and Type of Information Collected 6

Chapter 2 Nutritional Status of Infants and Children 9

2.1 Effects of Malnutrition 9
2.2 Basic Indicators of Nutritional Status 11
2.3 Gestational Age and Birthweight 12
2.4 Prevalence of Malnutrition 13
2.5 Geographic Variations in Malnutrition 15
2.6 Changes in Malnutrition since 1988/89 16
2.7 Age-specific Patterns of Malnutrition 17
2.8 Malnutrition among Children Age 3 to 35 Months in Uganda Compared with Other Sub-Saharan Countries 18

Chapter 3 Infant and Child Feeding Practices 21

3.1 Optimal Infant and Child Feeding Practices 21
3.2 Initiation of Breastfeeding 22
3.3 Frequent, On-demand Feeding 24
3.4 Exclusive Breastfeeding 24
3.5 Introduction of Complementary Foods 25
3.6 Bottle Use 27
3.7 Duration of Breastfeeding 28
3.8 Reasons for Weaning 28
3.9 Summary and Recommendations 29

Page

Chapter 4 Morbidity and Mortality 31

4.1 Infant and Under-five Mortality 31
4.2 Changes in Mortality since 1988/89 32
4.3 Comparison with other Sub-Saharan Countries 32
4.4 Association of Malnutrition with Morbidity and Mortality 32
4.5 Contribution of Undernutrition to Under-five Mortality 33
4.6 Age Specific Patterns of Morbidity 33
4.7 Morbidity, Breastfeeding and Treatment 36
4.8 Factors Associated with Diarrhoea 39
4.9 Summary and Recommendations 41

Chapter 5 Factors Associated with Malnutrition 43

5.1 Biological and Health Characteristics of Stunting 43
5.2 Biological and Health Characteristics of Wasting 45
5.3 Socio-economic and Demographic Characteristics of Stunting 45
5.4 Socio-economic and Demographic Characteristics of Wasting 47
5.5 Multivariate Regression Analysis 47
5.6 Risk Factors for Stunting 48
5.7 Risk Factors for Wasting 49
5.8 Summary and Recommendations 50

Chapter 6 Nutritional Status of Women 51

6.1 Background 51
6.2 Data Collected 52
6.3 Indicators of Maternal Nutritional Status 52
6.4 Height and Weight 53
6.5 Body Mass Index 54
6.6 Maternal Chronic Energy Deficiency 54
6.7 High Body Mass 56
6.8 Summary and Recommendations 57

Chapter 7 Salt Iodization Coverage 59

References 63

Appendix A Sample Design 69
Appendix B Household and Respondent Background Characteristics 71
Appendix C Anthropometric Data Verification 83
Appendix D Patterns in Malnutrition 1988/89 and 1995 85
Appendix E Regional, Residential, and Gender Differences in Prevalence of Malnutrition by Child's Age 89
Appendix F Feeding Practices by Age 93
Appendix G Logistic Regression Models 95
Appendix H List of Country Nutrition Reports and Nutrition Chartbooks Produced Under the Africa Regional DHS Nutrition and Family Health Analytical Initiative 97

TABLES

		Page
Table 1.1	Annual production of food crops	2
Table 1.2	Food imports	3
Table 2.1	Type of delivery, birth weight and size at birth	12
Table 2.2	Birth weight and size at birth for children under four years	13
Table 2.3	Moderate and sever stunting and wasting by region, residence, and sex of child	14
Table 3.1	Initial breastfeeding	23
Table 3.2	Prevalence and estimates of net relative risk of bottle use	27
Table 3.3	Median duration of breastfeeding	28
Table 3.4	Reason for weaning of last-born child	29
Table 4.1	Infant and under-five mortality rates	31
Table 4.2	Prevalence and treatment of diarrhoea, fever and cough	34
Table 4.3	Source for treatment of fever and cough	37
Table 4.4	Source for treatment of diarrhoea	37
Table 4.5	Use of oral rehydration therapy for treatment of diarrhoea	38
Table 4.6	Changes in feeding practice among children with diarrhoea	38
Table 4.7	Prevalence and estimate of net relative risk of diarrhoea among children under four years	40
Table 5.1	Stunting and wasting by biological characteristics	44
Table 5.2	Stunting and wasting by socio-economic characteristics	46
Table 5.3	Estimated net relative risk of stunting, underweight, and wasting	49
Table 6.1	Recommended weight gain ranges for pregnant women	51
Table 6.2	Distribution of mother's ages	52
Table 6.3	Nutritional status of mothers	52
Table 6.4	Distribution of mother's height, weight, and bmi	53
Table 6.5	Prevalence and estimated net relative risk of low body mass and high body mass among nonpregnant mothers by biological characteristics	54
Table 6.6	Prevalence and estimated net relative risk of low body mass and high body mass among nonpregnant mothers by socio-economic characteristics	55
Table 7.1	Coverage of salt iodization among Ugandan households	59
Table 7.2	Distribution of iodized salt in surveyed households among districts in Uganda	60

Page

Table 7.3	Malnutrition among children under four year, by household salt iodization status	61
Table B.1	Anthropometric measurement of children	74
Table B.2	Mean number of living and dead children	74
Table B.3	Mother's age	75
Table B.4	Mother's education	75
Table B.5	Mother's occupation	76
Table B.6	Ususal caretaker of children of working mothers	76
Table B.7	Mother's marital status	77
Table B.8	Residence of mother's husband	77
Table B.9	Husband's education	78
Table B.10	Husband's occupation	78
Table B.11	Toilet facilities	79
Table B.12	Source of drinking water	79
Table B.13	Type of floor	80
Table B.14	Exposure to radio and television	80
Table B.15	Transport owned	81
Table B.16	Possession score	81
Table B.17	Antenatal care	82
Table C.1	Imputed and valid Z-scores	84
Table C.2	Verification of anthropometric data	84
Table C.3	Digit preference in anthropometric data	84
Table E.1	Malnutrition by region and age	89
Table E.2	Malnutrition by gender, urban/rural residence, and age	90
Table F.1	Feeding practices by age	93

FIGURES

		Page
Figure 2.1	Causes of malnutrition	10
Figure 2.2	Malnutrition among children under four years, Uganda	14
Figure 2.3	Malnutrition among children under four years by region, Uganda	15
Figure 2.4	Malnutrition among children under four years by urban/rural residence, Uganda	16
Figure 2.5	Malnutrition among children 3 to 36 months 1988/89 and 1995	17
Figure 2.6	Stunting, underweight and wasting among children under four years, Uganda	18
Figure 2.7	Malnutrition among children age 3 to 35 months in Uganda compared with other sub-Saharan countries	19
Figure 3.1	Breastfeeding practice among infants under 4 months of age, Uganda	24
Figure 3.2	Exclusive breastfeeding among infants under 4 months by region and residence, Uganda	25
Figure 3.3	Breastfeeding with complementary foods among infants 6 to 9 months of age, Uganda	26
Figure 3.4	Breastfeeding with complementary solid foods among infants age 6 to 9 months by region and residence, Uganda	26
Figure 4.1	Contribution of malnutrition to under-five mortality, Uganda	33
Figure 4.2	Diarrhoea by age, Uganda	35
Figure 4.3	Diarrhoea and underweight by age, Uganda	35
Figure 4.4	Fever and cough by age, Uganda	36
Figure D.1	Malnutrition among children under three years of age by region, 1988/89 and 1995, Uganda	87
Figure D.2	Malnutrition by residence, 1988/89 and 1995, Uganda	88
Figure E.1	Stunting by region, residence and gender, Uganda 1995	91
Figure E.2	Stunting by region, gender and age in months, Uganda 1995	92

CONTRIBUTORS

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From Uganda, Dr. D.K.W. Lwamafa, Commissioner for Health Services of the Department of Nutrition, Ministry of Health, and Dr. Jessica Jitta, Director of the Child Health and Development Centre, Makerere University, participated in the writing of the final version of the report during a two-week workshop at Macro International headquarters, together with Patricia Haggerty and René Berger. Drs. Lwamafa and Jitta provided expert insight into the interpretation of the findings, formulation of recommendations, and background information on Uganda. They also proposed several important follow-up activities.

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EXECUTIVE SUMMARY

Malnutrition is one of the most important health and welfare problems among infants and young children in Uganda, resulting in serious health and economic consequences for both the individual and nation. There are clear age-specific patterns of stunting, which represents chronic malnutrition, and wasting, which represents acute malnutrition. The proportion of children who are stunted starts to rise precipitously at about 1 month of age and continues to rise through the second year of life, when half of all children are affected. During the third and fourth years this high level of stunting is sustained. Wasting follows a slightly different pattern, rising gradually in infancy until it peaks at 12 months of age when 10 percent of children are affected, and it remains at this level through the second year of life. Both indicators show infants and toddlers—or the first two years of life—to be a critical period for interventions to improve nutritional status.

The key infant feeding behavior that poses the greatest threat to child nutritional status and health is the delayed introduction of complementary foods. About one third of Ugandan infants 6 to 9 months of age receive only breast milk and water. In the Northern region, less than 50 percent of infants this age receive both breast milk and complementary foods. Delaying the introduction of complementary foods puts infants at risk of malnutrition because beyond about 6 months of age, breast milk alone cannot meet their energy, protein, and micronutrient needs.

As with malnutrition, significant age-related patterns were found in the incidence rates of diarrhoea, fever and cough. The proportions of children with fever and cough increase very rapidly in the first 6 to 9 months of life. The proportion of children with diarrhoea also climbs dramatically during infancy, peaking at 12 months of age and declining gradually thereafter. Not surprisingly, the age-related pattern for diarrhoea is identical to that for underweight, illustrating the direct relationship between diarrhoea and malnutrition. Less than half of all children with diarrhoea in the two weeks prior to the survey were given any form of oral rehydration therapy.

In Uganda 81 infants out of every 1,000 born die before their first birthday. Another 66 die before their fifth birthday. Thus, more than half of all child deaths under the age of five occur during the first year of life. Malnutrition is an important factor in the deaths of young children. Indeed, an estimated 40 percent of all deaths among children under the age of five years are related to malnutrition. Because of its high prevalence, moderate rather than severe malnutrition contributes the majority of these deaths. This suggests that nutrition programs to prevent and treat moderate malnutrition, as well as severe malnutrition, will have an important impact on child mortality.

Despite the high level of chronic malnutrition and infant and child mortality in Uganda, marked improvements in child health and survival have occurred since the first Demographic and Health Survey in Uganda in 1988/89. The prevalence of stunting has declined by almost 10 percentage points, and steady declines in infant, child and under-five mortality have also occurred. This represents significant progress in the well-being and survival of young children, and is testimony to the greater political stability in the country, the positive impact of economic growth policies put into effect by the Government which have served to raise the general standard of living, and the notable improvements in the health infrastructure.

Women's nutritional status prior to conception and during pregnancy is important, both as an indicator of women's overall health and as a predictor of pregnancy outcome for the mother and infant. In Uganda, nearly 9 percent of nonpregnant, nonlactating women and 10 percent of lactating women meet the criteria for chronic energy deficiency, having a body mass index (BMI) of less than 18.5 kg/m^2. This

level of underweight is indicative of poor maternal nutritional status, which puts women and their present and future pregnancies at risk.

Analysis of the factors associated with both maternal and child malnutrition point to poverty as the overriding factor contributing to poor nutritional status of women and children in Uganda. However, because the immediate causes are inadequate food intake and illness, both short- and long-term strategies are needed. Short-term strategies include the following:

- Focus on the first two years of life. Specifically, focus on encouraging women to introduce nutritious, hygienically prepared, locally available complementary foods starting by 6 months of age.

- Improve access to and use of reproductive health services to allow those women who want to plan their pregnancies to space them to at least two years between births. This will improve the probability of child survival and also permit women time to recuperate nutritionally between pregnancies.

- Reinforce the Government's current primary health care approach, which strives to strengthen communities' involvement in and management of health services.

- Improve child feeding behaviours in and around the diarrhoeal episode. Specifically, focus on increasing the amount of fluids given during and after the episode to reduce dehydration and increasing the use of oral rehydration therapy.

- Implement District level monitoring of salt iodization in households or schools and retail outlets, to determine precise iodization coverage levels and to identify where immediate attention is needed.

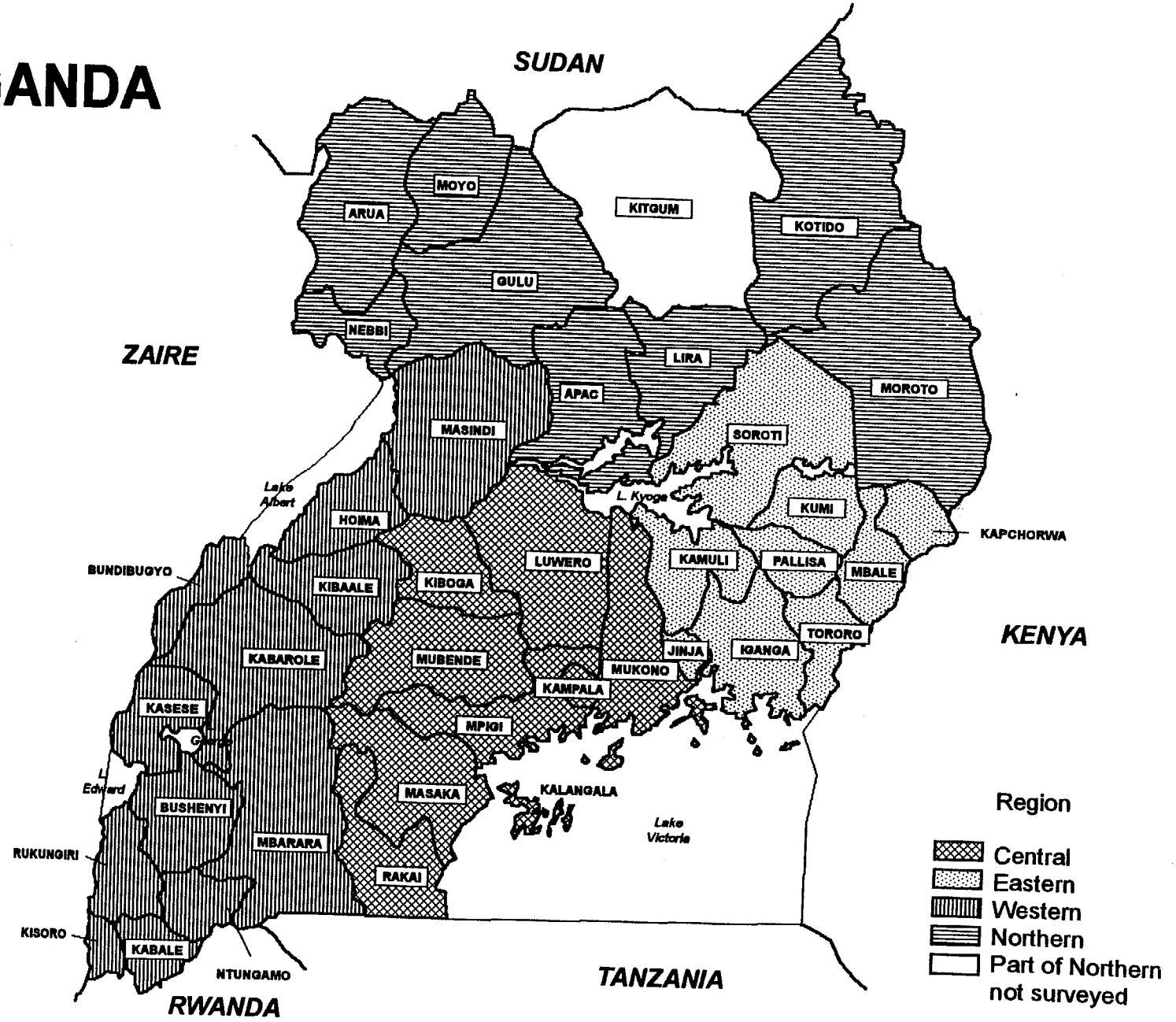
Long-term strategies include the following:

- Focus on improving the nutritional status and health of adolescent girls.

- Improve the energy balance of all women by improving the quantity and quality of their diets, and by promoting appropriate technologies to reduce women's workloads.

- Encourage and continue the Government's efforts to alleviate poverty at the household level.

UGANDA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Region
Central
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Western
Northern
Part of Northern not surveyed

Chapter 1

INTRODUCTION

1.1 GEOGRAPHY AND POPULATION OF UGANDA

Uganda is a land-locked East African country laying astride the equator, bordered by Kenya in the east, Sudan in the north, Zaire in the west and Rwanda and Tanzania in the south. The country has an area of 241,038 sq km, 81 percent of which is suitable for agriculture, 16 percent is under water and swamps and 3 percent is under forestry.

The country is endowed with a favourable climate and ample rainfall which averages 900-300 mm per annum, with the Lake Victoria crest and the high lands receiving 2,000 mm annually. The relatively high altitude (range 800-1500 m) makes temperatures moderate, from 17°C to 32°C. This climate provides two excellent growing seasons for the central, southern and western regions and one for the eastern and northern regions. The climate also promotes over a greater part of the country the cultivation of a variety of tropical and sub-tropical crops through out the year.

The soil fertility varies being generally fertile in the central, southern and western region and becoming less fertile as one moves from the eastern to the northern region. The vegetation is rain forest in the south and savanna woodland and semi-desert in the North.

Administratively the country is divided into 39 districts. These districts serve as basic units of administration and the country has decentralized administrative powers to the district level. The estimated population now stands at 19.2 million with a growth rate of about 2.5 percent per annum (MFEP, 1995a). The population is young, 43 percent being under 15 years while 19 percent is under 5 years of age. The women of child bearing age make up 22 percent, bringing the nutritionally vulnerable group up to 41 percent of the total population. Eighty eight percent of the population lives in the rural areas and 43 percent of the total population (mostly women and youth) form the labour force presumed active in agriculture.

1.2 ECONOMY

Uganda has an agricultural economy with 90 percent of the population depending on agriculture and agro-based industries. The country still falls among the poorest countries in the world with GDP of US$250 per capita and 55 percent of rural and 38 percent of urban populations living under the estimated poverty line (US$110 per capita per year) (World Bank, 1993). The recent government efforts towards development have been geared to creating a conducive environment for production. The rehabilitation of physical infrastructure and re-establishment of sound social and economic base, has translated into a rapidly growing rate of 5-7 percent annually, one of the highest in the region.

1.3 FOOD PRODUCTION AND AVAILABILITY

Agriculture contributes to 70 percent of GDP. Virtually all food production is by farmers with small holdings. Most people in rural areas produce the food they consume and those in urban areas depend on their earned income to buy the food they need. Small scale farmers possessing 2 to 3 acres for cultivation and another 2 acres for grazing animals produce the bulk of the food in the country. Only 16 percent of the total households are landless, a quarter of them being in the central region and 2 percent in the northern region (MFEP, 1991).

There has been a rapid growth in the agricultural sector, a growth greatly attributed to the high growth of the food crops. Marked growth rates have been recorded in fisheries (2.7 percent) and live stock (2.1 percent) sectors (MFEP, 1995b). The area planted by food crops has remained more or less constant even in the face of population growth and increased nutritional demands (World Bank, 1993). National yields are between 12-50 percent of yields attainable at agricultural research stations. The low levels of production are mainly due to poor technology, inability of the majority of farmers to access high yielding seed varieties and high post harvest losses (range 6-30 percent). Improvements in technology that would lead to higher production are yet to be fully exploited by the small growers.

1.4 PRODUCTION OF STAPLES

The food crops produced are generally high in starch and these include bananas, root crops, cereals and pulses and oil seeds. Table 1.1 shows the annual production for these food crops.

Table 1.1 Annual production of food crops

Annual production of selected food crops, Uganda

Crop	Percent total tonnage	Hectares	Annual production (million tonnes)
Bananas	50	1.4 million	8
Root crops (cassava and potatoes)	35	897,000	5.6
Cereals (maize, finger millet, sorghum, rice and wheat)	10	1.2 million	1.8
Pulses and oil seeds	5	1.4	0.48

Source: MAIIF, 1996

1.5 LIVESTOCK PRODUCTION

The country has an estimated 4.2 million cattle, 4.1 million goats, 1.0 million sheep, 0.9 million pigs and 20 million chicken. Milk output has increased from 235 million litres in 1981 to 271 million litres in 1994. Beef output has declined from 27,035 in 1981 to 21,920 million tonnes in 1994. Other livestock increases during this period have been goat and mutton (4 percent per annum), pork (43 percent per annum), poultry (9 percent per annum), and eggs (29 percent per annum). Thus availability of livestock products has not been significantly affected by factors responsible for low food crop production.

1.6 FISHERIES

Fisheries resources remain a great asset to food security in Uganda, the annual fish harvest being at 227,000 tonnes which contributes to the country's welfare in terms of wealth and diet. The plentiful fresh water lakes and rivers support fishing although land-based fish farming activities are increasingly becoming popular among farmers. Currently, an estimated 80 hectares contributes to about 1 percent of total fish production. Despite the level of fishing in Uganda, the fish availability is being threatened by the invasion of the water hyacinth.

1.7 OVERALL FOOD PRODUCTION

Overall food supply and demand figures show that Uganda has a positive food balance in most commodities such as peas, maize, finger millet, sorghum, cassava, potatoes, bananas, fish, goat meat and mutton. The commodities in deficit are beans, milk, beef and poultry products. In reality food production has the potential to feed the country and to supply food to the regional markets.

1.8 FOOD IMPORTS

Uganda is a net importer of rice and wheat to supplement the domestic food demand for human consumption as well as industrial use. In addition, the World Food Programme and other relief agencies have in the past imported beans, maize, Irish potatoes and cow peas especially to supply the refugees within the country and in the neighbouring countries (see Table 1.2).

Table 1.2 Food imports

Food imports (million tonnes), Uganda 1990-1994

Commodity	1990	1991	1992	1993	1994	Average 1990-94
Beans	31,417	0	0	1,932	9,605	8,591
C. Peas	0	0	0	3,459	16,165	395
Maize	52,325	0	8,696	11,434	19,733	18,438
Rice	0	1,034	868	2,134	7,294	2,266
Wheat	2,664	17,385	9,912	8,970	10,423	971
Cassava	0	0	5,850	118	0	1,194
I. potatoes	84	15	240	148	1,914	480

Source: Uganda National Integrated Household Survey (1994), (quoted in MAIIF, 1996)

1.9 FOOD MARKETING

Uganda's favourable rainfall and location provide it with a unique opportunity to supply food to its population and to neighbouring countries that are affected by recurrent drought and civil unrest. The informal sector handles most of the distribution of locally produced food. This sector consists of small scale private traders who buy food from the farmers and then retail it or sell it wholesale in markets and shops.

Food exports are channelled through formal and informal border trade, as well as indirectly through special agreements with international food agencies, like the World Food Programme. Over the last five years, only beans, maize and simsim were exported in sizeable quantities (i.e., over 10,000 million tonnes per annum). So Uganda exported mainly cereals, pulses, oil seeds and root crops between 1990-1994.

There is considerable evidence that rural poor households are increasingly selling their subsistence food to acquire cash to meet minimal cash requirements.

1.10 DIET

Numerous ecological zones have emerged in the country with the different ethnic groupings having different feeding traditions. The agricultural zones cutting across districts testify to the fact that more than one ethnic group may have the same traditional food habits. Traditional food crops grown within the

favourable environmental and climatic conditions influence the food consumption patterns observed in the country. The Ugandan diet is normally composed of locally available staple foods, accompanied by a sauce or relish. In the south-western and central regions, the main staple food is plantain (Matoke), supplemented by cassava, sweet potatoes, maize, beans, ground nuts and green vegetables. In the northern and eastern regions millet, sorghum and maize are the main staple foods, supplemented by cassava, sweet potatoes, beans, groundnuts, sesame and green vegetables. Protein intake is mainly obtained from vegetable sources while oil seeds, butter fat and staple starches provide the energy in the diet. Fruits, vegetables and milk are the most common sources of micronutrients.

1.11 CURRENT FOOD AND NUTRITION POLICY

Malnutrition in Uganda is endemic in many parts of the country and poses a serious threat to the health and nutritional well-being of the most vulnerable groups of the population. This high prevalence and the associated physical and socio-economic consequences are unacceptable given that Uganda is endowed with favourable agro-ecological conditions that can support and sustain the national food requirements and also in view of the nation's capacity to produce an agricultural crop surplus for the export market.

Although child malnutrition was previously documented and known to be a problem in Uganda, it was unfortunately only the acute form of severe malnutrition, that was of prime interest and concern in the sixties and seventies. Extensive work carried out in Uganda by scientists of international repute in the sixties and seventies focussed mainly on the two extreme forms of malnutrition, namely, kwashiorkor and marasmus.

The Uganda Demographic and Health Survey (UDHS) of 1988-89 (Kaijuka et al., 1989) provided the initial, though partial national-level perspective of the form, magnitude and extent of the nutrition problem in Uganda. The results showed that about 45 percent of children under five years of age were stunted or too short for their age (height-for -age less than 2 s.d. below mean for WHO reference population), 23 percent were under-weight (low weight-for -age) and 2 percent were wasted (low weight-for-height).

The type of malnutrition highlighted by this study revealed a new dimension of the problem that was characterized by a high prevalence of chronic malnutrition resulting in stunted growth of young children. Other studies since then have confirmed the wide prevalence of malnutrition in general and have also indicated the existence of serious micronutrient deficiencies.

With respect to Iodine deficiency, results of two studies conducted in 1991 in five high risk districts, revealed an overall total goitre rate (TGR) of 75 percent and visible goitre rate of 40 percent (MOH, 1993a). Preliminary results from the National Micronutrient Survey of 1993, organised by the Ministry of Health, indicate a widespread problem of iodine deficiency disorders in most districts of Uganda. An over-all national TGR of 16 percent was documented (MOH, 1993b).

With regard to Vitamin A deficiency (VAD), ophthalmic signs of the deficiency in children under 6 years of age were detected in 5.4 percent of the survey children in the Kamuli District survey of 1991. The prevalence rate of corneal xerosis/ulceration and keratomalacia was 26 times greater than the minimum level considered by WHO to constitute a vitamin A problem of public health significance, and the level of corneal scars was 35 times above the WHO minimum critical level (MOH, 1993a).

Iron deficiency anaemia (IDA) is believed to be widely prevalent clinically, with the main vulnerable groups being women and children. However, population based data on IDA is currently not available, and the problem is further compounded by the multiple causation of IDA where parasitic infestation and other tropical disorders contribute significantly to this nutritional deficiency.

Maternal malnutrition is also believed to be a common problem, although there is little documented evidence to this effect. The rate of low birth weight (<2.5 kg), which may be considered as a reflection of maternal malnutrition, is currently reported to be between 10-20 percent, using hospital based data (MOH, 1993c). This figure, it would appear, is likely to be an underestimate, since birth weights are not known for more than 60 percent of total births which take place in the home.

During the past decade Uganda has undergone marked positive changes in the political, social and economic spheres of life. The government and people have initiated action to address the various problems that had hitherto received little or no attention.

The overall legal framework to guarantee the fundamental rights of Ugandans to enjoy a sustained level of Food Security and Nutrition has now been enshrined in the recently promulgated Constitution of the Republic of Uganda (Republic of Uganda, 1995). For the first time in Uganda's history the supreme law of the land recognized the state's obligation towards the fulfilment of this strategic goal by highlighting it as a top priority agenda item as provided for in the "National Objectives and Directive Principles of State Policy," which pronounce that the State shall:

- Take appropriate steps to encourage people to grow and store adequate food; and
- Encourage and promote proper nutrition through mass education and other appropriate means in order to build a healthy State.

The highest political authority in government has identified four priority programmes which will form the basis and main thrust of government policy in the area of health over the next five years beginning in the 1996/97 fiscal year. These have been identified as

- Immunization
- Environmental Sanitation (Hygiene)
- Nutrition
- Dental Care

The Ministry of Health is currently implementing various strategies in order to respond appropriately to this call, with the aim of working within the overall policy framework of government to create an enabling environment that will support the community's own efforts to improve their health and nutrition status.

In 1978, Uganda endorsed the Alma Ata Declaration on Primary Health Care as a strategy for attaining health for all by the year 2000. Subsequently Uganda expanded the list of essential elements of the National Primary Health Care programme to include additional key priority health problems.

In 1993, the Government endorsed the white paper on Health Policy (MOH, 1993d) as an important strategy for improving the health and nutrition status of the Ugandan population. The policy paper spells out the Government's position on the need to accelerate the re-orientation of health services towards primary health care with increasing attention being placed on strengthening preventive and promotive services under the newly established decentralized system of government pertaining in Uganda. The Government in 1993 also put in place the policy framework for child survival and development of Ugandan children by adopting a strategic plan to address the major causes of childhood morbidity and mortality. This is now embodied in the Uganda National Programme of Action for Children (MFEP, 1993), comprising specific actions to alleviate these problems including nutrition improvement initiatives. The commitment of Government towards child welfare is further demonstrated by the child law which seeks to protect the rights of the Ugandan child.

The Uganda National Food and Nutrition Council, the multi-sectoral organ charged with the responsibility of advising Government on food and nutrition, adopted the final draft of the National Food and Nutrition Policy Document in 1993. The Food and Nutrition policy statement provides the framework for addressing food and nutrition issues in the country.

The National Plan of Action for Nutrition draft document, developed following the International Conference on Nutrition World Declaration and Plan of Action for Nutrition, is currently nearing completion. This document spells out action-oriented strategies to eliminate starvation, malnutrition and micronutrient deficiencies which strain human and societal development in this country (NFNC, 1995).

Despite Uganda's food production potential and vast natural resources, food insecurity is still a critical problem for the majority of the population. The latest famine of 1992/93 affected 16 districts mainly in the northern and north-eastern parts of the country with severe consequences being particularly felt in the young child population. This state of affairs has been attributed to a number of factors including heavy dependency on rain-fed agriculture, inadequate agricultural technologies, poor extension services, under-developed post-harvest systems, and poor infrastructure and distribution networks as well as ineffective markets. The result was low productivity, low farm incomes, and general poverty, particularly in the rural areas (MPED and USAID, 1996).

The Government is now in the process of formulating a National Food Strategy, to ensure food security and to develop food production in Uganda, and also to expand the Ugandan food exports in the neighbouring food deficit countries in the region.

1.12 DATA SOURCE AND TYPE OF INFORMATION COLLECTED

The Uganda data presented in this report are based on the 1995 Uganda Demographic and Health Survey (UDHS), a nationally representative survey conducted by Statistics Department of the Ministry of Finance and Economic Planning in collaboration with the Population Secretariat and the Ministry of Health. Technical assistance was provided by the Demographic and Health Surveys (DHS) Programme of Macro International Inc. in Calverton, Maryland, and financial assistance was provided by the U.S. Agency for International Development. Fieldwork for the survey was conducted between March and August 1995. The UDHS was designed to provide information on fertility and family planning among women of reproductive age, infant and child mortality, and maternal and child health and nutrition. A total of 7,550 households were included in the survey, from which 7,070 women aged 15 to 49 years were interviewed. The sample design of the UDHS is described in Appendix A.

A detailed description of the UDHS sample and data collection methods are presented in the UDHS survey report (Statistics Department [Uganda] and Macro International Inc., 1996). Data were collected at both the household and individual levels. Data collected at the household level included background information on all household members, including age, sex, education and relationship to the head of the household. Also collected were data on characteristics of the household's dwelling unit, such as the source of water, type of toilet facilities, flooring material and ownership of various consumer and durable goods. At the individual level, detailed information was sought on women's reproductive history, contraceptive knowledge and use, current pregnancy and parity, education and occupation, breastfeeding behaviour, marital status, antenatal and delivery care, maternal mortality, husband's education and occupation, and knowledge of sexually transmitted diseases (particularly HIV/AIDS). Appendix B presents the background characteristics of the households and respondents included in this report.

This report presents the results of analyses of nutrition and health data for 4,775 children under four years of age included in the UDHS who had complete age and anthropometric data. Nutritional data collected

on these children included height, weight, age, breastfeeding history and feeding patterns. Information was also collected on diarrhoea, fever and cough in the two weeks prior to the survey and on relevant socio-economic and demographic characteristics. For comparison purposes, data are presented from Demographic and Health Surveys conducted in other sub-Saharan countries.

An earlier Demographic and Health Survey was conducted in Uganda in 1988/89. Where applicable, in this report comparisons between the first and second UDHS are made. It is of note, however, that in the 1988/89 UDHS anthropometric measurements, nutrition and health information was obtained for children 3 to 36 months of age only, and the nine districts comprising the Northern region were excluded. Therefore, comparisons in the text between 1988/89 and 1995 are based on the 3 to 36 month age range and on the three geographical regions (Central, Eastern and Western) common to both surveys.

Chapter 2

NUTRITIONAL STATUS OF INFANTS AND CHILDREN

Malnutrition is one of the most important health and welfare problems among infants and young children in Uganda, resulting in serious health and economic consequences for both the individual and nation. The prevalence and severity of malnutrition among Ugandan infants and children from birth to four years of age, regional differences in malnutrition, and the age-specific nature of the patterns of malnutrition, are described in this chapter. Comparisons are also made with the 1988/89 UDHS, and with Demographic and Health Surveys in other African countries.

2.1 EFFECTS OF MALNUTRITION

Malnutrition results in increased risk of illness and death[1]. In addition, malnutrition can result in a lower level of cognitive development, which results in lower educational attainment (Brozek and Schurch, 1984). In adulthood, the accumulated effect of malnutrition can be a reduction in worker productivity and increased absenteeism in the workplace, both of which may reduce individual and national lifetime earning potential (World Bank, 1993). Malnutrition also has intergenerational effects; infants born to women who themselves were malnourished during early childhood are smaller than infants born to better nourished women (Villar and Rivera, 1988). Infants born with low birth weight (defined as birth weight less or equal to 2.5 kg) are at greater risk of illness and death compared with normal weight infants (IOM, 1985).

Malnutrition is a direct result of both inadequate intake of food and infectious disease. Inadequate food intake is a consequence of insufficient food at the household level and improper feeding practices. Infectious diseases, particularly diarrhoea, acute respiratory illness, malaria and measles, result from inadequate health care, an insufficient water suppy, and poor environmental sanitation. Poor sanitation puts infants and young children, at risk of increased incidence and duration of illness (Haggerty et al., 1994a; Clemens and Stanton, 1987). Diarrhoeal disease compromises nutritional status through reduced dietary intake, poor absorption, and increased nutrient loss (Brown et al., 1990; Rosenberg et al., 1977; Rahaman and Wahed, 1983). In environments where infectious diseases are common, children typically suffer recurrent infections and are unable to recover fully from each bout of illness. The result is weakened immunity and increased susceptibility to malnutrition. When both malnutrition and infection are present the result is an interaction that is biologically more detrimental than the combined effect of the two working independently (Scrimshaw et al., 1968).

The interaction between inadequate food intake and infectious disease, of which diarrhoea is particularly significant, is important in understanding the direct causes of child malnutrition (Lutter et al., 1989). Several studies have pointed to the fact that child nutritional status depends on both the prevalence of diarrhoea and food intake. The relationship between inadequate food intake and diarrhoea is thus interactive, or synergistic, and affects nutritional status in a manner far greater than the simple additive effects of diarrhoea or inadequate intake alone would predict. These interactive effects are of particular importance in Uganda, where the delayed introduction of complementary foods (resulting in inadequate nutrient intake) and the high prevalence of diarrhoeal disease between 3 and 12 months of age result in dramatic increases in the prevalence of malnutrition.

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[1] Although the association between malnutrition and death has been recognized for many years, recently a method has been developed to estimate the contribution of malnutrition to under five mortality (Pelletier et al., 1993).

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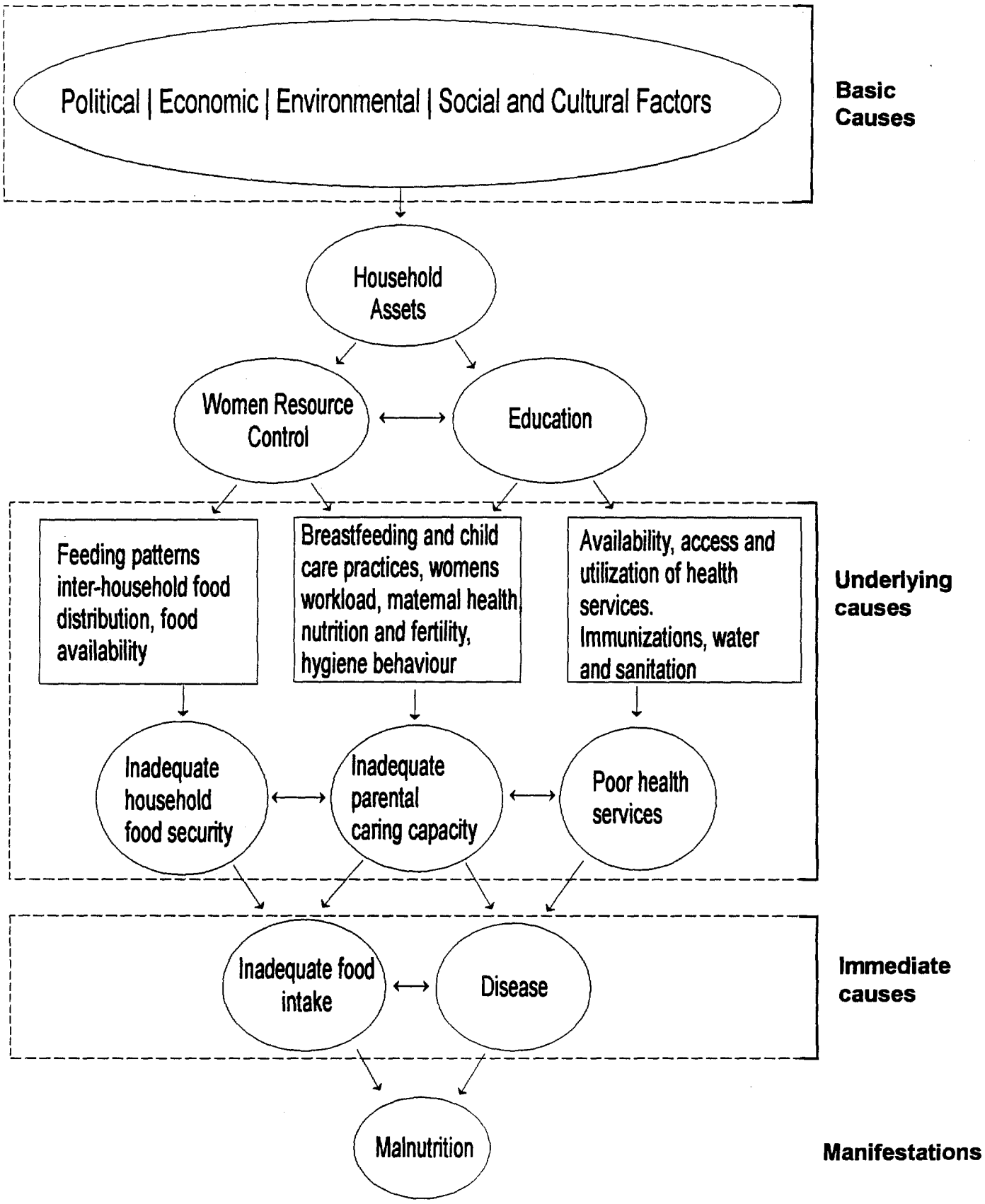
Figure 2.1 Causes of Malnutrition



Both inadequate intake of food and disease reflect underlying social and economic conditions at the household, community and national level. Figure 2.1 adapted from the UNICEF conceptual framework (UNICEF, 1990; Jonsson, 1995) reflects the relationships among variables and mechanisms that lead to childhood malnutrition. Political, socio-economic, environmental and cultural factors, operating at the national and community levels, and poverty at the household level, ultimately affect the nutritional status of children. For example, employment, by providing a source of income, is an important determinant of household food security; female employment, in particular, which offers women opportunities for resource control, has been shown to result in increased food availability, improved child care practices and improved nutritional status (NCC/UNICEF, 1996). Similarly, maternal education, through its association with the biological and behavioural causes of malnutrition, such as inter-household food distribution, child care practices, feeding behaviours and patterns, and food handling procedures, is a powerful predictor of child nutritional status and fertility (Moore, 1990). In terms of cultural influences, in some parts of Uganda food taboos which deter women and children from eating specific animal protein food and vegetable crops can adversely affect the nutritional status of these vulnerable groups. Environmental factors such as the repeated drought in the Northern and Eastern parts of the country negatively affect food production and deprive the community of seasonal micronutrient rich food sources such as amaranthus (Lwamafa et al., 1994). At the macro-level, the Government of Uganda has put in place a policy for income generation for alleviation of poverty at the household level and also as a means of improving the health and nutrition status of the Ugandan population.

The current situation in Uganda is that women are responsible for about 80 percent of food production in the country and yet only seven percent of women own land. This disparity reflects the general pattern of womens' lack of control of resources and meaningful participation in decision making at the household level. In addition, the low access to health care facilities, with only 49 percent of the Ugandan population residing within a 5 km radius of a static health unit (MOH, 1993), poor environmental conditions coupled with the high morbidity due to the common childhood diseases in Uganda, further aggravates the malnutrition problem in the country (MOH, 1993).

2.2 BASIC INDICATORS OF NUTRITIONAL STATUS

The assessment of nutritional status is based on the concept that in a well-nourished population the distribution of children's height and weight, for a given age, will approximate a normal distribution. This means that about 68 percent of children will have a height or weight within 1 standard deviation of the median for that age. About 14 percent of children will have a height or weight within 1 or 2 standard deviations of the median for that age. Of the remainder, 2 percent will have a height or weight less than 2 standard deviations from the median of that age. Because all populations have similar genetic potential for growth (Habicht et al., 1974), the U.S. National Center for Health Statistics (NCHS) Reference Data are recommended by WHO (1979) to be used in the evaluation of nutritional status.

Three indicators using measures of height and weight in combination with age are commonly used to determine nutritional status in infants and children.

Stunting, defined as height-for-age more than two standard deviations below (-2 SD) the median of the NCHS reference population, is the failure to grow adequately in height in relation to age. It reflects past or chronic malnutrition and results from inadequate food intake over a long period of time and/or repeated episodes of illness, particularly diarrhoea.

Wasting, defined as weight-for-height more than two standart deviations below (-2 SD) the median of the NCHS reference population, is the failure to gain weight adequately in relation to height and reflects recent or acute malnutrition. Wasting results from a recent shortage of adequate nutrition and/or recent or current acute illness, especially diarrhoea.

Underweight, defined as weight-for-age more than two standart deviations below (-2 SD) the median of the NCHS reference population, is a composite indicator that reflects either chronic or acute malnutrition status or both. It does not add additional information beyond that provided by the indicators of stunting and wasting, however, it is often used as a general indicator of a population's health status.

Children who are below -2 SD but not below -3 SD are considered moderately malnourished, whereas children who are below -3 SD are considered severely malnourished.

Although a child may be both stunted and wasted, these two indicators often reflect different aetiologies and consequences, and hence, have some different implications for programmatic action. Appendix C discusses some aspects of the quality of nutrition data from the 1995 UDHS.

2.3 GESTATIONAL AGE AND BIRTH WEIGHT

Less than 3 percent of children are reported to have been delivered by cesarean section (Table 2.1). Mothers were able to report birth weights for only 26 percent of children. The mean birth weight for those children is 3.2±0.7 kg, which is similar to the NCHS median of 3.3 kg (WHO, 1979). Among those children weighed at birth, the incidence of low birth weight is 10.3 percent. This is higher than the incidence of low birth weight in the U.S. of 7 percent (IOM, 1985), though less than in many developing countries. However, since this incidence is based on only about a quarter of all births, it must be interpreted with caution. In contrast to the low reported incidence of low birth weight, nearly 20 percent of the infants were perceived by their mothers to be small at birth (Table 2.1)[2]. Assuming maternal perception of having a small infant may influence feeding and care behaviours, maternal perceptions of small size as well as actual size are important to consider in examining the factors associated with malnutrition.

Table 2.1 Type of delivery, birth weight and size at birth

Among children under four years, the percentage delivered by caesarean section, the percentage weighed at birth, mean birth weight, the percentage of low birth weight (LBW) births and the percentage of births that were of average size or larger, or small, at birth, Uganda 1995

Characteristic	Percentage	Number of children[1]
Caesarean section	2.6	4,746
Weighed at birth	25.8	4,775
Mean weight (kg) and (SD)	3.2 (0.7)	1,233
LBW[2]	10.3	1,233
Size at birth		
Small	19.3	4,721
Average+	80.7	4,721

[1] Totals vary due to missing cases.
[2] Low birth weight (less than 2.5 kg)

Significant regional differences in the proportion of newborns who were weighed at birth were reported (Table 2.2). The highest proportion was in the Central region, where 44 percent of mothers could report birth weights, and in the urban areas, where 68 percent of mothers could report birth weights. In contrast, in the Northern and Western regions only 14 and 17 percent of mothers could report birth weights, respectively. In rural areas, only about 20 percent could report birth weights.

Although the incidence of low birth weight was 11 percent in rural areas as compared with 8 percent in urban areas, this difference was not significant. Low birth weight was significantly higher among female (12 percent) than among male (8 percent) newborns. Both rural mothers and mothers of female infants were significantly more likely to perceive their infant to be "small" at birth. Mothers in the Northern region were twice as likely to perceive their infant to be "small" at birth as compared with mothers in the Central and Western regions (15 versus 30 percent).

[2] A Kappa correlation of 0.6 was found between reported low birth weight and mother's perception of small infant size at birth.

Table 2.2 Birth weight and size at birth for children under four years

Among children under four years, the percentage weighed at birth, mean birth weight, the percentage of low birth weight (LBW) births, and the percent distribution of births that were small at birth, or of average size or larger, by region, residence, and sex of child, Uganda 1995

Region, residence, and sex of child	Weighed at birth	Mean weight (kg) and (SD)	LBW[1] births	Size at birth			Number of children[2]
				Small	Average+	Total	
Region							
Central	44.2	3.2(0.7)	9.4	15.9	84.1	100.0	1,224
Eastern	27.3	3.2(0.7)	9.2	20.8	79.2	100.0	1,249
Northern	16.7	3.1(0.6)	11.9	30.1	69.9	100.0	907
Western	13.9	3.3(1.0)	13.6	13.7	86.3	100.0	1,342
	p<0.0001	p<0.01	NS	p<0.0001			
Residence							
Urban	68.0	3.2(0.7)	8.4	15.9	84.1	100.0	530
Rural	20.5	3.2(0.8)	11.1	19.7	80.3	100.0	4,191
	p<0.0001	NS	NS	p<0.03			
Sex of child							
Male	25.9	3.3(0.8)	8.2	16.4	83.6	100.0	2,304
Female	25.8	3.1(0.8)	12.3	22.0	78.0	100.0	2,417
	NS	p<0.0002	p<0.02	p<0.0001			
Total	26.1	3.2(0.8)	10.3	19.3	80.7	100.0	4,722
Number[2]	4,722	1,233	1,233	910	3,811		4,722

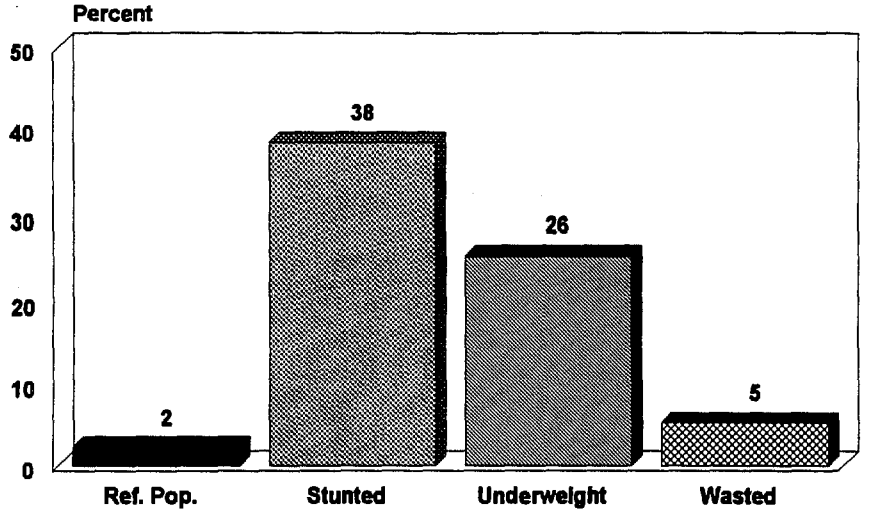
Note: Level of significance determined using Chi-square test.
NS = Not significant
[1] Low birth weight (less than 2.5 kg)
[2] Totals vary due to missing cases.

2.4 PREVALENCE OF MALNUTRITION

The prevalence of malnutrition in Uganda is high, with 38 percent of children less than 4 years of age being stunted, and 5 percent being wasted (Figure 2.2). In other words, more than one-third of Ugandan children are too short. These are 19 and 2½ times, respectively, the levels that would be expected in a healthy, well-nourished population. Boys are slightly more stunted than girls (40 percent versus 37 percent, respectively, $p<0.05$) (Table 2.3).

Of the children who are stunted, 40 percent are severely stunted (i.e., below -3 SD from the reference median) (Table 2.3). Thus, severe stunting affects 15 percent of all Ugandan children. Likewise, about one in six (17 percent) of the wasted children (or 1 percent of all the children) are severely wasted (Table 2.3). In a healthy, well-nourished population only 1 in 1,000 children is expected to be severely malnourished. Thus, the level of severe stunting in Uganda is 15 times that expected in a healthy, well nourished population and severe wasting is 17 times healthy levels.

Figure 2.2
Malnutrition among Children under Four Years, Uganda



UDHS 1995

Table 2.3 Moderate and severe stunting and wasting, by region, residence and sex of child

Among children under four years, the percentage moderately malnourished and the percentage severely malnourished, by region, residence, and sex of child, Uganda 1995

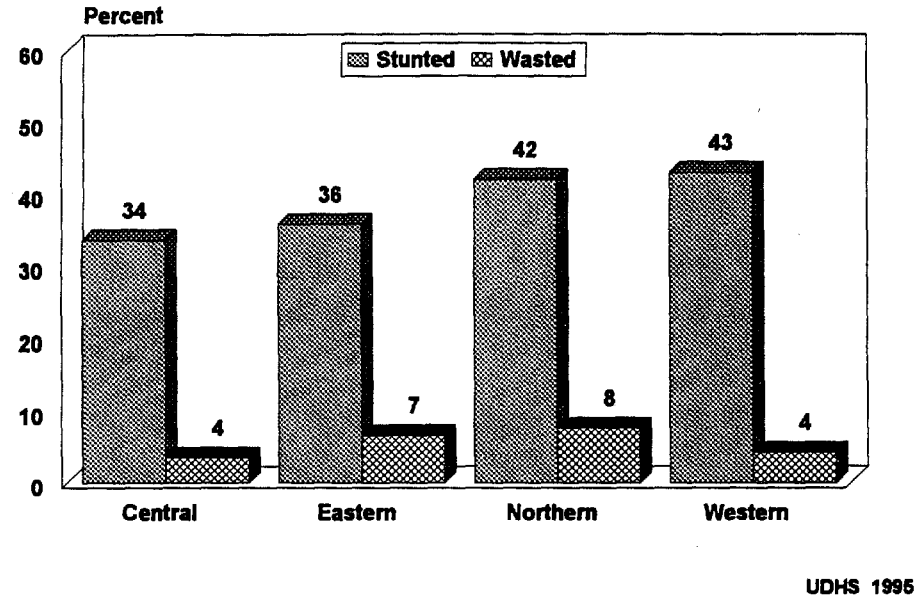
Region and residence	Stunted			Wasted		
	Moderate[1]	Severe[2]	Number	Moderate[1]	Severe[2]	Number
Region						
Central	22.4	11.1	1,228	2.8	0.7	1,228
Eastern	21.3	14.3	1,269	6.1	0.5	1,269
Northern	24.1	17.8	927	6.2	1.4	927
Western	25.4	17.4	1,351	3.0	1.1	1,351
	p<0.0001			p<0.0001		
Residence						
Urban	14.6	7.9	537	3.8	1.2	537
Rural	24.4	15.9	4,239	4.5	0.9	4,239
	p<0.0001			NS		
Sex of child						
Male	24.0	16.0	2,334	5.0	1.1	2,334
Female	22.7	14.1	2,441	3.8	0.7	2,442
	p<0.05			NS		
Total	23.3	15.0	4,775	4.4	0.9	4,775

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

2.5 GEOGRAPHIC VARIATIONS IN MALNUTRITION

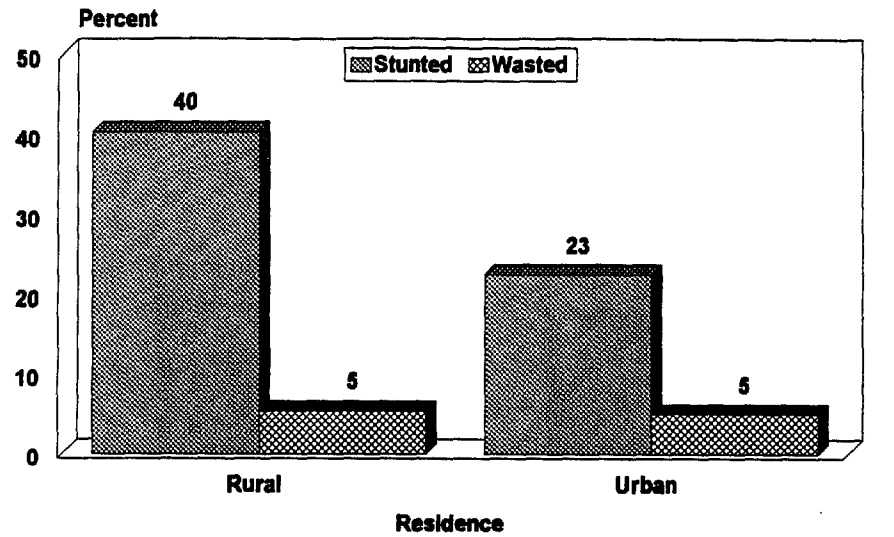
There are noticeable and significant regional differences in the proportion of children suffering from malnutrition (Figure 2.3). The highest prevalences are in the Northern and Western regions with about 42 percent of children stunted. However, the level of wasting is twice as high in the Northern region as compared with the Western region (8 versus 4 percent). In contrast, the lowest prevalences are in the Central and Eastern regions with about 35 percent. However, the level of wasting is higher in the Eastern region as compared with the Central region (7 versus 4 percent).

Figure 2.3
Malnutrition among Children under Four Years by Region, Uganda



Urban versus rural residence of a child is also significantly associated with malnutrition. Stunting is nearly twice as prevalent among rural children compared with urban children (40 versus 23 percent) (Figure 2.4). However, the level of wasting is similar at about 5 percent.

Figure 2.4
Malnutrition among Children under Four Years by Urban/Rural Residence, Uganda



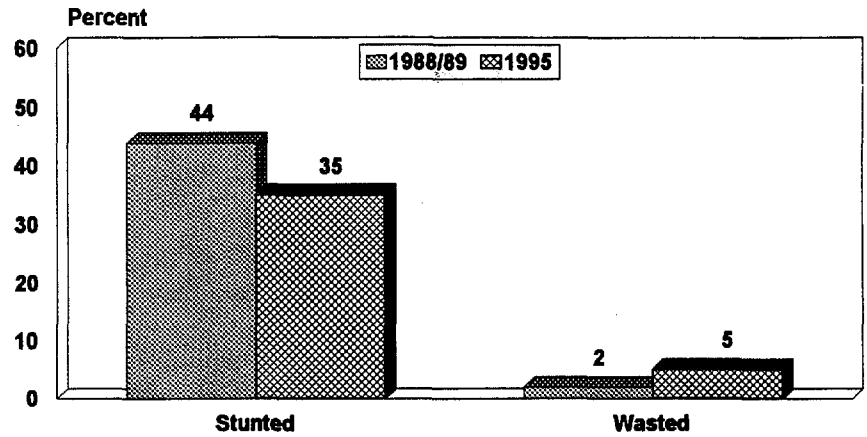
UDHS 1995

2.6 CHANGES IN MALNUTRITION SINCE 1988/89

There were differences in sampling methods between the first and second Uganda DHS surveys and, therefore, any comparisons between the two surveys must take these differences into account. In the 1988/89 UDHS, only children 3 to 36 months of age had anthropometric measurements taken, whereas in 1995, all children under 4 years of age were included. In this report, comparisons are made for the age range that overlaps, i.e. 3 to 36 months. In addition, in the 1988/89 UDHS the Northern region was not included in the sampling frame, although it was included in 1995. Therefore, when comparing changes between the two surveys, only the Central, Eastern and Western regions are included.

Between the 1988/89 and 1995 UDHS surveys there has been a significant decline in the prevalence of stunting from 44 to 35 percent (Figure 2.5). This decline may be in part attributed to the greater political stability in the country and the economic growth policies put into place by the Government. The rehabilitation of the infrastructure has also improved the population's access to social services such as health, water and sanitation, and more people are able to grow their own food.

Figure 2.5
Malnutrition among Children 3 to 36 Months in 1988/89 Compared with 1995, Uganda



Note: Comprison is based on the age range 3 to 36 months, and the three regions (Western, Central, Eastern) common to both surveys.

UDHS 1988/89 and 1995

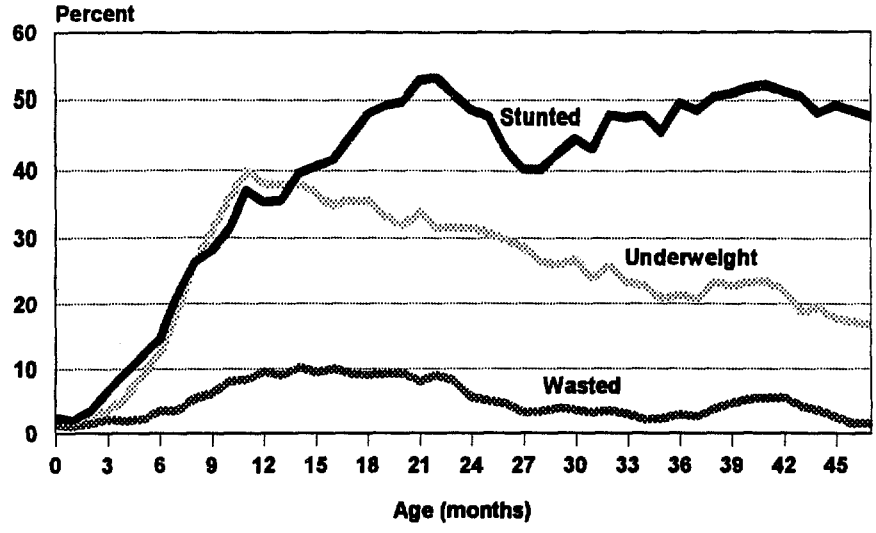
In contrast to the lower level of stunting, there has been an increase in the level of wasting, from 2 to 5 percent, between 1988/89 and 1995. Because wasting reflects acute nutritional status which is influenced by a number of short term (i.e., seasonal, episodic) factors, this increase must be interpreted with caution. The increase may be real, which would be cause for some concern, or it may be due to differences between the two surveys in the seasons during which data were collected[3], or to annual fluctuations in wasting related to variations in agricultural output, disease prevalence, climate, etc.

2.7 AGE-SPECIFIC PATTERNS OF MALNUTRITION

There is a clear age-specific proportion of children suffering from stunting and wasting (Figure 2.6). The prevalence of stunting starts to rise precipitously at about 1 month of age and continues to rise until about 2 years of age when more than 50 percent of children are stunted. Wasting follows a different pattern, rising rapidly and peaking earlier, at around 12 months, when 10 percent of children are wasted. It remains at this high level through the second year before declining to about 5 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. All three indicators show infants and toddlers to be most vulnerable to malnutrition and the first 2 years of life to be a critical period for interventions to improve nutritional status.

[3] Fieldwork for the 1995 UDHS was conducted from March through August, whereas in the 1988/89 survey, data were collected between September 1988 and February 1989.

Figure 2.6
Stunting, Underweight, and Wasting among Children under Four Years, Uganda



UDHS 1995

Inadequate dietary intake and illness experienced during infancy and the second year of life clearly results in long-term growth failure, manifested by the sustained high level of stunting in the third and fourth years of life. Because these are cross-sectional data, it cannot be determined if the prevalence of stunting continues to increase or merely reflects the deficits acquired during the first two years of life. Longitudinal data from other studies; however, would suggest that the proportion of children aged 3 and 4 years who are stunted reflects deficits acquired during their first two years (Lutter et al., 1989).

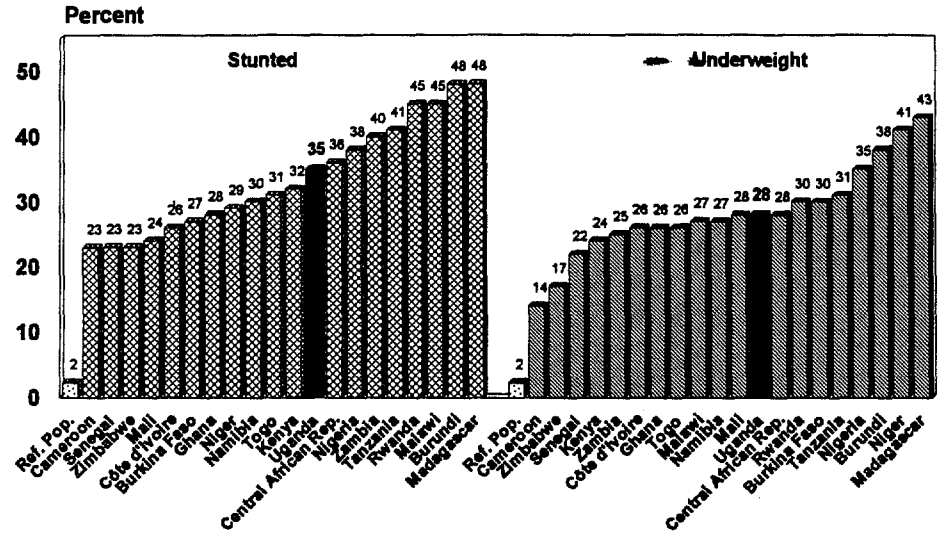
Although chronic malnutrition, as reflected by the prevalence of stunting, is a greater nutritional problem in Uganda than acute malnutrition, the prevalence of acute malnutrition is also high. About 6 percent of all children less than 4 years of age and 10 percent of children age 12 to 24 months are wasted. As with the data on stunting, these data indicate that the most critical period of nutritional vulnerability for Ugandan children is in the first two years of life.

2.8 MALNUTRITION AMONG CHILDREN AGE 3 TO 35 MONTHS IN UGANDA COMPARED WITH OTHER SUB-SAHARAN COUNTRIES

Comparison of nutritional status among sub-Saharan countries must be done with caution as the season in which anthropometric data are collected can greatly affect the proportion of children categorized as underweight. Underweight and wasting would be especially vulnerable to this limitation; stunting would be less affected. Among the sub-Saharan countries surveyed, the percentage of children age 3 to 35 months

who are underweight ranges from 14 percent in Cameroon to 43 percent in Madagascar (Figure 2.7)[4]. In the vast majority of the countries, however, the percentage underweight falls between 22 and 31 percent. Uganda, at 28 percent underweight, falls in the middle range for sub-Saharan countries. In terms of stunting, Uganda's prevalence of 35 percent stunting is in the high middle range of sub-Saharan countries surveyed (Figure 2.7).

Figure 2.7
Malnutrition among Children Age 3 to 35 Months in Uganda Compared with Other Sub-Saharan Countries



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

Source: DHS Surveys 1986-1995

[4] Only children aged 3 to 35 months are included in cross country comparisons because this is the common age range sampled across all the countries surveyed.

Chapter 3

INFANT AND CHILD FEEDING PRACTICES

3.1 OPTIMAL INFANT AND CHILD FEEDING PRACTICES

Infant and child feeding practices are important predictors of child nutritional status and hence the prevalence of malnutrition. In this chapter, optimal infant feeding practices are described and compared with infant feeding practices in Uganda.

Optimal infant feeding is defined by WHO and UNICEF as follows (WHO/UNICEF, 1990; WHO, 1994):

- Initiation of breastfeeding within about one hour of birth;
- On-demand and frequent feeding (including night feeds);
- Exclusive breastfeeding (defined as breast milk only and no other foods or liquids) until the infant is about 6 months of age;
- Breastfeeding complemented with hygienically prepared appropriate local weaning foods at about 6 months of age;
- Increased breastfeeding during illness and recovery
- Continued breastfeeding well into the second year of life and beyond.

Early initiation of breastfeeding is important in that it fosters mother-infant bonding and takes advantage of the newborn's intense sucking reflex and alertness immediately postpartum, which permits the newborn to benefit within the first hour of life from the nutritional, anti-bacterial, and anti-viral properties of colostrum (Righard and Alade, 1990). Early initiation of breastfeeding also stimulates breast milk production and causes the uterus to retract, which can reduce postpartum blood loss. Delayed initiation of breastfeeding often results in the newborn being provided with another source of nourishment, often liquids and foods, which can introduce infection and delay lactogenesis (milk arrival) (Perez-Escamilla et al., 1996).

Frequent, on-demand breastfeeding, including night feeds, are important to ensure both that an infant receives sufficient breast milk and that the supply of breast milk is maintained. Frequent feedings can also help to prevent the problem of engorgement. On-demand feeding is important to ensure that newborns regain their birth weight (de Carvalho et al., 1983). Infants should be breastfed 8 to 10 times every 24 hours and during the first month of life even more frequently.

Exclusive breastfeeding, defined as breast milk as the only source of infant food or liquid, meets nutritional requirements (Cohen et al., 1994), satisfies fluid needs even in hot and humid climates (Sachdev et al., 1991), and protects against illness (Huffman and Combest, 1990) for about the first six months of life. Exclusively breastfed infants are 14 times less likely to die from diarrhoea compared with formula fed infants and 4 times less likely to die compared with partially breastfed infants (Victora et al., 1987). Thus, exclusive breastfeeding is the infant feeding behaviour most predictive of infant survival.

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At about 6 months of age, breast milk alone will no longer satisfy the energy and protein requirements of most infants. Local foods that are rich in energy, protein, and micronutrients, hygienically prepared, and soft to eat need to be provided. During this transitional period when complementary foods are being introduced, on-demand and frequent breastfeeding should continue to ensure that infants receive all the benefits of breastfeeding. The introduction of other foods and liquids, which is often associated with increased diarrhoeal morbidity, can be prevented with proper hygiene.

Increased breastfeeding during illness and recovery is important to reduce the risk of inadequate nutrient intake during illness, dehydration, and to promote catch-up growth. Dietary intake of all foods, except breast milk, is reduced during illness (Hoyle et al., 1980; Brown et al., 1990; Dickin et al., 1990). Thus, breastfeeding, by providing a continual source of high quality and hygienic food, plays a critical role in the maintenance of infant and child nutritional status in and around periods of illness.

The recommended duration of breastfeeding has recently received considerable attention due to several studies which show that children who are breastfed beyond the second year of life are more likely to suffer from malnutrition. A review of these studies, however, shows most to have serious methodological flaws (Grummer-Strawm, 1993). Both WHO and UNICEF recommend that because of its many nutritional and immunological benefits breastfeeding should continue into the second year of life and beyond. Breastfeeding beyond about 6 months of age should be complemented with energy and other nutrient dense weaning foods.

3.2 INITIATION OF BREASTFEEDING

In Uganda, virtually all women (99 percent) initiate breastfeeding (Table 3.1). No differences in breastfeeding initiation were found by region, maternal age, education, possession score (an indicator of socio-economic status), or source of antenatal care. Significant differences were found by place of birth and type of assistance at delivery. Women who delivered at a pubic or private facility were slightly less likely to initiate breastfeeding compared with women who delivered at home (98 versus 99 percent). Also women who delivered with a doctor, nurse, or midwife were slightly less likely to initiate breastfeeding compared with women who had other kinds of assistance (98 versus 99 percent). These differences, though significant, are too small to be of importance. In general, these patterns are similar to those found in the 1988/89 UDHS.

Although virtually all women initiate breastfeeding, the recommended practice of initiating breastfeeding within the first hour after giving birth occurs in only 46 percent of all births (Table 3.1). More serious is the practice of delaying initiation for more than 24 hours, which was reported by 13 percent of mothers. Mothers who give birth in the Eastern and Western regions are most likely to put their newborns to the breast within the first hour; about half of women report this practice. In the other regions only about 40 percent of women report putting the infant to the breast within the first hour of life. Maternal age was significantly related to timing of breastfeeding initiation, with older mothers (greater than 30 years), more likely to initiate breastfeeding within the first hour of birth compared with younger mothers. Mothers with no education were significantly more likely to breastfeed within the first hour compared with mothers with primary or secondary education. Mothers who give birth in a public facility were slightly more likely to initiate breastfeeding within an hour compared with mothers giving birth at home or in a private facility. However, overall only about 50 percent of mothers initiated breastfeeding immediately after birth and the majority of these births are in the home. Women who were assisted at birth by a doctor, nurse, or midwife or a traditional birth attendant were more likely to initiate breastfeeding within an hour compared with women with other attendants. Nearly 20 percent of those women giving birth unassisted report delaying introduction for more than a day.

Table 3.1 Initial breastfeeding

Percentage of children under 4 years who were ever breastfed and the percent distribution who started breastfeeding immediately, within 24 hours, and after 24 hours or more, by background characteristics, Uganda 1995

Background characteristic	Ever breastfed	Started breastfeeding: First 1 hour	First 24 hours	After 24 hours	Total	Number of children
Region						
Central	99.3	43.6	40.9	15.4	100.0	1,217
Eastern	99.4	48.3	40.3	11.4	100.0	1,255
Northern	99.3	39.5	46.9	13.7	100.0	922
Western	99.5	51.1	35.7	13.2	100.0	1,336
	NS		p<0.0001			
Mother's age group						
15-19	98.6	43.3	40.4	16.3	100.0	478
20-24	99.4	43.6	42.3	14.1	100.0	1,460
25-29	99.6	44.7	43.5	11.9	100.0	1,171
30-34	99.6	49.2	37.1	13.7	100.0	855
35-49	99.2	52.0	35.9	12.1	100.0	766
	NS		p<0.0006			
Mother's education						
No education	99.7	49.1	37.3	13.6	100.0	1,476
Primary	99.2	44.9	41.3	13.7	100.0	2,730
Secondary+	99.1	44.3	44.8	10.9	100.0	524
	NS		p<0.009			
Possession score[1]						
0	99.4	46.9	38.8	14.3	100.0	2,651
1	99.5	45.1	43.3	11.6	100.0	1,775
2+	98.3	44.4	39.2	16.3	100.0	288
	NS		p<0.007			
Source of antenatal care						
Doctor	98.7	35.8	49.1	15.1	100.0	458
Nurse/midwife/auxiliary	99.4	47.6	39.5	12.9	100.0	3,885
TBA	100.0	51.2	31.7	17.1	100.0	41
Other/none	99.7	43.6	40.4	16.1	100.0	342
	NS		p<0.0002			
Assistance at delivery						
Doctor/nurse/midwife	98.7	48.5	40.7	10.8	100.0	1,773
TBA[2]	99.6	48.7	39.4	11.9	100.0	731
Relative/friend	99.9	43.7	41.3	15.0	100.0	1,642
Other/none	99.8	43.1	38.4	18.5	100.0	578
	p<0.0001		p<0.0001			
Place of delivery						
At home	99.8	45.2	39.9	14.9	100.0	3,025
Public facility	98.5	50.4	39.8	9.8	100.0	986
Private facility	98.8	45.2	42.9	11.9	100.0	681
	p<0.0001		p<0.0003			
Total	99.4	46.2	40.4	13.4	100.0	4,724

Note: Level of significance determined using Chi-square test
NS = Not significant
[1] Score of one for availability/ownership of electricity, radio, television, or refrigerator. Maximum score of 4
[2] Traditional birth attendant

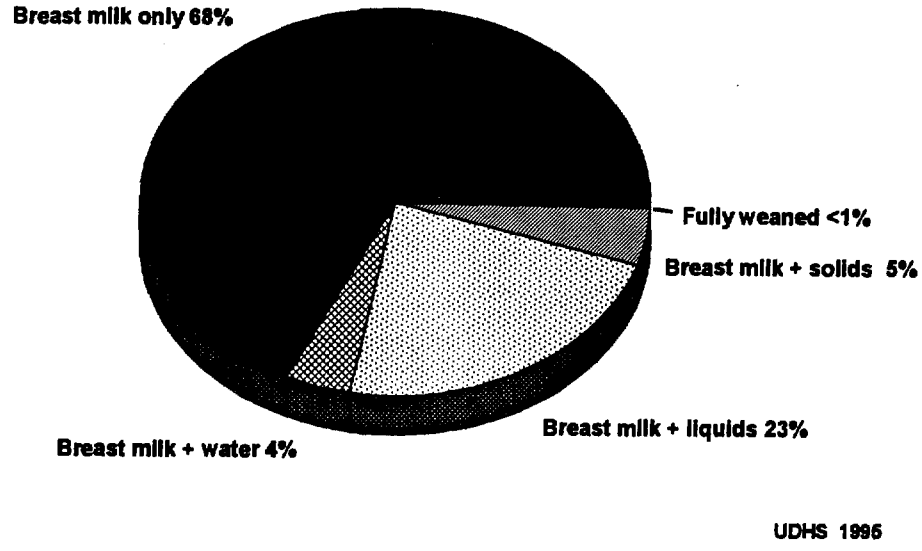
3.3 FREQUENT, ON-DEMAND FEEDING

Breastfeeding is frequent and on-demand. Among infants under 6 months, 86 percent were breastfed six or more times in the 24 hours preceding the interview.

3.4 EXCLUSIVE BREASTFEEDING

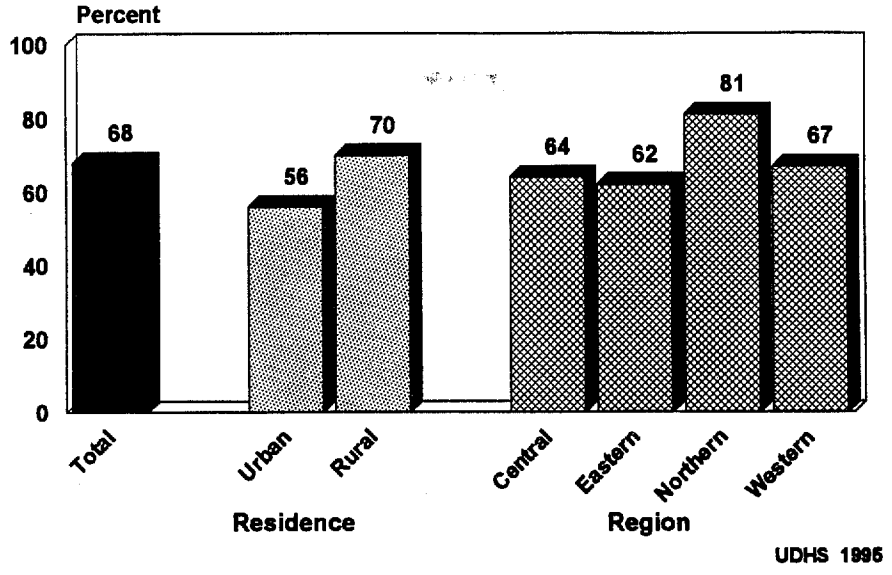
Exclusive breastfeeding, the behaviour most important to infant health and survival, is commonly practiced; nearly 70 percent of all infants less than 4 months of age are exclusively breastfed (Figure 3.1). This high prevalence of exclusive breastfeeding is similar to that found in the 1988/89 UDHS. The provision of only water in addition to breast milk, or "full breastfeeding," was practiced by another 4 percent of infants, which again was similar to the previous survey. Another 23 percent receive liquids in addition to breast milk, 5 percent receive solids, and less than 1 percent are weaned. Thus, breastfeeding patterns have not changed over the past 6 years in Uganda, and exclusive breastfeeding remains high relative to other sub-Saharan countries (Macro International, 1996).

Figure 3.1
Breastfeeding Practice Among Infants under 4 Months of Age, Uganda



Significant regional differences in the proportion of infants exclusively breastfed were found ($p<0.05$) (Figure 3.2). Infants in the Northern region are more likely to be exclusively breastfed compared with infants in the other regions (81 versus 62 to 67 percent). Exclusive breastfeeding is also more common in rural compared with urban areas (70 versus 56 percent).

Figure 3.2
Exclusive Breastfeeding among Infants under 4 Months by Region and Residence, Uganda



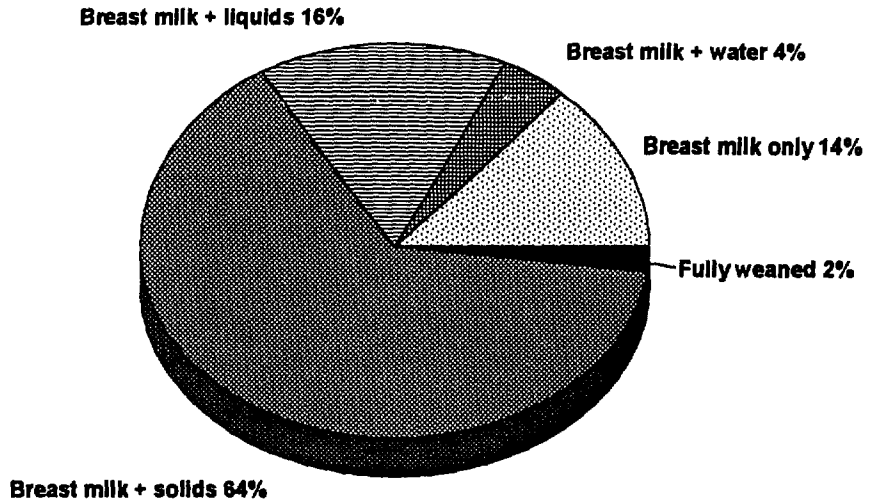
3.5 INTRODUCTION OF COMPLEMENTARY FOODS

Optimal infant feeding practices include the introduction of complementary foods at about 6 months of age. Therefore, all infants between 6 and 9 months of age should be receiving complementary foods in addition to breast milk. In Uganda, however, only 64 percent of infants in this age group are receiving both breast milk and complementary foods (Figure 3.3). Virtually all the others receive only breast milk and water, with no other source of nutrients. Thus, the introduction of complementary foods, critical at about 6 months because breast milk can no longer satisfy an infant's energy, protein, and micronutrient needs, is seriously delayed for a large proportion of Ugandan infants.

Significant regional differences in the introduction of complementary foods exist (Figure 3.4). Infants in the Eastern region are most likely to receive both breast milk and complementary foods, where 74 percent are fed in this manner. Infants in the Northern region are least likely to receive both breast milk and complementary foods, where less than 50 percent are fed in this manner. Exclusive breastfeeding from birth to 4 months of age, an optimal behaviour, is unfortunately negatively associated with timely complementary feeding between 6 and 9 months.

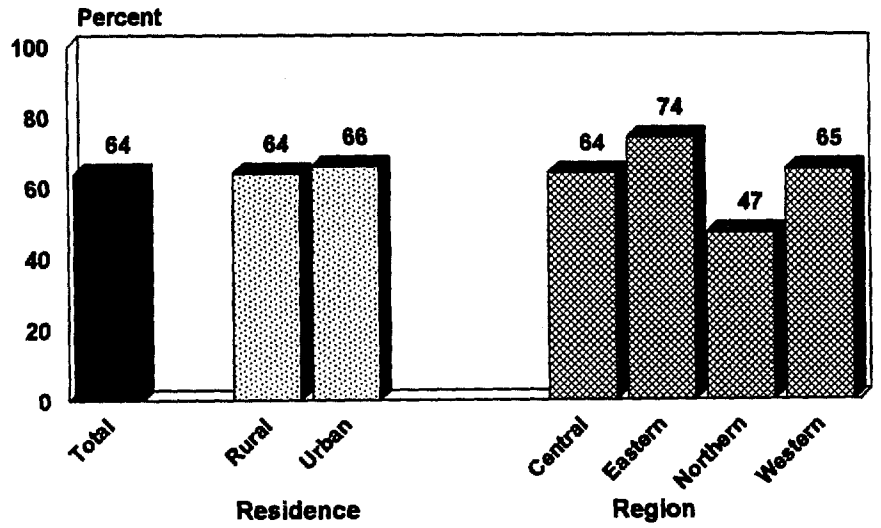
There were no significant urban rural differences in the proportion of infants breastfed and given complementary foods between 6 and 9 months. For both urban and rural infants the prevalence of this behaviour was about 65 percent.

Figure 3.3
Breastfeeding with Complementary Foods among Infants 6 to 9 Months of Age, Uganda



UDHS 1995

Figure 3.4
Breastfeeding with Complementary Solid Foods among Infants Age 6 to 9 Months by Region and Residence, Uganda



UDHS 1995

3.6 BOTTLE USE

Bottle feeding was not common in Uganda, however, 8 percent of mothers with infants did report this practice. Moreover, significant differences in bottle feeding existed for all the factors examined (Table 3.2). Bottle feeding was more prevalent among women in the Central region and in urban areas, among professional women and those with secondary or higher education, among those with a higher possession score, and among those who had frequent exposure to radio or television and who received antenatal care or delivery assistance from a physician. After controlling for all the factors significant in the bivariate model, region, maternal education, maternal occupation, regular listening to a radio, and source of antenatal care contributed significantly to the net relative risk of bottle use. Women in the Northern region were 2 times, and women in the Central and Western regions 3 times, more likely to use a bottle compared with women in the Eastern region. Women with a primary or secondary education were 1.4 and 3 times more likely to use a bottle, respectively. Women working in professional occupations were twice as likely to use a bottle compared with women working in agriculture. Women who listened on a regular basis to the radio were one

Table 3.2 Prevalence and estimates of net relative risk of bottle use

Percentage of children 0 to 11 months using a bottle and the estimate of net relative risk for using a bottle, by background characteristics, Uganda 1995

Background characteristic	Bottle use	Net relative risk
Region		
Central	14.0	2.91
Eastern	3.5	1.00[a]
Northern	6.1	1.92[b]
Western	8.8	3.04[b]
	p<0.0001	
Residence		
Urban	20.4	
Rural	6.7	
	p<0.0001	
Mother's education		
No education	4.3	1.00[a]
Primary	7.8	1.36
Secondary+	22.5	2.97[b]
	p<0.0001	
Mother's occupation		
Not working	10.0	1.76[b]
Professional[1]	19.0	2.05[b]
Agriculture (self-employed)	5.0	1.00
Domestic/Skilled manual	9.5	1.43
	p<0.0001	
Father's education		
No education	1.9	
Primary	5.6	
Secondary +	16.4	
	p<0.0001	
Listens to radio daily		
Yes	13.7	1.57
No	5.6	1.00[a]
	p<0.0001	
Watches television weekly		
Yes	25.5	
No	7.6	
	p<0.0001	

Table 3.2—*Continued*

Background characteristic	Bottle use	Net relative risk
Possession score[2]		
0	6.1	
1	8.8	
2+	24.4	
	p<0.0001	
Source of antenatal care		
Doctor	19.7	1.94[b]
Nurse/Midwife/Aux.	7.1	1.00[a]
TBA[3]	11.1	2.13
Other/none	4.3	0.82
	p<0.0001	
No. of antenatal care visits		
0	4.4	
1-3	5.1	
4-6	11.9	
7+	13.8	
	p<0.0001	
Assistance at delivery		
Doctor/nurse/midwife	13.2	
TBA[3]	5.5	
Relative/friend	6.0	
Other/none	4.0	
	p<0.0001	
Place of delivery		
At home	5.5	
Public facility	12.4	
Private facility	14.6	
	p<0.0001	
Total	8.2	

Note: Analysis based on 1,347 children. Level of significance determined using Chi-square test. Relative risk estimates based on odds ratios.
[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] Traditional birth attendant
[a] Total p<0.05
[b] p<0.05 compared with reference category

and a half times more likely to use a bottle compared with women who did not. Both occupation and access to a radio are associated with household wealth. While the risk that bottle feeding presents for infants ofwealthy women cannot be determined because wealthy women are more likely to have access to the resources needed to use bottles hygienically, the danger is that poor women, who do not have access to these resources, may regard bottle feeding as a status symbol and copy this behaviour. Lastly, receipt of antenatal care by a physician or a traditional birth attendant was associated with twice the risk for bottle use compared with women who had care from other sources.

3.7 DURATION OF BREASTFEEDING

The median duration of exclusive breastfeeding among last born children, or the time when 50 percent of infants no longer receive only breast milk, is 3 months (Table 3.3). The median duration of exclusive breastfeeding did not differ by infant sex. However, as seen previously significant regional and urban/rural differences were found. Maternal education was also inversely associated with the duration of exclusive breastfeeding. The median duration for women with no education was 4.3 months compared with 2 months for women with secondary education.

The overall duration of any breastfeeding was 20 months, illustrating that infants are breastfed well into the second year of life. This practice is consistent with optimal breastfeeding practices. Although the duration of any breastfeeding did not differ by infant sex, significant differences were found by region, urban rural residence, maternal education, and assistance at delivery.

Table 3.3 Median duration of breastfeeding

Median duration of breastfeeding among children under 3 years, by selected background characteristics, Uganda 1995

Background characteristic	Median duration of breastfeeding (months)			Number of children[2]
	Any	Exclusive	Full[1]	
Region				
Central	17.4	2.2	2.3	1,201
Eastern	19.0	2.3	3.0	1,245
Northern	24.8	5.7	6.6	925
Western	20.1	3.1	3.6	1,289
Residence				
Urban	16.9	1.8	1.9	532
Rural	19.9	3.3	3.8	4,127
Mother's education				
No education	22.6	4.3	4.7	1,432
Primary	18.6	2.7	3.2	2,735
Secondary+	17.7	2.0	2.0	491
Assistance at delivery				
Heath professional	17.8	2.2	2.4	1,722
TBA[3]	22.0	4.2	4.9	746
Other/none	20.5	3.5	3.8	2,183
Sex of child				
Male	19.4	3.1	3.8	2,279
Female	19.7	3.0	3.4	2,380
Total	19.5	3.0	3.5	4,659

Note: Medians are based on current status.
[1] Full breastfeeding includes exclusively breastfed children and those who received water in addition to breastfeeding.
[2] Number refers to the duration of any breastfeeding
[3] Traditional birth attendant

3.8 REASONS FOR WEANING

Information on the reasons for weaning was obtained from mothers for their last-born child (n=3,505). Five major categories for the reasons for weaning were found: maternal illness, child illness or death; maternal and child factors (such as nipple/breast problem, insufficient milk, and employment), child age, or pregnancy (Table 3.4). The majority of last born children were still breastfeeding (68 percent). Child age was the most common reason for weaning (13 percent) and the proportion of women citing this reason increased, as expected, with child age. Maternal and child factors was the next most common (8 percent), followed by pregnancy (7 percent).

Table 3.4 Reason for weaning of last-born child

Among last-born children under four years, the percentage weaning because: the mother or child was ill, maternal/child characteristics, mother considered it time to stop, subsequent pregnancy, or still breastfeeding, by selected background characteristics, Uganda 1995

Background characteristic	Mother ill	Child ill/died	Maternal child factors[1]	Child age	Pregnancy	Still breast-feeding	Total	Number of children
Region								
Central	2.9	1.5	13.4	15.3	5.1	61.8	100.0	896
Eastern	2.1	0.9	7.1	12.7	9.8	67.4	100.0	899
Northern	0.8	0.4	3.7	13.3	5.0	76.7	100.0	722
Western	3.9	2.6	5.3	12.5	7.1	68.6	100.0	984
				p<0.0001				
Residence								
Urban	3.3	1.0	18.8	14.2	4.8	57.9	100.0	394
Rural	2.5	1.5	6.1	13.3	7.1	69.5	100.0	3,110
				p<0.0001				
Child's age (months)								
<12	0.2	0.0	0.8	0.3	0.3	98.4	100.0	1,329
12-17	1.0	1.6	4.1	1.4	4.9	87.0	100.0	708
18-23	3.6	1.4	7.5	14.1	16.9	56.6	100.0	640
24-29	7.4	3.8	18.4	33.0	14.8	22.5	100.0	364
30-35	6.9	4.3	22.3	48.9	12.0	5.6	100.0	233
36-47	6.5	3.0	24.7	57.6	4.8	3.5	100.0	231
				p<0.0001				
Mother's education								
No education	1.9	1.5	4.4	11.9	7.1	73.2	100.0	1,092
Primary	3.0	1.5	7.3	14.1	6.8	67.5	100.0	2,026
Secondary +	2.6	1.3	17.6	14.5	6.5	57.6	100.0	387
				p<0.0001				
Possession score[2]								
0	2.3	1.8	4.5	13.0	7.3	71.1	100.0	1,989
1	3.3	0.9	9.6	14.2	6.6	65.5	100.0	1,290
2 +	1.4	1.9	20.4	14.2	4.7	57.3	100.0	211
				p<0.0001				
Stunted								
Yes	3.1	2.1	8.4	14.8	10.6	61.1	100.0	1,233
No	2.3	1.1	7.1	12.7	4.8	72.1	100.0	2,272
				p<0.0001				
Underweight								
Yes	1.7	1.5	7.2	10.2	9.2	70.2	100.0	942
No	2.9	1.4	7.6	14.6	6.0	67.5	100.0	2,563
				p<0.0001				
Total	2.6	1.4	7.5	13.4	6.8	68.2	100.0	3,505

Note: Analysis is based on 3,505 last-born children. Level of significance determined using Chi-square test.
[1] Nipple/breast problem, no milk, and working
[2] Score of one for availability/ownership of electricity, radio, television, or refrigerator.
Maximum score of 4

3.9 SUMMARY AND RECOMMENDATIONS

The infant feeding behaviour that poses the greatest threat to child nutritional status and health is the delayed introduction of complementary foods. Delaying the introduction of complementary foods puts infants at risk of malnutrition because beyond about 6 months, breast milk alone is inadequate to meet energy, protein, and micronutrient needs. While other infant feeding behaviours, such as early initiation of breastfeeding and exclusive breastfeeding, can also be improved, these are unlikely to be as strongly related to malnutrition as delayed introduction of complementary foods. Thus, the key recommendations to improve infant and child feeding practices are as follows:

- Qualitative research is needed to understand the reasons behind the timing and quality of complementary foods and to identify public health messages that may be effective in promoting the introduction of appropriate local complementary foods at about 6 months.

- Once identified and formulated these messages should be disseminated through various forms of media to reach the widest possible audience.

- Operations research is needed to test the effectiveness of the messages identified by the qualitative research in promoting the timely introduction of complementary foods.

- Both qualitative and operations research are needed to develop and test the acceptability and sustainability of locally available, nutritious, low-cost, and easily prepared and served complementary foods at the household level.

Chapter 4

MORBIDITY AND MORTALITY

Illness and inadequate food intake are direct causes of malnutrition (Jamison, 1993). In turn, malnutrition also results in increased risk of death (Pelletier et al., 1993). In Uganda, malaria, acute respiratory infection (ARI) and diarrhoeal diseases are the most common childhood illness and account for the greatest proportion of infant and under-five mortality (MOH, 1993d). In this chapter, the prevalence of morbidity and rates of mortality are described and compared with data from the 1988/89 UDHS. The prevalence and age-specific patterns of common childhood illnesses are also described and related to care-seeking behaviours.

4.1 INFANT AND UNDER-FIVE MORTALITY

Infant and under-five mortality rates were calculated for the five and ten year periods preceding the 1995 UDHS. The infant mortality rate (IMR) is the probability of death in the first year of life and is calculated per 1,000 live births. Similarly, the under-five mortality rate (U5MR) is the probability of dying before the child's fifth birthday and is calculated per 1,000 live births. Although total mortality rates are calculated for a five year period preceding the DHS, ten year rates are used in the calculations of specific background factors.

In Uganda, the IMR for the five years preceding the 1995 UDHS is 81 per 1,000. Based on the ten years preceding the UDHS, the IMR is 86 per 1,000. The IMR differs significantly by region, urban/rural residence, maternal education, maternal age at birth, previous birth interval, and infant sex (Table 4.1).[1] Infants in the Eastern and Northern regions have an IMR of nearly 100 compared with infants in the Central and Western regions who have an IMR of about 75 Infants in rural areas have an IMR of 88 compared with 74 for infants in urban areas. Similarly, maternal education is a powerful predictor of IMR in a dose-response fashion, but with the strongest effect at the highest level of education. Infants of mothers with no education, primary education, and secondary education have an IMR of 94, 88,

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 characteristics, Uganda 1995

Background characteristic	Mortality rates (per 1,000) Infant	Under-five
Region		
Central	76.6	141.3
Eastern	98.1	175.7
Northern	99.3	190.0
Western	75.1	130.7
Residence		
Urban	74.4	133.5
Rural	87.6	159.1
Mother's education		
No education	94.0	176.0
Primary	87.9	153.8
Secondary+	48.0	93.9
Mother's age at birth		
<20	109.2	196.5
20-29	83.4	149.7
30-39	70.1	131.7
40-49	71.2	135.5
Birth order		
1	107.0	182.9
2-3	83.8	157.0
4-6	78.9	148.3
7+	78.5	137.3
Previous birth interval		
<2 years	122.0	204.9
2-3 years	63.5	128.1
4 years+	47.0	87.6
Sex of child		
Male	87.4	161.9
Female	84.9	150.8
Total	86.1	156.2
Five-year rate	81.3	147.3

Note: *Infant mortality rate:* the probability of dying before the first birthday; *under-five mortality rate:* the probability of dying before the fifth birthday. Ten year rates are used to calculate mortality rates for specific background characteristics.

[1] In Table 4.1 infant and under-five mortality rates for the ten-year period preceding the 1995 UDHS are analysed according to background characteristics. Five-year rates are shown, but these are not used in the analysis of differentials. Ten-year rates have been found to give stronger statistical validity to these analyses.

and 48, respectively. Maternal age of less than 20 years at the time of birth is also associated with an increase in IMR. Infants of mothers in this age category have an IMR of 109 compared with 70 to 83 for mothers in the older age categories. Previous birth interval of less than 2 years is also strongly associated with IMR. Infants born less than 2 years after a previous sibling have an IMR of 122 compared with 64 for infants born 2 to 3 years after a previous sibling. In contrast, infants born more than 4 years after a previous sibling have an IMR of 47. Male infants are also slightly more likely to die in the first year of life compared with female infants: the IMR for male and female infants is 87 and 85, respectively.

The U5MR is 147, indicating that half of all deaths before age 5 years occur during the first year of life and half occur during the subsequent 4 years. As with IMR, U5MR also differs significantly and similarly by region, urban/rural residence, maternal education, maternal age at birth, previous birth interval, and infant sex (Table 4.1).

Because the relationships reported in this section between mortality and the various characteristics associated with it are bivariate associations and may themselves be intercorrelated, they do not imply causality. Differences based on region and urban/rural residence are likely to be related to characteristics of the population in these regions and/or access to medical care.

4.2 CHANGES IN MORTALITY SINCE 1988/89

The IMR of 81 per 1,000 and U5MR of 147 per 1,000 found in the 1995 UDHS represent considerable declines in these rates since the 1988/89 UDHS when the IMR and U5MR were 20 to 25 absolute points higher (after adjusting for the absence of the Northern region and some reporting errors in the 1988/89 UDHS as described in MFEP, 1996). The observed declines reflect the impact of efforts put in place since the mid-1980s to improve living standards and restore the health infrastructure of Uganda.

4.3 COMPARISON WITH OTHER SUB-SAHARAN COUNTRIES

The under-five mortality of 147 in Uganda is in the middle range compared with other sub-Saharan countries. The overall range is 53 in Botswana to 318 in Niger.

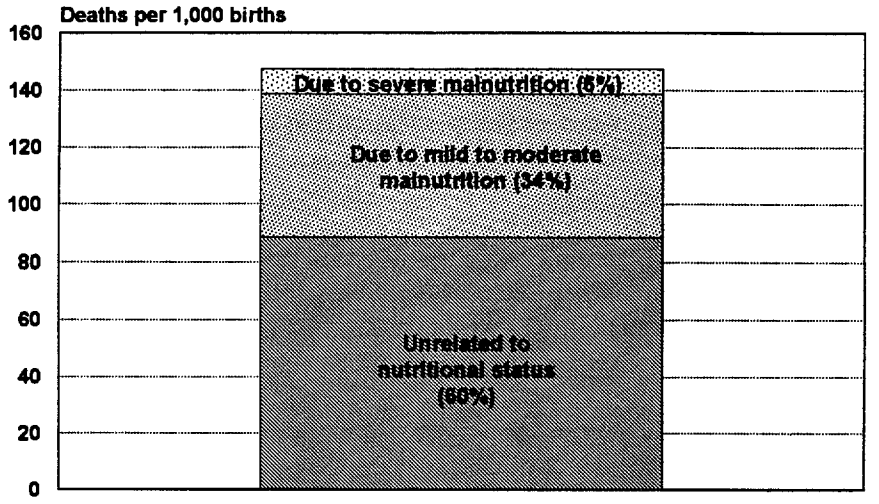
4.4 ASSOCIATION OF MALNUTRITION WITH MORTALITY

Malnourished children are at much greater risk of morbidity and subsequent death. Surprisingly, while the prevalence of malnutrition is highest in the Western region, the Western region also has the lowest IMR and U5MR. The explanantion for this dichotomy continues to be pondered in Uganda, and requires further research. The prevalence of malnutrition is lower in urban areas, which also have lower IMRs and U5MRs compared with rural areas. It is clear that these lower prevalences of malnutrition are related to factors such as maternal education which more directly influence child feeding and child care and also are associated with socio-economic status.

4.5 CONTRIBUTION OF MALNUTRITION TO UNDER-FIVE MORTALITY

Malnutrition is an important factor in the death of many young children. Malnutrition has a synergistic relationship with disease that causes an increase in the risk of death. The contributions of moderate and severe malnutrition to child mortality are presented in Figure 4.1. In Uganda, a total of 40 percent of all deaths that occur before age five are related to malnutrition. Because of its high prevalence, moderate rather than severe malnutrition contributes to the majority of these deaths. This translates to mild and moderate malnutrition contributing 34 percent of all deaths and severe malnutrition contributing only 6 percent. This suggests that nutrition programmes established to prevent and treat moderate malnutrition, as well as severe malnutrition, will have an important impact on child mortality.

Figure 4.1
Contribution of Malnutrition to Under-five Mortality, Uganda



Note: Calculation based on Pelletier et al., 1993

UDHS 1995

4.6 AGE-SPECIFIC PATTERNS OF MORBIDITY

The prevalence of common childhood illnesses, diarrhoea, ARI, and fever, were examined by maternal recall for the two-week period preceding the interview. Based on these reports, one-quarter of the children had diarrhoea, nearly half (49 percent) had a fever, and over half (55 percent) had a cough (Table 4.2). These data should be interpreted with caution because of the methodological problems often associated with maternal recall (Haggerty et al., 1994b; Martorell et al., 1976).

Significant differences for these three illnesses were found by region and urban/rural residence (Table 4.2). Prevalences for diarrhoea were lowest in the Central and Western regions compared with the Eastern and Northern regions. Interestingly, there were no rural urban differences in the prevalence of diarrhoea.

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

Percentage of children under 4 years with diarrhoea, fever, and cough (with short, rapid breathing) in the two weeks preceding the survey and whether treatment was sought, by region and residence, Uganda 1995

Region and residence	Percentage of children with:			Number of children	Advice/treatment sought for:			Number of children
	Diarrhoea	Fever	Cough[1]		Diarrhoea	Number	Fever/ Cough	
Region								
Central	17.8	41.9	44.2	1,225	71.9	217	86.3	621
Eastern	27.6	62.8	48.8	1,265	72.6	347	71.5	636
Northern	35.9	61.0	62.8	926	76.4	331	69.9	468
Western	20.8	33.0	65.2	1,351	54.1	279	64.4	716
	p<0.0001	p<0.0001	p<0.0001		p<0.0001		p<0.0001	
Residence								
Urban	21.5	37.6	44.5	534	71.1	114	85.5	248
Rural	25.2	50.0	56.3	4,222	69.0	1,061	71.5	2,193
	NS	p<0.0001	p<0.0005		NS		p<0.0001	
Total	24.7	48.6	55.1		69.2		72.9	

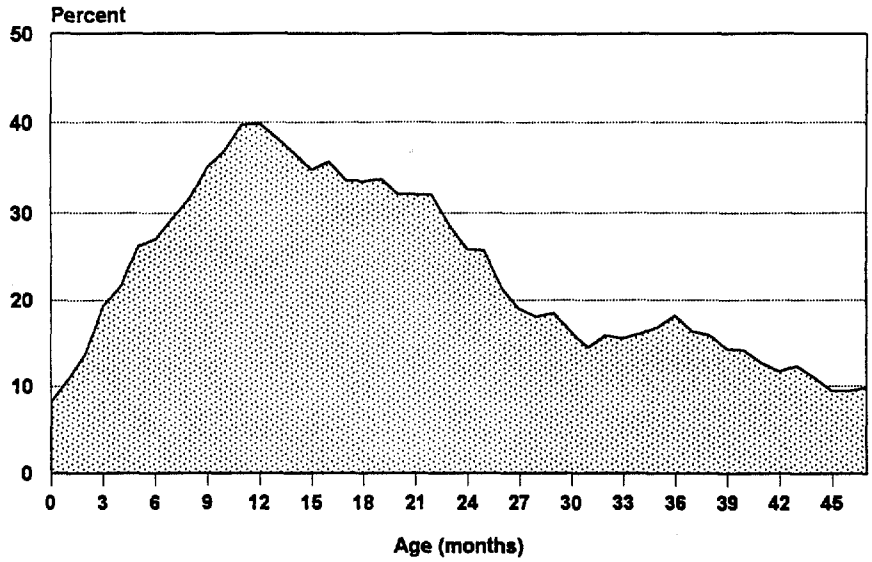
Note: Level of significance determined using Chi-square test.
NS = Not significant
[1] n=2,444 cases with cough for which data on short/rapid breathing was also available.

Prevalences for fever were also lower in the Central and Western regions. However, unlike the case for diarrhoea significant rural urban differences were found for fever, with a higher prevalence reported for rural areas. With respect to a cough, higher prevalences were found in the Central and Eastern regions and in rural areas.

As with malnutrition, significant age-related patterns were found in the prevalence of diarrhoea, fever, and cough (Figure 4.2). The prevalence of diarrhoea climbs precipitously during infancy peaking at about 11 months of age and declining slightly until about 22 months and then more sharply until 30 months before stabilizing. At the peak at 11 months, 40 percent of all mothers reported diarrhoea in the preceding two weeks. before beginning to decline. Diarrhoea frequently causes fluid loss and dehydration, decreased food intake because of anorexia, malabsorption and increased nutrient loss (Molla et al., 1976). Both dehydration and decreased food intake can lead directly to weight loss. It is noteworthy that the age-specific pattern of diarrhoea is identical to that for underweight, illustrating the direct relationship between diarrhoea and malnutrition (Figure 4.3).

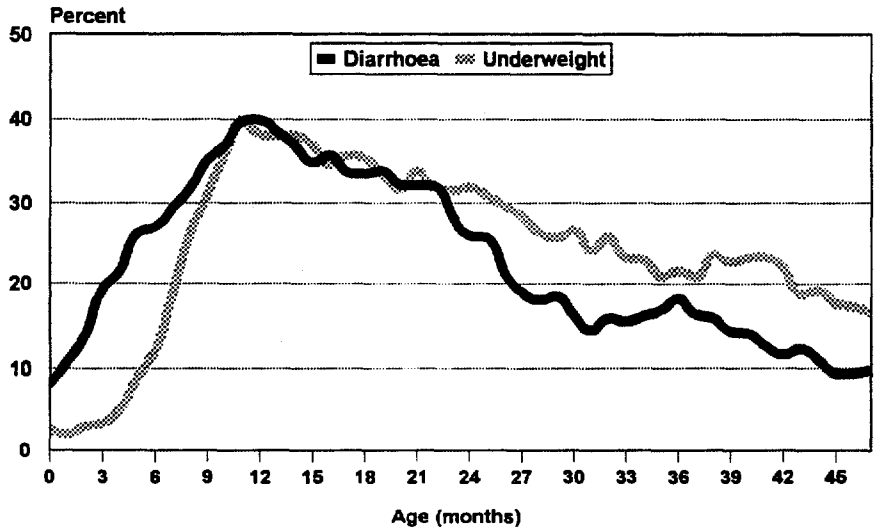
The age-specific patterns of fever and cough, shown in Figure 4.4, also rise abruptly starting at birth but peak earlier at about 6 to 9 months and remains high through four years of age.

Figure 4.2
Diarrhoea by Age of Child, Uganda



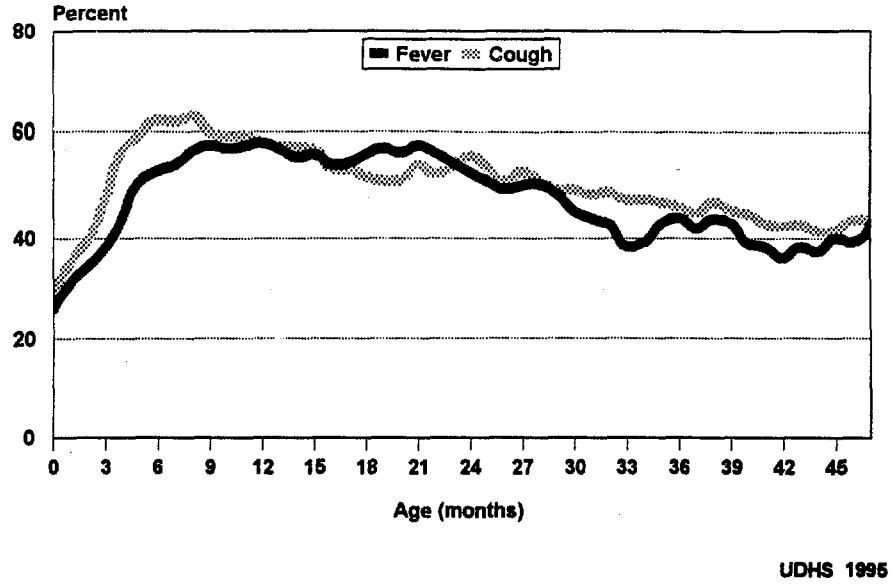
UDHS 1995

Figure 4.3
Diarrhoea and Underweight by Age of Child, Uganda



UDHS 1995

Figure 4.4
Fever and Cough by Age of Child, Uganda



4.7 MORBIDITY, BREASTFEEDING, AND TREATMENT

Overall, advice or treatment was sought for about 70 percent of the reported illnesses (Table 4.2). Although there were no significant urban rural differences in care seeking behaviour for diarrhoea, women in urban areas were significantly more likely to seek advice or treatment if their child had a fever/cough compared with rural women. This could reflect both greater access to health care in urban areas, greater awareness of the need for treatment, or both. Women in the Western region were less likely to seek advice or treatment for diarrhoea compared with women in the other regions (54 percent versus about 70 to 75 percent) and this may inpart account for the higher prevalence of malnutrition in the Western region. Women in the Central region were significantly more likely to seek advice or treatment for fever/cough compared with women in the other regions.

Slightly over one-quarter of all women who sought treatment for their child's illness of fever and/or cough reported using a public facility for this treatment, whereas nearly a half reported using a private facility (Table 4.3). Another quarter used a shop, consulted a relative or some other source. Very few (2 percent) used a traditional practitioner. There were both urban/rural and regional differences in the kind of facility sought for treatment. Women in urban areas were far more likely to report using a private facility compared with women in rural areas. Also women in the Central region were more likely to use a private facility compared with women in the other regions. Sources of treatment for diarrhoea were similar to those for fever/cough (Table 4.4), with the lowest treatment seeking behaviour found in the Western region.

Table 4.3 Source for treatment of fever and cough

Percent distribution of children under 4 years sick with fever/cough whose mothers sought treatment/advice from various sources, by region and residence, Uganda 1995

Region and residence	Source for treatment of fever/cough				Total	Number of children	Inter-region/ residence difference
	Public facility[1]	Private facility[2]	Traditional practitioner	Other private[3]			
Region							
Central	20.9	55.7	2.6	20.7	100.0	535	
Eastern	31.2	43.7	0.7	24.4	100.0	455	
Northern	25.7	41.3	2.4	30.6	100.0	327	
Western	27.8	47.6	2.8	21.7	100.0	460	p<0.0001
Residence							
Urban	17.9	68.9	1.4	11.8	100.0	212	
Rural	27.3	45.0	2.3	25.4	100.0	1,568	p<0.0001
Total	26.2	47.9	2.2	23.8	100.0	1,780	

[1] Public hospital, health center, clinic, health post
[2] Private hospital, doctor, clinic, pharmacy
[3] Shop, store, relative, other

Table 4.4 Source for treatment of diarrhoea

Percent distribution of children under 4 years with diarrhoea whose mothers sought treatment/advice from various sources, by region and residence, Uganda 1995

Region and residence	Source for treatment of diarrhoea				Total	Number of children
	Public facility[1]	Private facility[2]	Traditional practitioner	Other private[3]		
Region						
Central	19.2	63.5	5.1	12.2	100.0	156
Eastern	32.2	51.8	2.0	14.1	100.0	255
Northern	26.9	42.3	8.7	22.1	100.0	253
Western	43.0	41.7	2.0	13.2	100.0	151
		p<0.0001				
Residence						
Urban	23.5	67.9	1.2	7.4	100.0	81
Rural	30.8	47.3	4.9	17.0	100.0	734
		p<0.003				
Total	30.1	49.3	4.5	16.1	100.0	815

[1] Public hospital, health center, clinic, health post
[2] Private hospital, doctor, clinic, pharmacy
[3] Shop, store, relative, other

Among children with diarrhoea, nearly half (49 percent) were given some form of oral rehydration therapy (ORT) (Table 4.5). The vast majority (48 percent) were treated with prepackaged oral rehydration salts (ORS), prepared as a solution with water. A small proportion were given recommended home fluids (RHF). There were no significant urban/rural differences in overall use of ORT. However, regional differences were found. Children in the Northern region were more likely to be given ORS than children in the other regions. Both home-prepared solution and commercially prepared ORS, if mixed with clean water, provide an essential source of electrolytes, sugar, and water to prevent dehydration and breakdown of tissues during diarrhoeal illness.

In Uganda, about 50 percent of children were given increased fluids during a diarrhoeal episode (Table 4.6). Another 30 percent were given less, with the remainder provided with the same amount of fluids. The Central region had the highest proportion of children given more fluids during diarrhoea, while the Northern region had the lowest proportion of children given more fluids (and, conversely, the highest proportion given less fluids). Urban children were given more fluids during diarrhoea than rural children.

Table 4.5 Use of oral rehydration therapy for treatment of diarrhoea

Percentage of children under 4 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, Uganda 1995

Region and residence	Gave ORS[1]		Gave RHF[2]		Gave ORT[3]	
	Percent	Number	Percent	Number	Percent	Number
Region						
Central	44.7	217	2.3	216	45.8	216
Eastern	45.3	349	6.6	348	45.7	348
Northern	57.0	330	3.3	333	57.3	330
Western	42.1	280	6.4	280	44.6	280
	p<0.0001		p<0.04		p<0.004	
Residence						
Urban	55.3	114	6.1	115	57.0	114
Rural	46.8	1,063	4.7	1,063	47.8	1,062
	NS		NS		NS	
Total	47.7	1,177	4.8	1,178	48.7	1,176

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)

Table 4.6 Changes in feeding practices among children with diarrhoea

Among children under four years with diarrhoea, the percent distribution of those who received the same, more, or less fluids, by region and residence, Uganda 1995

Region and residence	Amount of fluids received			Total	Number of children
	Same	More	Less		
Region					
Central	17.9	72.5	9.6	100.0	218
Eastern	26.6	42.5	30.9	100.0	346
Northern	15.0	32.7	52.3	100.0	327
Western	23.6	58.2	18.2	100.0	275
		p<0.0001			
Residence					
Urban	18.4	64.0	17.5	100.0	114
Rural	21.3	47.4	31.3	100.0	1,051
		p<0.002			
Total	21.0	49.0	30.0	100.0	1,165

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

Current recommendations by WHO and UNICEF call for the continuation of feeding, with an increase in fluids during a diarrhoeal episode. Women who are breastfeeding are encouraged not only to continue breastfeeding, but also to increase the frequency of these feeds. In Uganda, about 50 percent of children were given increased fluids during diarrhoea, another 30 percent were given less fluids and 20 percent received the same amount. Thus, half of all Ugandan children are either receiving the same or less fluids during diarrhoea. Significant regional and urban/rural differences were also found. Children in the Central region were significantly more likely to receive more liquids during diarrhoea and children in the Northern region least likely (73 versus 33 percent). Conversely, children in the Central region are least likely to be given less liquids compared with children in the Northern region (10 versus 52 percent). Children living in urban areas were also significantly more likely to receive more liquids during diarrhoea compared with children in rural areas. It is possible that children in the Northern region are given less other fluids during diarrhoea because such a high proportion receive ORS.

4.8 FACTORS ASSOCIATED WITH DIARRHOEA

Diarrhoea in the previous two-weeks was significantly related to a number of both biological and non-biological factors (Table 4.7). In general, women of higher socio-economic status as defined by maternal and paternal education, floor material, type of toilet, possession score, and regular listening to a radio or viewing of a television were significantly less likely to report that their children had diarrhoea. Also, children from homes with no toilet facilities had significantly more diarrhoea than those from homes using flush toilets or latrines. This may reflect socio-economic status or the direct effect of sanitation and hygiene on diarrhoea. Among the biological factors, mothers of male children and with children less than 24 months of age were significantly more likely to report diarrhoea. Bottle use was positively associated with diarrhoea, indicating that bottle-fed infants were more likely to have diarrhoea compared with infants not fed with a bottle. As seen in Figures 4.2 and 4.3, age is strongly associated with diarrhoea, with children 6 to 23 months at greatest risk. Fever and cough were also associated with diarrhoea: children with fever and/or cough were more than twice as likely to have diarrhoea compared with children without these illnesses. Measles immunization was also associated with diarrhoea, children who had not been immunized were more likely to have had diarrhoea compared with children who had been immunized.

Because many of the factors associated with diarrhoea in a bivariate fashion are highly correlated, a logistic regression model was developed to identify the factors that best explain the incidence of diarrhoea in the previous two weeks. The estimates of relative risk, based on the odds ratios from the regression model, are presented in Table 4.7. For each factor, one category of the factor serves as the reference category, as indicated by the value of 1. A net relative risk greater than 1 indicates greater risk while a net relative risk less than 1 indicates reduced risk. The magnitude of increased or reduced risk is directly proportional to the net relative risk value. For example, for the factor urban/rural residence, the reference category is urban residence and is assigned a value of 1. The net relative risk of 1.77, 1.27, and 1.17 for residence in the Northern, Eastern, and Western regions, respectively, indicates that these infants have a 77, 27, and 17 percent greater risk of diarrhoea compared with children living in the Central region. Whether or not a woman listens to the radio is negatively related to child diarrhoea: children whose mothers listen to the radio have 26 percent more diarrhoea compared with children whose mothers do not listen to the radio. This may be the result of differential reporting of diarrhoea by socio-economic status, i.e. mothers who listen to the radio may be of higher socio-economic status and possibly better at reporting diarrhoeal episodes.

Although a number of factors were associated with diarrhoeal disease in a bivariate fashion, most of these were explained by six overriding factors: region, listening to the radio, child sex, age of child, presence of cough, and presence of fever (Table 4.7). Child's age is particularly important with children between the ages of 6 and 23 months more than twice as likely to have diarrhoea compared with children greater than 36 months of age. The greatest risk is for children 12 to 17 months of age. However, even very young children,

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

Percentage of children 0-47 months who had diarrhoea in the preceding two weeks and the net relative risk of diarrhoea, by selected background characteristics, Uganda 1995

Background characteristic	Diarrhoea	Net relative risk
Region		
Central	17.8	1.00[a]
Eastern	27.6	1.27[b]
Northern	35.9	1.77[b]
Western	20.8	1.17
n=4769	p<0.0001	
Mother's education		
No education	27.5	
Primary	24.5	
Secondary +	18.3	
n=4770	p<0.0002	
Mother's occupation		
Not working	26.1	
Professional[1]	18.7	
Agriculture employee	24.4	
Domestic/Service/Skilled manual	28.5	
n=4748	p<0.01	
Husband's education		
No education	30.7	
Primary	25.4	
Secondary +	21.2	
n=4424	p<0.0001	
Floor material		
Earth/sand[2]	24.6	
Dung	29.8	
Cem/fin/oth[3]	16.3	
n=4740	p<0.0001	
Type of toilet		
Own/shared flush	19.7	
Improved/trad. pit	23.3	
None/bush/other	30.9	
n=4755	p<0.0001	
Possession score[4]		
0	28.3	
1	20.5	
2+	16.8	
n=4752	p<0.0001	
Listens to the radio		
Yes	18.6	1.00[a]
No	27.7	1.26
n=4769	p<0.0001	
Sex of child		
Male	26.6	1.12
Female	23.0	1.00[a]
n=4769	p<0.005	

Table 4.7—*Continued*

Background characteristic	Diarrhoea	Net relative risk
Bottle use		
Yes	30.1	
No	24.4	
n=4768	p<0.04	
Child's age (months)		
0-5	19.2	1.42[b]
6-11	33.1	2.22[b]
12-17	36.3	2.47[b]
18-23	33.6	2.32[b]
24-29	20.7	1.41[b]
30-35	15.1	1.18
36-47	13.3	1.00[a]
n=4770	p<0.0001	
No. children in household		
1	30.1	
2	24.1	
3	25.3	
4	20.1	
5	22.3	
6+	22.3	
n=4769	p<0.0001	
Fever (2 weeks)		
Yes	36.7	1.73
No	13.4	1.00[a]
n=4754	p<0.0001	
Cough (2 weeks)		
Yes	33.8	1.56
No	15.2	1.00[a]
n=4765	p<0.0001	
Cough with rapid breathing (2 weeks)		
Yes	39.1	
No	27.1	
n=2444	p<0.0001	
Measles immunisation		
Yes	22.5	
No	27.1	
n=4762	p<0.0001	
Total	24.7	

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

those less than 6 months, are 50 percent more likely to have diarrhoea compared with children over 36 months. Children who had a fever were 73 percent more likely to report diarrhoea and children with a cough were 50 percent more likely to report diarrhoea.

4.9 SUMMARY AND RECOMMENDATIONS

The results presented in this chapter show that while rates of infant and under-five mortality have improved since the 1995 UDHS, that mortality rates are still very high. Malnutrition plays a particularly important role in mortality in Uganda, where 40 percent of all deaths that occur before age five are related to malnutrition. The age-specific nature of illness and the fact that half of all under-five deaths occur during the first year of life also point to infancy as a critical period in child development. Child spacing emerges as an important factor for child survival.

Thus, the key recommendations to reduce infant and child mortality are as follows:

- Because of its high prevalence, moderate rather than severe malnutrition contributes the majority of under five deaths. This suggests that nutrition programmes established to prevent and treat moderate malnutrition, as well as severe malnutrition, will have an important impact on child mortality.

- Significant geographical variation in both the reported prevalence of illness and treatment behaviour suggest that targeted interventions to specific regions is warranted. In particular, the Northern region would benefit from a campaign about the need for fluids during diarrhoea.

- Public health campaigns are needed to increase the frequency of giving fluids during and after a diarrhoeal episode, which currently occurs in only about half of the children with diarrhoea. It is also important to increase the use of oral rehydration solutions or therapy during these episodes.

Chapter 5

FACTORS ASSOCIATED WITH MALNUTRITION

Although the direct causes of malnutrition are inadequate dietary intake and morbidity, these in turn are related to a number of biological, demographic, and socio-economic factors. The relationship between these factors and malnutrition is described in this chapter using both bivariate and multivariate statistical techniques.

5.1 BIOLOGICAL AND HEALTH CHARACTERISTICS OF STUNTING

Stunting and wasting are associated with a large number of biological and health characteristics (Table 5.1). However, because stunting is a cumulative process and increases with age, differences in the age distribution of children may in part explain some of the findings. Differences in age distributions are of particular concern for factors such as the reasons for weaning, current pregnancy status, and measles vaccination.

Among children less than 4 years of age stunting is significantly associated with child age, maternal perception of small size at birth, low birth weight, twin birth, male sex, reason for weaning, maternal pregnancy status, diarrhoea or fever in the previous two weeks, measles immunization, and the number of antenatal visits. Given that stunting is a cumulative process, it is not surprising that age is significantly related to stunting, with the youngest children at least risk and older children at increasing risk. Noteworthy is the fact that already among children 6 to 11 months the prevalence of stunting is 27 percent, showing how early in life stunting begins. The prevalence is stunting peaks between 18 and 23 months and does not increase thereafter. Thus, the first two years of life is the critical period to intervene to prevent child malnutrition.

Although only about one quarter of all infant birth weights were reported by their mothers, the prevalence of stunting among low birth weight infants is 45 percent compared to 30 percent among normal weight infants. Twin birth is another risk factor for stunting, in part because of its correlation with low birth weight. The prevalence of stunting among twins was 49 percent compared to 38 percent among singletons. Male children are at greater risk of stunting compared with female children: these prevalences are 40 and 37 percent for boys and girls, respectively.

Children who were currently breastfed were least likely to be stunted compared with children who had been weaned for various reasons (Table 5.1). However, because current breastfeeding status is strongly associated with age, which in turn is strongly associated with stunting, it is likely that the positive effect of breastfeeding on stunting is a proxy for the reduced risk of stunting among younger children. Children who had been weaned because their mother was pregnant were most likely to be stunted. Stunting is also associated with maternal pregnancy status, as children of women who are currently pregnant face a greater risk of stunting than children of women who are not pregnant. Although this finding may reflect greater risk associated with short birth intervals, it may also reflect differences in the age distribution of the children and the fact that mothers of older children, who are at greater risk of the cumulative effects of stunting, may also be more likely to be pregnant than mothers of younger children.

Both diarrhoea and fever in the previous two weeks are associated with stunting (Table 5.1). Surprisingly, a negative association was also found for measles immunization. This finding is probably due to the positive association between child age and stunting; in Uganda, children tend to be one year or older before they are immunised, and therefore, they are more likely to be stunted.

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Table 5.1 Stunting and wasting, by biological characteristics

Percentage of children under four years of age who are stunted and wasted, by biological characteristics, Uganda 1995

Biological characteristic	Stunted	Wasted
Child's age (Months)		
0-5	6.8	2.0
6-11	26.5	7.3
12-17	39.7	9.8
18-23	51.3	8.3
24-29	42.7	3.3
30-35	47.2	2.1
36-47	49.8	2.9
n=4775	p<0.0001	p<0.0001
Size of child at birth		
Small	46.6	7.2
Average+	36.3	4.8
n=4721	p<0.0001	p<0.005
Birth weight		
Low	44.9	7.4
Normal	29.3	4.2
n=1233	p<0.0003	NS
Singleton/twin		
Singleton	38.1	5.1
Twin	48.6	12.0
n=4775	p<0.02	p<0.001
Sex of child		
Male	40.0	6.1
Female	36.7	4.6
n=4775	p<0.02	p<0.02
Reason for full weaning		
Mother ill	41.2	2.6
Child ill/ died	48.6	5.5
Maternal and child factors[1]	40.4	3.8
Child's age	40.2	2.8
Pregnancy	54.4	4.8
Currently breastfed	31.6	6.7
n=4737	p<0.0001	p<0.0002
Current pregnancy status		
Yes	46.2	6.1
No/ not sure	37.0	5.2
n=4775	p<0.0001	NS
Diarrhoea (2 weeks)		
Yes	43.7	8.0
No	36.6	4.4
n=4769	p<0.0001	p<0.0001
Fever (2 weeks)		
Yes	40.9	6.0
No	35.8	4.7
n=4756	p<0.0003	p<0.05
Measles immunization[2]		
Yes	43.2	5.2
No	33.4	5.4
n=4766	p<0.0001	NS
Total	38.3	5.3

Note: Level of significance determined using Chi-square test.
NS = Not significant
[1] Ill, nipple/breast problem, no milk, working and child refuses
[2] Children 9 months and older only

The prevalence of stunting among children of women who received no antenatal care during the pregnancy of the index child was 44 percent compared to 36 percent for women who had received 7 or more antenatal visits (Table 5.1). Antenatal care can help 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. However, antenatal care is also related to socio-economic status as well as care-seeking behaviours, both of which are positively correlated with child health and nutritional status.

5.2 BIOLOGICAL AND HEALTH CHARACTERISTICS OF WASTING

In general, the direction and magnitude of the associations of wasting with biological and health characteristics are similar to that for stunting (Table 5.1). Several exceptions, however, are noted. Although children who are twins are more likely to be both stunted and wasted compared with singletons, the prevalence of wasting among twins reaches 12 percent, which is extremely high. Currently breastfed children are at greatest risk of wasting, which is most likely explained by the fact that they are most likely to be in the age range where wasting is most prevalent. This suggests that differences in the age distribution of children among the various responses for "reason for weaning" are responsible for the findings and that child age is what is underlying the observed relationships.

5.3 SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OF STUNTING

The associations between social and economic factors and stunting presented in Table 5.2 should be interpreted with caution as many of the factors are highly correlated. In general, the results confirm the fact that poverty as measured by maternal and paternal education and occupation, possession score, water source, type of toilet, and floor material are highly associated with stunting. Rural children were nearly twice as likely to be stunted compared with urban children. Particularly noteworthy, however, is pronounced dose response in maternal education and stunting, which highlights the fact that even some primary school maternal education is highly protective of child nutrition. The prevalences of stunting are 43, 38, and 26 percent for women with no education, primary education, and secondary education, respectively. Although maternal educational level is highly correlated with household income, which will also positively affect child nutritional status, many studies have shown that even after holding household income constant, maternal education has a positive effect on child nutritional status. Thus, as a long-term health and nutrition investment, emphasis on maternal education is likely to have important and lasting positive effects.

Women's rank as first, second, or third wife was the only variable examined that was not associated with stunting.

Paternal education and occupation also affect child nutritional status, most likely through its association with household income level. The magnitude of the effects for both these factors is similar to that associated with maternal education.

Both listening to the radio and watching television on a regular basis were negatively associated with stunting (Table 5.2). Ownership of a radio or television is associated with household wealth, which in turn is highly and positively associated with child nutritional 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 private tap (Table 5.2). Improved pit latrines are also associated with better nutrition compared with traditional pit latrines or no latrine at all. While improved water and sanitation facilities may reflect higher income, they also have a direct impact on nutritional status because they reduce

Table 5.2 Stunting and wasting, by socio-economic characteristics

Percentage of children under four years who are stunted and wasted, by socio-economic characteristics, Uganda 1995

Socio-economic characteristic	Stunted	Wasted
Residence		
Urban	22.5	4.9
Rural	40.3	5.4
n=4775	p<0.0001	NS
Region		
Central	33.5	3.5
Eastern	35.6	6.6
Northern	41.9	7.6
Western	42.9	4.2
n=4775	p<0.0001	p<0.0001
Mother's education		
No education	43.1	7.2
Primary	38.2	4.9
Secondary+	25.7	2.4
n=4775	p<0.0001	p<0.0001
Husband's education		
No education	43.2	8.2
Primary	40.8	5.1
Secondary+	30.5	3.8
n=4429	p<0.0001	p<0.0009
Husband's occupation		
Not working	36.3	6.3
Professional[1]	33.3	4.2
Agriculture/self-employed	42.0	6.2
Services/Skilled manual	32.0	3.6
n=4775	p<0.0001	p<0.03
Wife's rank		
First	42.6	3.5
Second	37.6	8.4
Third +	37.8	5.1
n=4773	NS	p<0.0009
Reads the newspaper weekly		
Yes	39.9	2.7
No	29.2	5.7
n=4759	p<0.01	p<0.0009
Watches TV weekly		
Yes	21.4	2.7
No	39.0	5.4
n=4775	p<0.0001	NS
Listens to radio daily		
Yes	32.8	3.9
No	41.1	6.0
n=4775	p<0.0001	p<0.003

Table 5.2—*Continued*

Socio-economic characteristic	Stunted	Wasted
No. antenatal care visits		
None	43.6	4.3
1-3	39.3	6.5
4-6	37.3	4.1
7+	35.6	5.6
n=4758	p<0.05	p<0.008
No. dead children		
0	37.0	5.0
1	41.1	5.4
2+	40.1	6.4
n=4775	p<0.04	NS
Possession score[2]		
0	42.2	6.2
1	36.1	4.3
2+	16.1	3.3
n=4758	p<0.0001	p<0.006
Transport owned		
None	38.9	26.8
Bicycle	38.4	24.6
Car/motorcycle	25.1	12.8
n=4751	p<0.02	p<0.003
Drinking water source		
Private tap	16.2	0.7
Public tap	23.9	4.5
Well	39.0	5.4
Borehole	33.3	5.0
Surface water/other	41.4	5.5
n=4764	p<0.0001	p<0.03
Type of toilet		
Flush	24.9	0.9
Pit	37.6	5.0
None	42.5	6.7
n=4760	p<0.002	p<0.04
Total	38.3	5.3

Note: Level of significance determined using Chi-square test.
NS = Not significant
[1] Includes professional, clerical, managerial and sales occupations.
[2] Score of one for availability/ownership of electricity, radio, television, or refrigerator. Maximum score of 4

levels of infectious disease. Poor households are more likely to obtain water from public or open-air sources and less likely to have toilet facilities. Where water is not readily available, food hygiene is often inadequate and where sanitation is poor an increased number of insects (particularly flies) are present. Both of these increase the risk of illness through contamination of food and water.

Stunting also is associated with the number of previous child deaths in a family. Children of mothers with one 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.

5.4 SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OF WASTING

In general, the findings for wasting are similar to those for stunting with a few exceptions (Table 5.2). Unlike the case for stunting, urban/rural residence was not associated with wasting nor was weekly watching of a television. The number of children in the family who had previously died was also not significantly related to wasting. Although wife's rank was not important for stunting, it was significantly related to wasting, with children of the second wife being at particular risk.

5.5 MULTIVARIATE REGRESSION ANALYSIS

The biological, health, social, and economic factors identified as important in the bivariate analyses were used in a logistic regression model to explain stunting and wasting among Ugandan children less than 4 years of age. (See Appendix F for an explanation of logistic regression models.) This model estimates the probability that stunting or wasting will occur. Regression estimates greater than 1 indicate that the risk of malnutrition is greater than that for the reference category; estimates less than 1 indicate that the risk of malnutrition is less than that for the reference category.

The following variables were used to develop the best model to explain childhood malnutrition in Uganda. Only those variables which are significant are discussed in the sections that follow.

Biological and Health Variables

Diarrhoea (none, 1-6 days, 7+ days)
Fever (yes, no)
Cough (yes, no)
Age of child (0-5, 6-11, 12-17, 18-23, 24-29, 30-35, 36-47 months)
Sex of child (male, female)
Current pregnancy status
Reason for stopping breastfeeding (maternal factors (ill, nipple/breast problems, no milk, working), child refuses, pregnancy, appropriate age to wean, not yet weaned)
Twin birth (yes, no)
Birth weight (low, normal)
Size at birth (small, average+)
Number of antenatal visits (0, 1-3, 4-5, 6-7, 8+)
Child immunized against measles (yes, no)
Diet:
- 0 to 3 months (exclusively or fully breastfed, partially breastfed)
- 4 to 6 months (breastfed, fully weaned)
- 7 to 11 months (breastfed with complementary foods, breastfed but no complementary foods)
- 12 to 23 months (breastfed with complementary foods, fully weaned)
- 24 to 59 months (fully weaned, breastfed with complementary foods)

Social and Demographic Variables

Region (Central, Eastern, Northern, Western)
Residence (urban, rural)
Mother's age (15-19, 20-24, 25-29, 30-34, 35-49)
Mother's education (none, primary, secondary+)
Mother's occupation (professional/clerical, sales, agriculture (self-employed), services/manual, not working)
Whether mother watches television weekly (yes, no)
Whether mother listens to radio weekly (yes, no)
Whether mother works away from the home (yes, no)
Husband's education (none, primary, secondary+)
Husband's occupation (professional/clerical, sales, agriculture (self-employed), services/skilled manual, not working)
Sex of household head (male, female)
Marital Status (polygamous, monogamous, widowed/separated/divorced, never married)
Possession score (maximum score of 4 based on the availability of electricity and ownership of a TV, radio, and refrigerator)
Transport owned (car/motorcycle, bicycle, none)
Source of drinking water (private tap, public tap, protected well, unprotected well, surface water)
Toilet facilities (flush, improved pit, traditional pit, none)
Type of floor material (natural, cement, finished)
Number of dead children (0, 1, 2+)
Number of children at home (1, 2, 3, 4, 5, 6+)

Because appropriate child feeding practices are age dependent, initially separate analyses were conducted for individual age groups. Risks of malnutrition were compared with optimal feeding practices for each of the dietary age groups listed above. However, because child feeding practices are also highly related to demographic and socio-economic characteristics, such as maternal education, age, and socio-economic status, the age-specific bivariate analyses between diet and stunting and diet and wasting showed no association suggesting that socio-economic factors were more important than the dietary information in the relationships under study. Consequently, the model presented here includes all children.

5.6 RISK FACTORS FOR STUNTING

The important determinants of stunting are as follows: region of residence, possession score, reasons for full weaning, child's age, diarrhoea in the previous two weeks, maternal perception of child size at birth, and child sex (Table 5.3). Using children in the Central region as the reference category, children in the Eastern and Northern regions were at lower risk whereas children in the Western region were at greater risk. Possession score was also related to stunting in the expected direction. Using children in household with a score of 0 as the reference category, children in households with a score of 1 or 2 had a 14 and 63 percent lower risk of stunting, respectively.

Not surprisingly, the risk of stunting increases with age as stunting is a cumulative process that occurs over the course of many individual insults of nutritional deprivation and/or illness. Children between 0 and 5 months of age have the lowest risk of stunting. Those age 6-11 months have nearly four times the risk of younger infants, and beyond 12 months the risk of stunting continues to rise until it is more than eight times that of the youngest infants at 18 to 23 months. This dramatic rise with age reflects the cumulative effects of repeated illness, inadequate nutrient intake, and most importantly their negative interactive effect during this critical period of child development. At 36 months until 4 years, the net relative risk of stunting remains high at between 8 and 9. This is the time when diarrhoeal disease and ARI decrease to low levels.

Whether or not a child is currently breastfed and, if not, the reasons for stopping breastfeeding are associated with stunting. Children who are currently breastfed appear to have the greatest risk of stunting, being significantly more stunted than children who were weaned because of their age or because of maternal or child factors such as nipple/breast problems, no milk, employment, a child who refused the breast, or mother's illness. It is well known that breastfeeding is highly beneficial during the first two years of life. However, when the introduction of appropriate complementary foods is delayed, the child is put at great risk. Because all children less than four-years of age are included in the model, most of the breastfed children are more than six months old and require appropriate supplementary foods. However, the delayed introduction of these foods described in Chapter 3 puts them at great risk of malnutrition. This finding also suggests that while breastfeeding throughout infancy is beneficial, it must be accompanied by the introduction of complementary foods at about 6 months of age.

Children who had diarrhoea in the previous two weeks were 20 percent more likely to be stunted compared with children who had not experienced diarrhoea. Also, children who were perceived by their mother's to be small at birth were 33 percent more likely to stunted compared with children whose mothers perceived them to be of normal size at birth. Lastly, male children were about 14 percent more likely to be stunted compared with female children.

Twins are more than 60 percent more likely to be stunted compared with singletons. Twins are more likely to be low birth weight and have to compete between themselves as well as with other siblings for care by their parents. Twins represent a group that may require targeting of specialized health and nutrition services to prevent poor growth.

5.7 RISK FACTORS FOR WASTING

Risk factors for wasting reflect differences in the etiologies and age-specific patterns of wasting compared with stunting (Table 5.3). Not surprisingly, infants less than 5 months of age are least likely to be wasted. This reflects the fact that birth weights (among those children whose mothers report them) appear to be adequate and the prevalence of low birth weight is low. Breastfeeding, which is nearly universal, also is protective of child health during this period. However,

Table 5.3 Estimated net relative risk of stunting, underweight and wasting

Estimated net relative risk of stunting and wasting for children under four years, by background characteristics, Uganda 1995

Background characteristic	Net relative risk	
	Stunting	Wasting
Region		
Central	1.000[a]	1.000[a]
Eastern	0.836[b]	1.699[b]
Northern	0.962	1.850[b]
Western	1.112	1.047
Mother's education		
No education		1.000[a]
Primary		0.706[b]
Secondary+		0.371[b]
Wife's rank		
First		1.000[a]
Second		2.474[b]
Third +		1.599[b]
Possession score[1]		
0	1.000[a]	
1	0.864[b]	
2+	0.371[b]	
Reason for full weaning		
Mother ill	0.602[b]	
Child ill/died	0.777	
Maternal and Child factors[1]	0.674[b]	
Child's age	0.574[b]	
Pregnancy	0.881	
Currently breastfed	1.000[a]	
Child's age (months)		
0-5	1.000[a]	1.000[a]
6-11	3.855[b]	3.930[b]
12-17	5.925[b]	5.073[b]
18-23	8.285[b]	4.398[b]
24-29	7.813[b]	1.811
30-35	8.672[b]	1.164
36-47	9.347[b]	1.595
Diarrhoea (2 weeks)		
Yes	1.204[b]	
No	1.000[a]	
Size of child at birth		
Small	1.334[b]	
Average+	1.000[a]	
Sex of child		
Female	1.000[a]	1.000[b]
Male	1.138[b]	1.351[b]

[a] Total $p<0.05$
[b] $p<0.05$ compared with reference category
[1] Score of one for availability/ownership of electricity, radio, television, and/or refrigerator. Maximum score of 4
[2] Nipple/breast problem, no milk, working and child refuses

during the age interval 6 to 11 months infants are nearly four times more likely to be wasted compared with younger infants. This dramatic increase in risk reflects the delayed introduction of complementary foods, rapid rise in diarrhoeal disease, and most importantly the negative interactive effect of the two on child nutritional status. Risk of wasting continues to climb precipitously during the 12 to 17 month age interval, increasing to five times the risk of infants less than 5 months of age. Diarrhoea peaks at 12 months of age and remains high during this interval. Also, because of the delayed introduction of complementary foods, many children in this age interval are not receiving complementary foods or because they were only recently introduced, are not receiving enough nutrients from them. The combined effects of diarrhoea and inadequate food intake are significantly more deleterious to child nutritional status than either alone, as is illustrated by the risk of wasting, which remains at over four times the risk of infants less than 5 months during the 18 to 23 month period.

Region was also significantly associated with the net relative risk of wasting. Compared to children in the Central and Western regions, children in the Eastern and Northern regions faced 1.7 and 1.9 times the risk, respectively. Maternal education was also significantly associated with wasting in the expected direction. Compared to children whose mothers had no education, children of mothers with primary education had a 30 percent lower risk of wasting, and children of mothers with secondary education had a 60 percent lower risk. Lastly, male children were 1.4 times more likely to be wasted compared with female children.

5.8 SUMMARY AND RECOMMENDATIONS

Child nutritional status is largely associated with age of child, infant feeding practices, and factors associated with poverty. Delayed introduction of complementary foods, poor sanitation, disease and the interactive negative effect of malnutrition and disease, result in a rapid rise in both stunting and wasting at about 6 months of age. Risks of both stunting and wasting remain high throughout the second year of life before starting to decline, suggesting that the first two years of life is a critical period for public health intervention.

Thus, the key recommendations to improve child nutritional status are as follows:

- Public health efforts to improve child feeding behaviours should focus on the first two years of life. Specifically, these efforts should concentrate on encouraging women to introduce nutritious weaning foods at about 6 months of age, increasing the frequency of breastfeeding and using oral rehydration therapy during diarrhoeal episodes.

- As a long-term strategy, efforts should be made to improve educational opportunities for female children.

- Current efforts of the GOU to alleviate poverty at the household level should be reinforced and encouraged to continue.

- In an effort to reduce childhood disease, the GOU's current primary health care approach, which strives to strengthen communities' involvement in and management of health services, should be reinforced.

Chapter 6

NUTRITIONAL STATUS OF WOMEN

Women's nutritional status prior to conception and during pregnancy is important both as an indicator of overall women's health and as a predictor of pregnancy outcome for both the mother and infant. Women of childbearing age are particularly vulnerable to malnutrition because of the large nutritional costs associated with pregnancy and lactation. In countries such as Uganda, where the fertility rate is 6.9, the average woman bears nearly seven children during her reproductive years. Women's bodies are repeatedly challenged by the nutritional stress of reproduction. In this final chapter, anthropometric measures of women who are the mothers of children under 4 years of age are described and the implications for maternal and child health discussed.

6.1 BACKGROUND

Maternal nutritional factors, including low caloric intake or gestational weight gain, prepregnant weight, and height, are the most important determinants of poor fetal growth or intrauterine growth retardation (IUGR) in rural developing countries (Kramer, 1987). These factors alone account for over half of the difference between the rates of IUGR in developed compared with rural developing countries (Krasovec and Anderson, 1991). IUGR infants have a higher risk of perinatal mortality and other adverse outcomes. Additionally, women who gain too much weight given their prepregnancy weight-for-height have a greater risk of delivering a high birth weight baby, with resulting increased rates of prolonged labor, shoulder dystocia, caesarean delivery, and birth trauma (IOM, 1990).

Prepregnancy weight is an important determinant of birth weight in both developed and developing countries (IOM, 1990). Gestational weight gain is also an important determinant of fetal growth, with the optimal gestational weight gain based on prepregnancy weight for height. To minimize poor pregnancy outcomes, women with lower prepregnancy weight for height need to gain more weight than women with high prepregnancy weight for height. The recommended weight gain ranges for pregnant women are shown in Table 6.1. However, the high pregnancy weight gains associated with positive pregnancy outcomes for women with low prepregnancy weight may be unrealistic for many women in developing countries (Krasovec and Anderson, 1991). Therefore, it is important to focus attention not only on pregnant women but on improving the nutritional status of women in general so they do not enter pregnancy in a nutritionally disadvantaged state.

Table 6.1 Recommended weight gain ranges for pregnant women

Recommended total weight gain ranges for pregnant women, by prepregnancy body mass index (BMI)

Prepregnant weight-for-height category	Recommended weight gain (kg)
Low (BMI < 19.8)	12.5-18.0
Normal (BMI of 19.8 to 26.0)	11.5-16.0
High (BMI >26.0 to 29.0)	7.0-11.5

Source: IOM, 1990

The nutritional cost of pregnancy has been estimated at 85,000 kcals. This figure assumes that women will store some 35,000 kcals of fat for lactation (Hytten, 1980). More recent work suggests that the energy cost of pregnancy is closer to 55,000 kcals (IOM, 1990). Nevertheless, the US Recommended Dietary Allowances recommends that pregnant women consume an additional 300 kcals per day during their second and third trimesters based on Hytten's estimate. The USRDA also recommends that lactating women consume an additional 300 kcal per day. These additional kcals must be consumed above a woman's regular food intake to maintain energy balance.

6.2 DATA COLLECTED

Maternal height and weight measures were collected from women having living children under the age of five years. This selection criteria produces a sample that is biased toward women who are between 20 and 39 years of age, as this is the age interval in which women are most likely to have a child under five years (Table 6.2). Consequently, the age intervals 15 to 19 and 40 to 49 years are underrepresented.

Women were weighed on a digital scale and weight was recorded in kilograms to the nearest 100g. Height was measured using a standard anthropometer specifically made for the survey and recorded to the nearest millimeter. A total of 3,598 women were measured, of whom 550 (15 percent) were pregnant, 2,356 (65 percent) were lactating and 692 (20 percent) were neither pregnant nor lactating at the time of the survey (Table 6.3).

Table 6.2 Distribution of mother's ages

Percent distribution of mother's ages, Uganda 1995

Age	Percent
15-19	12.1
20-24	30.3
25-29	23.3
30-34	17.4
35-39	11.1
40-44	4.6
45-49	1.2
Total	100.0
Number of women	3,598

Table 6.3 Nutritional status of mothers

Mean, standard deviation, and median for height, weight, and body mass index (BMI) of mothers age 15 to 49 years, Uganda 1995

				Nonpregnant mothers					
	Pregnant mothers			Lactating			Nonlactating		
Anthropometric variables	Mean	Standard deviation	Median	Mean	Standard deviation	Median	Mean	Standard deviation	Median
Height (cm)	158.4	6.8	158.3	158.2	6.4	158.1	158.3	6.0	158.5
Weight (kg)	56.4	7.7	55.7	53.3	7.2	52.7	54.9	8.5	54.0
BMI[1]	22.4	2.6	22.1	21.3	2.5	21.1	21.9	3.1	21.3
Number	550[2]			2,356			692		

[1] Body mass index
[2] 54 of the pregnant women are both pregnant and lactating. The heights and weights of these women are not significantly different from the pregnant but not lactating women.

6.3 INDICATORS OF MATERNAL NUTRITIONAL STATUS

To date, the assessment of nutritional status in nonpregnant women has been based on normative distributions (Krasovec and Anderson, 1991). Commonly used anthropometric references for adult women represent averages of the healthy populations studied and should not necessarily be interpreted as "ideal" or desirable.

Weight is predominantly a measure of current nutritional status and is often used as an indicator of overall health and nutritional status. The desirable or appropriate level of weight at different stages of the life cycle, however, is still unknown. In Uganda, it has been found that women who weigh less than 45 kg are at a high obstetric risk.

Height is a measure of past nutritional status as well as the genetic potential of the individual. It also reflects, in part, the cumulative effect of social and economic status over generations. No international standard exists for adult women's height, however, women whose height falls below 145 cm have been found to be at a greater risk of maternal mortality than taller women, and in Uganda, a cutoff of 150 cm is typically used. This relationship reflects the association between short stature and small pelvic size which can result in obstructed labor (WFPHA, 1983). Additionally, short stature is associated with young age at pregnancy. Young women may have an immature pelvis, which can lead to cephalopelvic disproportion (Liljestrand, 1985). Short stature is correlated with low birth-weight infants, high risk of stillbirth, and high rate of miscarriage (Krasovec and Anderson, 1991).

Body mass index (BMI) or Quetlet index, calculated as (weight in kilograms/height in metres squared) can be used to assess women's nutritional status. It was originally developed to diagnose obesity but, more recently, James et al. (1988) have advocated its use for assessing chronic energy deficiency (CED). CED has been defined "...as a steady state at which a person is in energy balance although at a cost either in terms of risk to health or as an impairment of functions and health" (James, 1988).

The key advantage of using BMI to assess maternal nutritional status is that it is a self-contained ratio and does not require reference tables. Data from well-nourished populations show that a normal range maternal BMI is between 21.5 and 23.1. The International Dietary Energy Consultative Group suggests that Quetlet BMIs between 17.0 and 18.4 are indicative of Grade I (moderate) CED, those between 16.0 and 17.0 of Grade II CED, and those below 16 of Grade III (severe) CED (James et al., 1988). A Quetlet BMI of 12 is the absolute lower limit compatible with life. At the other extreme, women who are 20 percent overweight have BMIs between 25.8 and 27.3 whereas those who are severely overweight, i.e., 40 percent overweight, have BMIs between 30.1 and 32.3.

Table 6.4 Distribution of mother's height, weight, and BMI

Percent distribution of mother's height, weight, and body mass index (BMI), Uganda 1995

Indicator	Pregnant mothers	Nonpregnant mothers: Lactating mothers	Nonpregnant mothers: Nonlactating mothers
Height (cm)			
< 145	1.6	1.7	1.8
145-149.9	9.0	8.1	6.3
150-154.9	22.1	20.7	19.7
155-159.9	26.1	31.1	33.9
160-164.9	24.1	24.0	25.9
165-169.9	12.9	11.3	9.3
170+	4.2	3.0	3.1
Total	100.0	100.0	100.0
Weight (kg)			
<40	0.3	1.8	1.9
40-44.9	4.1	8.4	9.3
45-49.9	16.5	23.4	19.4
50-54.9	25.3	29.7	26.4
55-59.9	25.0	22.4	20.8
60+	28.8	14.3	23.2
Total	100.0	100.0	100.0
Body mass index (kg/m^2)			
<16	0.0	0.7	0.1
16-16.9	0.6	1.2	1.1
17-18.49	2.0	8.4	7.6
18.5-25.79	86.8	85.2	82.0
25.8+[1]	10.7	5.4	9.8
Total	100.0	100.0	100.0
<18.5	2.6	10.3	8.8

[1] Women who are 20% and above overweight

6.4 HEIGHT AND WEIGHT

The mean, standard deviation and median for height and weight of pregnant, lactating, and nonpregnant nonlactating Ugandan mothers is shown in Table 6.3. The mean height was 158 cm. In the entire sample about ten percent of the women were under 150 cm (Table 6.4). The mean weight of pregnant, lactating, and nonpregnant, nonlactating women was 56.4 kg, 53.3 kg, and 54.9 kg, respectively (Table 6.3). About 4 percent of the pregnant women and 11 percent of both the nonpregnant, nonlactating women and the lactating women weighed less than 45 kg (Table 6.4).

6.5 BODY MASS INDEX

The mean BMI for pregnant, lactating, and nonpregnant, nonlactating Ugandan women was 22.4, 21.3, and 21.9, respectively. These mean values are inside the normal range. As expected, the mean BMI of pregnant women is slightly higher than for nonpregnant women. Using the James classification, the distribution of BMIs was calculated (Table 6.4). Nearly 10 percent of lactating women and nearly 9 percent of the nonpregnant nonlactating women meet the criterion for chronic energy deficiency, or BMI less than 18.5. This level of underweight is indicative of poor maternal nutritional status, which puts women and their present and future pregnancies at risk. The BMI criterion for CED is not valid for pregnant women, and therefore comparisons between pregnant and nonpregnant women should not be made using this indicator.

A number of social and economic factors were associated with low BMIs in nonpregnant women, defined as below 18.5, and high BMIs, defined as greater than 25.0 (Tables 6.5 and 6.6). The variables identified as important in the bivariate analyses, and presented in the first and third columns of Tables 6.5 and 6.6, have been included in the multivariate analyses in order to determine their net effects on low and high BMI. The odds ratios derived from the logistic regression analysis were used to estimate the net relative risks of these factors for both CED and overweight.

Table 6.5 Prevalence and estimated net relative risk of low body mass and high body mass among nonpregnant mothers by biological characteristics

Percentage of nonpregnant mothers age 15 to 49 years who have low body mass and high body mass and the estimated net relative risk of having low body mass and high body mass by biological characteristics, Uganda 1995

Background characteristic	BMI <18.5 Low	BMI <18.5 Net relative risk	BMI >25 High	BMI >25 Net relative risk
Mother's age				
15-19	11.8	1.318	3.5	0.673
20-24	9.5	1.000	5.8	1.000[a]
25-29	9.0	1.120	9.4	1.411
30-34	10.2	1.210	9.2	1.503[b]
35-49	10.4	1.232	11.7	2.188[b]
n=3048	NS		p<0.0001	
Number of births in the last five years[1]				
1-2	10.4		7.4	1.000[a]
3-4	7.1		11.5	1.556[b]
n=3048	p<0.04		p<0.004	
Total number of births				
1-3	10.2		6.3	
4-9	9.8		9.4	
10+	9.0		12.5	
n=3048	NS		p<0.0009	
Currently breastfeeding				
Yes	10.3		6.3	0.628[b]
No	8.8		13.5	1.000[a]
n=3048	NS		p<0.0001	
Has wasted child <4 years of age				
Yes	19.5	1.938[b]	2.0	
No	9.4	1.000[a]	8.3	
n=3048	p<0.0001		p<0.002	

Note: Level of significance determined using Chi-square test.
[a] Overall p<0.05
[b] p<0.05 compared with reference category
[1] All of the women interviewed had given birth at least once in the past five years.

6.6 MATERNAL CHRONIC ENERGY DEFICIENCY

The important determinants of CED among Ugandan women are region of residence, whether the mother has an underweight child, and type of household toilet (Table 6.5 and 6.6).

Table 6.6 Prevalence and estimated net relative risk of low body mass and high body mass among nonpregnant mothers by socio-economic characteristics

Percentage of nonpregnant mothers age 15 to 49 years who have low body mass and high body mass and the estimated net relative risk of having low body mass and high body mass by socio-economic characteristics, Uganda 1995

Background characteristic	BMI <18.5 Low	BMI <18.5 Net relative risk	BMI >25 High	BMI >25 Net relative risk
Residence				
Urban	5.6		19.4	1.802[b]
Rural	10.5		6.5	1.000[a]
n=3048	p<0.003		p<0.0001	
Region				
Central	5.6	1.000[a]	13.6	1.000[a]
Eastern	13.6	2.199[b]	2.8	0.327[b]
Northern	14.7	2.047[b]	1.4	0.195[b]
Western	7.2	1.262	12.2	1.351[b]
n=3048	p<0.0001		p<0.0001	
Religion				
Catholic	12.0		7.7	
Protestant	8.7		8.1	
Muslim	8.5		6.9	
Seventh-day Adventist	3.3		16.7	
Other	5.7		10.8	
n=3048	p<0.01		NS	
Mother's education				
No education	10.7		4.6	
Primary	10.0		8.2	
Secondary+	7.4		16.3	
n=3048	NS		p<0.0001	
Husband's education				
No education	11.4		6.1	
Primary	11.0		6.0	
Secondary+	6.8		13.0	
n=2793	p<0.003		p<0.0001	
Father's occupation				
Not working	24.2		0.0	
Professional/other[1]	7.6		13.0	
Agric. (self employed)	11.5		6.3	
Services/ manual labor	6.3		8.4	
n=3048	p<0.0001		p<0.0001	

Table 6.6—*Continued*

Socio-economic characteristic	BMI <18.5 Low	BMI <18.5 Net relative risk	BMI >25 High	BMI >25 Net relative risk
Sex of household head				
Male	10.6		8.1	
Female	7.1		7.4	
n=3048	p<0.01		NS	
Possession score[2]				
0	11.8		5.1	1.000[a]
1	8.0		9.2	1.358[b]
2+	4.2		25.9	2.588[b]
n=3036	p<0.0001		p<0.0001	
Toilet				
Flush	0	0.595[b]	30.9	
Pit	8.2	0.006	8.9	
None	17.7	1.000[a]	2.5	
n=3037	p<0.0001		p<0.0001	
Reads newspaper regularly				
Yes	4.9		18.2	
No	10.8		6.1	
n=3039	p<0.0001		p<0.0001	
Watches TV regularly				
Yes	2.0		27.0	
No	10.3		7.2	
n=3048	p<0.003		p<0.0001	

Note: Level of significance determined using Chi-square test.
[a] Overall p<0.05
[b] p<0.05 compared with reference category
[1] includes clerical, managerial and sales occupations.
[2] Score of one for availability/ownership of electricity, radio, television, and/or refrigerator. Maximum score of 4

The region where a mother lives is an important predictor of maternal CED. Women residing in the Central region were less likely to be malnourished than mothers residing in the Eastern or the Northern regions. By comparison, women in the Eastern and Northern regions had twice the risk of malnutrition than women in the Central region. The Central region is also the region with the lowest prevalence of child malnutrition, and the lowest IMR and U5MR, which again points to the overriding influence of poverty on maternal and child nutritional status. Region of residence indirectly influences both maternal and child nutritional status by determining other factors that directly affect nutrition status such as access to food, health care, and wealth, which were not measured by the survey.

Whether a woman had a malnourished child is also associated with maternal CED. Mother's with children whose weight-for-age Z score is less than 2 standard deviations below the median based on the NCHS reference are nearly twice as likely to be underweight than mothers whose children are not underweight. This reflects general poverty and difficulty in securing food at the household level.

Type of household toilet was also significantly associated with BMI. Not surprisingly, women with a flush toilet had a much lower risk of low BMI compared with women with no toilet. The type of toilet has a direct impact on health but is also a proxy for household wealth and therefore access to food.

6.7 HIGH BODY MASS

The important determinants of high body mass, or overnutrition, among Ugandan women are age, urban or rural residence, region of residence, number of births in the previous 5 years, current breastfeeding status, and household possession score.

Women's age was a good predictor of overnutrition in the expected direction; BMI scores increased incrementally with age. Compared with women 20 to 24 years old, women 30 to 34 years old were 50 percent more likely to be overweight and women 35 to 49 years old were twice as likely to be overweight.

Both urban-rural residence and region of residence were predictive of overweight. Women in urban areas were 1.8 times more likely to be overweight compared with women in rural areas. Women in the Eastern and Northern regions were about 70 percent less likely to be overweight compared with women in the Central region. Women in the Western region were 35 percent more likely to be overweight compared with women in the Central region. The regional pattern of overweight coincides with that of underweight in that regions with the highest risk of underweight also had the lowest risk of overweight.

Women who had given birth 3 or 4 times in the previous 5 years were 50 percent more likely to be overweight compared with women who had given birth 1 to 2 times during the same time interval. This finding is probably due to the fact that women who have had 3 to 4 births in the last five years are 25 years of age or older (and possibly age 35 to 49), and are more likely to be overweight. Current breastfeeding status was also negatively related to overweight. Currently breastfeeding women had a 37 percent less risk of overweight compared with women not currently breastfeeding.

Not surprisingly, household possession score was significantly related to risk of overweight in the expected direction. women with a household possession score of 1 were 35 percent more likely to be overweight compared with women from households with a score of 0. Women in households with a score of 2 or more were two and a half times more likely to be overweight compared with women with a household score of 0. Again, this is indicative of the overriding effect of poverty on maternal nutritional status.

6.8 SUMMARY AND RECOMMENDATIONS

In summary, the associations between maternal nutritional status and factors measured in this survey reflect the overwhelming influence of poverty. Approximately 10 percent of the women measured in this survey were under 150 cm in height. Although the mean BMI of Ugandan women is within the normal range, nearly 10 percent of the lactating women and 9 percent of nonpregnant nonlactating women meet the criterion for chronic energy deficiency. This level of underweight is indicative of poor maternal nutritional status, which puts women and their present and future pregnancies at risk. The figure of low birth weight is 10.3 percent, however, this incidence is based only on the 25 percent of infants whose mothers could report birth weights. Knowledge of birth weight likely reflects hospital births, which in turn are associated with urban residence, maternal education, and higher socio-economic status. Children whose birth weights are unknown are more likely to be low birth weight.

Efforts to improve maternal nutritional status of Ugandan women need to focus on both short- and long- term inputs. Long-term recommendations include the following:

- Improve the nutritional status and health of adolescent girls.
- Promote women's income earning opportunities in an effort to improve the nutritional status of all household members.
- Improve access to education for young girls and women.

Short-term recommendations include the following:

- Improve the energy balance of pregnant and lactating women by improving the quantity and quality of their diets and by promoting appropriate technologies to reduce their workloads.
- Improve the energy balance of nonpregnant nonlactating women by improving their dietary quantity and quality and minimizing their energy expenditure so that these women enter into pregnancy in the best possible nutritional state.
- Improve access to reproductive health services to improve child spacing—ideally two years or more between births—thus allowing women time to recuperate nutritionally.

Chapter 7

SALT IODIZATION COVERAGE

Inadequate intake of iodine in the diet can lead to a wide spectrum of nutritional problems, including nutritional stunting, goitre, mental retardation and cretinism. Certain geographical areas in Uganda, particularly those in the mountainous and flood prone districts, lack iodine in the soils, which in turn has led to low levels of iodine in local livestock and crops. The indigenous human population living in these iodine deficient regions suffers from varying degrees of iodine deficiency as has been reported in the preliminary results of the Uganda National Micronutrient Survey (MOH, 1993b).

WHO/UNICEF/ICCIDD recommends levels of iodine in edible salt at the household level from 20 to 50 parts per million (ppm), depending on the existing climatic conditions and per capita salt intake (WHO, 1994). These levels of iodine in the household are considered adequate for providing the recommended daily allowance of 150 micrograms of iodine per individual. In Uganda, the full range of 20 to 50 ppm is applicable, because of the varied climatic zones throughout the country. WHO/UNICEF/ICCIDD also recommends the use of various indicators and criteria to track the progress of salt iodization programmes (WHO/UNICEF/ICCIDD, 1993). According to these criteria, at the household level 90 percent of households should be using iodized salt in order for coverage to be considered "adequate". To assess adequacy of the monitoring process itself, WHO/UNICEF/ICCIDD recommends that in 90 percent of districts in each region, statistically representative samples of households and retail outlets should be surveyed.

The Government of Uganda, having put in place the policy framework for a Universal Salt Iodization (USI) programme in 1993, began implementing a campaign to promote the marketing and consumption of iodized salt in the country in 1994. As one means of assessing progress towards the achievement of its USI goal, the 1995 UDHS obtained information on the presence of iodized salt in the home. UDHS interviewers tested salt samples for iodine content from each household included in the survey, using test kits provided by UNICEF. As shown in Table 7.1, adequately iodized salt was found in 65 percent of all households in Uganda, while in 35 percent of households the salt found was not adequately iodized. These results indicate that nationally, efforts still need to be pursued vigorously to achieve universal coverage.

Table 7.1 Coverage of salt iodization among Ugandan households

Percentage of households having iodized salt, by region and residence, Uganda 1995

Region and residence	Percentage	Number of households
Region		
Central	91.4	2,182
Eastern	58.7	1,830
Northern	37.9	1,368
Western	62.4	2,197
Residence		
Urban	87.9	1,020
Rural	61.9	6,530
Total	65.4	7,550

The levels of salt iodization differed by region and by urban-rural residence (Table 7.1). By region, iodization coverage was highest in the Central region (91 percent) and lowest in the Northern region where only 38 percent of households had adequately iodized salt. In the Eastern and Western regions, about 60 percent of households had adequately iodized salt. Among urban households, adequately iodized salt was found in 88 percent of homes, while in rural areas only 62 percent of households had the same.

Programmatically, adequacy of iodization coverage at the district level is of great interest to the GOU. Although the UDHS included all districts, the survey sampling frame was designed to be representative at the regional level only, not at the district level. Therefore, from the survey data it is not possible to determine with statistical validity the adequacy of iodization coverage at the district level. Nevertheless, by looking at the iodization data by district (Table 7.2), it is possible to ascertain roughly which districts may be at greatest

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risk of iodine deficiency. Table 7.2 suggests that the Apac, Arua, Kabale, Kiboga, Kisoro, Kumi, Lira and Moyo districts may be the most problematic, each likely to have a large proportion of households without iodized salt. Although representative district level data should be obtained in 90 percent of districts in all regions in order for the salt iodization monitoring process to be considered adequate, the UDHS data serve to point the Government, UNICEF and other interested organizations in the direction of locations which should be studied more closely.

Because iodine is vital to the physical and mental growth of children, the UDHS iodization data were studied at the child level, according to levels of child malnutrition. Iodine nutriture would be expected to affect long-term rather than short term nutrition, but both stunting (chronic malnutrition) and wasting (acute malnutrition) were studied. Table 7.3 and Figure 7.1 show that among Ugandan children under 4 years of age living in homes without adequately iodized salt, 41 percent were stunted, compared with 37 percent of similar children living in homes with adequately iodized salt ($p<0.005$). Although these differences may be due to differences in socio-economic levels between the "iodized" and "non-iodized" households—i.e. homes without iodized salt may also be the poorest homes, with the lowest level of parental education, the least food and other resources, etc.—they may also reflect one mechanism which explains why children from poorer households are more malnourished than those from wealthier households, i.e. because they do not obtain sufficient iodine in the diet. Not surprisingly, wasting was not significantly associated with salt iodization.

In summary, it is very encouraging that iodized salt is found in two thirds of the Ugandan households. This is testimony to the positive impact of Uganda's USI programme and marketing campaign. However, there is still much work to be done to achieve universal coverage, as many households, particularly those in the Northern region, are not yet covered. The problem is also more prevalent in the rural than in the urban areas. District level monitoring should be pursued by surveying 90 percent of all districts in each region, using a representative sample of households or schools and retail outlets, to determine precise coverage levels and to identify where immediate attention is warranted.

Table 7.2 Distribution of iodized salt in surveyed households among Districts in Uganda

Among all households included in the UDHS, the percentage in each district having iodized salt in the home, Uganda 1995

District[1]	Percentage	Number of households
Apac	12.4	234
Arua	32.1	279
Bundibugy	98.0	89
Bushenyi	51.6	326
Gulu	76.7	184
Hoima	49.5	104
Iganga	70.8	389
Jinja	77.3	123
Kabale	41.1	165
Kabarole	51.7	400
Kalangala	97.8	13
Kampala	94.1	477
Kamuli	57.1	204
Kapchorwa	94.2	49
Kasese	60.4	177
Kibaale	60.2	122
Kiboga	47.7	44
Kisoro	18.4	106
Kotido	86.9	88
Kumi	35.4	152
Lira	10.4	263
Luwero	91.7	167
Masaka	95.9	351
Masindi	86.9	125
Mbale	71.2	301
Mbarara	83.5	426
Moroto	69.1	50
Moyo	19.4	115
Mpigi	92.9	380
Mubende	76.7	188
Mukono	93.0	410
Nebbi	63.6	155
Pallisa	10.5	134
Rakai	94.5	152
Rukungiri	76.0	158
Soroti	32.5	194
Tororo	69.9	257
Total	65.4	7,550

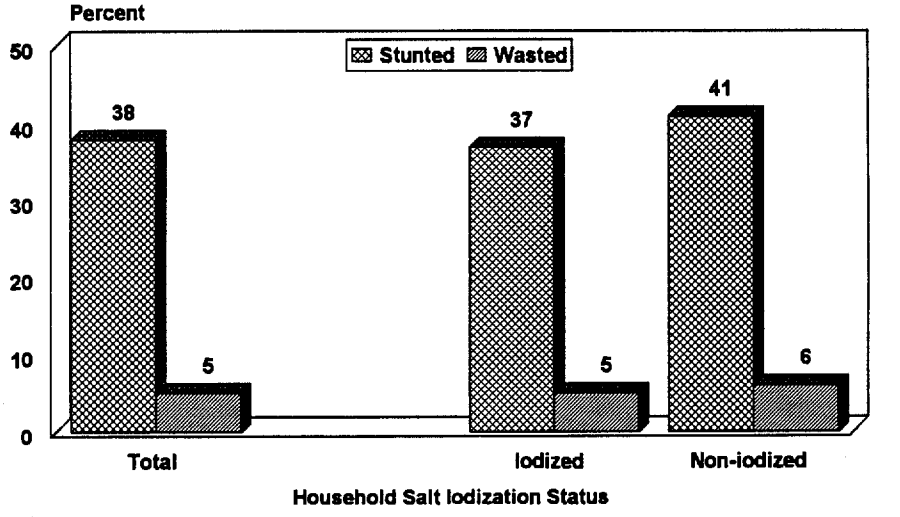
[1] The UDHS Survey sampling frame is representative only to the regional level. Therefore, the district level data in the table are not statistically representative.

Table 7.3 Malnutrition among children under four years, by household salt iodization status

Among children under four years, the percentage stunted and wasted, by presence or absence of iodized salt in the home, Uganda 1995

Household salt iodization	Percentage stunted	Percentage wasted	Number of children
Iodized	36.8	4.8	3,027
Non-iodized	41.1	5.8	1,587
	p<0.005	NS	
Total	38.2	5.2	4,613

Figure 7.1
Malnutrition among Children under Four Years According to Whether or Not Household Salt Is Adequately Iodized



UDHS 1995

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Appendix A

SAMPLE DESIGN

Using the 1991 Population and Housing Census as the sampling frame, a sample of 303 primary sampling units consisting of enumeration areas (EAs) was selected. For the purpose of the 1995 UDHS, the following primary domains were utilised: Uganda as a whole; urban and rural areas; and the four regions.

The sampling frame for the 1995 UDHS was selected in two stages. In the first stage, 303 EAs were selected with probability proportional to size. Then, within each EA, a completed household listing and mapping exercise was conducted, thus forming the basis for the second-stage sampling. From these household lists, households to be included in the UDHS were selected with probability inversely proportional to size based on the household listing results. All women 15 to 49 years of age in these households were eligible to be interviewed in the UDHS. The overall target sample was 6,000 women (oversampling of some areas occurred in order to evaluate some USAID funded project areas); however, 7,377 women were eligible to be interviewed, and 7,070 interviews (96 percent) were conducted. Additionally, information on 5,447 children under four years of age was collected.

In the analyses used for this report, only children with complete height, weight and valid date of birth information were included. Thus, 4,775 children 0-47 months of age were included.

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Appendix B

HOUSEHOLD AND RESPONDENT BACKGROUND CHARACTERISTICS

A total of 4,775 children under the age of four years are included in the analyses presented in this report. Table B.1 shows the distribution of children by gender, region and urban/rural residence. Overall, there are more girls than boys included in the sample. On average, there are more children in the home in the Western and Eastern regions (3.4 and 3.2, respectively) compared with the Northern and Central regions (3.0 and 2.8, respectively). There are more children in the home in rural areas (3.2) compared with urban areas (2.6). There are also differences by region and urban/rural residence in the total number of children and the number of children born who have died (Table B.2).

Table B.3 shows the distribution of mother's age groups for the regions and urban/rural residence. Overall, the majority of mother's were in one of two age groups; almost 31 percent of mothers were between 20 and 24 years, and one-quarter were in the 25 to 29 year age group. While there were differences by region and urban/rural residence, the patterns were similar to the overall pattern.

Overall, almost one-third of mother's had not been to school, almost 60 percent had been to primary school and only 11 percent had been to secondary school or higher (Table B.4). There were wide variations by region and urban/rural residence. Almost half of mothers in the Northern region have never been to school, compared with only 14 percent of mothers in the Central region. In urban areas, over one-third of mothers have a secondary or higher education, compared with only 8 percent in rural areas.

Over half of Ugandan mothers are employed in the agricultural sector, less than 10 percent are in professional fields, and over one-third are not working at all (Table B.5). The type of employment varies by region and urban/rural residence. In the Central region, 16 percent of mothers are employed in professional fields, while only 5 percent of mothers are in professional fields in the Western region. Thirty percent of mothers in urban areas work in a professional field, while less than 6 percent are similarly employed in rural areas; however, over 50 percent of mothers in rural areas are agricultural employees.

Table B.6 describes the caretaker for children of working mothers. Overall, almost 70 percent of mothers take care of their own children. There are differences by region and urban/rural residence, such that in the Eastern region, only 50 percent of mother provide their own child care, while 42 percent of children in this region are cared for by a family member or relative. In urban areas, while almost 15 percent of children are cared for by a neighbor, friend or child care service, 70 percent are cared for by their mother. In rural areas, while 70 percent of the child care is undertaken by the mother, 27 percent is provided by a family member or relative.

Over three-quarters of mothers were married (Table B.7), while 10 percent were living with someone, 6 percent were divorced or not living together and only 3 percent had not been married. There were more married mothers in the Eastern and Northern regions (88 and 83 percent respectively) compared with the Western and Central regions (74 and 72 percent, respectively). In urban areas, only 69 percent of mothers were married, while 16 percent were living together. However, in rural areas, 80 percent of mothers were married and 10 percent were living together.

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Among married mothers, 87 percent of husbands lived at home with the mother (Table B.8), while 13 percent of husbands lived elsewhere. The distribution of residence of mother's husband, while significant for region, did not vary widely for urban/rural residence. Eighty-nine percent of husbands live at home in the Eastern region, while 85 percent of husbands live at home in the Central region.

Almost two-thirds of husbands had a primary education, while just over one-quarter had a secondary or higher education (Table B.9). There were wide differences in husbands education by region and urban/rural residence. Over one-third of husbands in the Central region had a secondary or higher education, and only 7 percent had no education, while in the Western region less than 20 percent had a secondary or higher education and 16 percent had no education. In urban areas, 60 percent of husbands had a secondary or higher education, and only 3 percent had no education. While in rural areas, 65 percent of husbands had a primary education and 13 and 21 percent, respectively, had no education, and a secondary or higher education.

Similar to the mothers, over half of the husbands were agricultural employees (Table. B.10). There were differences in husband's occupation by region and urban/rural residence. Husbands in the Central region were more likely to be in the professional or household domestic, service or skilled manual fields, compared with husbands in the other regions. Few husbands were not working. Husbands in rural areas were likely to be agricultural employees (66 percent), in the professional fields (18 percent) or in the household domestic, service or skilled manual fields (15 percent), while in urban areas 51 percent of husbands work in the professional sector, while 38 percent work in the household domestic, services or skilled manual fields.

Table B.11 describes the distribution of toilet facilities by region and urban/rural residence. Most Ugandan households have some type of pit latrine (traditional or improved), while the majority (19 percent) of those remaining have no toilet facilities. Only 1 percent of households own or have access to a flush toilet. There are wide variations in the distribution of toilet facilities based on region and urban/rural residence. Households in the Northern region are almost equally as likely to have a pit latrine as no facility at all (56 to 44 percent, respectively), while households in the Western region are overwhelmingly (94 percent) likely to have a pit latrine. In urban areas, 7 percent of households have access to, or own, a flush toilet, while only 4 percent have no facility at all. However, in rural areas, 20 percent of households have no facility, while virtually all those remaining have a pit latrine.

Over half of Ugandan households receive their water from a surface or some other source, 25 percent of households have access to a well, 16 percent use a borehole, 5 percent have access to a public tap and almost 2 percent have a private tap (Table B.12). There are wide variations by region and urban/rural residence, with more households in the Western region using surface water or a well compared with those in the Eastern region who are almost equally as likely to use surface, a well or borehole (39, 33 and 24 percent, respectively) as their water source. Residents in urban areas are more likely to use a public or private tap (41 percent), while those in rural areas are more likely to use surface or other sources (56 percent).

Almost two-thirds of Ugandan households have earth or sand floors (Table B.13). There are wide variations in household floor material based on region and urban/rural residence. Eighty-two percent of households in the Western region have earth or sand floors, while 53 percent of households in the Eastern region have dung floors. Additionally, while 63 percent of households in the Central region have earth or sand floors, 35 percent also have cement or finished floors. The proportion of households with a cement or finished floor is considerably higher in urban are compared with rural (68 vs 7 percent, respectively), while only 27 percent of urban residents have a earth or sand floor.

One-third of Ugandan mothers listen to the radio on a daily basis, while only 3 percent watch television (TV) at least weekly (Table B.14). Exposure to radio and TV varies widely by region and urban/rural residence. Mothers in the Central region are both more likely to listen to the radio and watch TV, compared with mothers in the Northern region who are least likely to either listen to the radio or watch TV. Urban mothers were also more likely to listen to the radio and watch TV compared with rural mothers.

Over half the Uganda households had no form of transportation, while 43 percent have a bicycle, and only 2 percent have a motorcycle or car (Table B.15). There are wide differences in the availability of transportation by region and urban/rural residence. Households in the Western region were most likely to have no transportation, while those in the Central region were equally as likely to have either no transportation or a bicycle. More urban households had a motorcycle or car compared with rural households, and those in rural area were more likely to have a bicycle.

Table B.16 describes the distribution of households by possession score (an index based on the availability and ownership of a radio, refrigerator, a television set, and electricity) for region and urban/rural residence. A score of zero refers to the poorest households, while a score of 2 or higher represents the wealthiest households. Fifty-six percent of mothers live in households with a score of zero, indicating a lack of any of these amenities. Overall, slightly over one-third of the households had a possession score of "1"; however, there were differences by region and urban/rural residence. Households in the Central region had the highest indices with 53 percent scoring a "1" and 17 percent scoring a "2," while households in the Northern region had the lowest scores, with 22 percent scoring a "1," but only 2 percent scoring a "2." Over one-third of households in rural area scored a "1", similar to urban areas, but only 2 percent scored a "2." Conversely, 39 percent of households in urban area scored a "2."

Over 80 percent of mothers received antenatal care from either a nurse or midwife; however, there were differences based on region and urban/rural residence (Table B. 17). Mothers in the Central and Western regions were more likely to receive antenatal care from a physician compared with mothers in the other regions. Twenty-seven percent of mothers in urban area received antenatal care from a physician, while only 8 percent or rural mothers received similar care; however, 84 percent of rural mothers receive antenatal care from a nurse or midwife.

Table B.1 Anthropometric measurement of children

Percent distribution of children under four years for whom height and weight measurements were collected by sex, according to region and residence, Uganda 1995

Region and residence	Children measured			Number of children
	Male	Female	Total	
Region				
Central	46.7	53.3	100.0	1,228
Eastern	52.3	47.7	100.0	1,269
Northern	47.2	52.8	100.0	927
Western	48.8	51.2	100.0	1,351
Residence				
Urban	48.6	51.4	100.0	537
Rural	48.9	51.1	100.0	4,239
Total	48.9	51.1	100.0	4,776

Table B.2 Mean number of living and dead children

Among women with children less than 5 years of age, the mean number of children living at home (and SD), the mean total number of children ever born (and (SD), and the mean number of dead children per mother (and SD), by region and residence, Uganda 1995

Region and residence	Number of children at home	Total number of children ever born	Number of dead children	Number of children
	Mean (SD)	Mean (SD)	Mean (SD)	
Region				
Central	2.81 (1.68)	4.21 (2.72)	0.54 (0.93)	1,228
Eastern	3.19 (1.82)	4.45 (2.68)	0.63 (1.00)	1,269
Northern	2.98 (1.80)	3.98 (2.53)	0.65 (1.08)	926
Western	3.41 (1.95)	4.48 (2.76)	0.56 (0.96)	1,351
	p<0.0001	p<0.04	p<0.0001	
Residence				
Urban	2.61 (1.61)	3.62 (2.31)	0.35 (0.72)	536
Rural	3.18 (1.85)	4.39 (2.73)	0.62 (1.02)	4,238
	p<0.0001	p<0.0001	p<0.0001	
Total	3.11 (1.84)	4.30 (2.69)	0.59 (0.99)	4,775

Note: Levels of significance determined using ANOVA.

Table B.3 Mother's age

Percent distribution of children under four years by mother's age, according to region and residence, Uganda 1995

Region and residence	Mother's age (years)						Number of children
	15-19	20-24	25-29	30-34	35-49	Total	
Region							
Central	13.2	31.4	25.5	16.0	13.8	100.0	1,228
Eastern	9.4	33.5	21.9	18.8	16.5	100.0	1,270
Northern	10.5	31.2	23.7	18.1	16.5	100.0	926
Western	7.9	27.9	27.2	19.0	17.9	100.0	1,351
			p<0.0001				
Residence							
Urban	11.7	33.8	27.7	17.8	8.9	100.0	538
Rural	10.0	30.5	24.3	18.0	17.1	100.0	4,239
			p<0.0001				
Total	10.2	30.9	24.7	18.0	16.2	100.0	4,777

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

Table B.4 Mother's education

Percent distribution of children under four years by level of mother's education, according to region and residence, Uganda 1995

Region and residence	Mother's education				Number of children
	No education	Primary	Secondary+	Total	
Region					
Central	13.8	67.6	18.6	100.0	1,228
Eastern	28.5	59.9	11.6	100.0	1,270
Northern	48.4	46.4	5.2	100.0	926
Western	37.3	55.0	7.8	100.0	1,352
		p<0.0001			
Residence					
Urban	10.4	54.6	35.0	100.0	537
Rural	33.7	58.3	8.0	100.0	4,238
		p<0.0001			
Total	31.1	57.9	11.0	100.0	4,775

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

Table B.5 Mother's occupation

Percent distribution of children under four years by mother's occupation category, according to region and residence, Uganda 1995

Region and residence	Mother's occupation: Not working	Professional/ Technical/ Managerial	Agricultural employee	Household domestic/ Services/ Manual	Total	Number of children
Region						
Central	36.1	15.9	38.7	9.3	100.0	1,218
Eastern	13.6	6.4	77.5	2.5	100.0	1,263
Northren	76.5	6.9	10.4	6.1	100.0	921
Western	24.5	5.0	67.9	2.7	100.0	1,351
			p<0.0001			
Residence						
Urban	43.9	30.2	12.6	13.3	100.0	533
Rural	33.5	5.8	56.7	3.9	100.0	4,221
			p<0.0001			
Total	34.7	8.5	51.8	5.0	100.0	4,754

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

Table B.6 Usual caretaker of children of working mothers

Percent distribution of children cared for by their mothers, by family members or relatives, and by neighbors or friends, according to region and residence, Uganda 1995

Region and residence	Child's caretaker: Mother	Family/ relative	Neighbor/ friend/ service	Total	Number of children
Region					
Central	78.2	15.3	6.5	100.0	1,225
Eastern	50.3	42.5	7.2	100.0	1,261
Northern	85.8	12.7	1.5	100.0	927
Western	67.6	28.1	4.4	100.0	1,351
		p<0.0001			
Residence					
Urban	70.4	14.8	14.8	100.0	533
Rural	69.2	27.0	3.9	100.0	4,228
		p<0.0001			
Total	69.3	25.6	5.1	100.0	4,761

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

Table B.7 Mother's marital status

Percent distribution of children under four years by mother's marital status, according to region and residence, Uganda 1995

Region and residence	Marital status of mother: Never married	Married	Living together	Widowed	Divorced/ not living together	Total	Number of children
Region							
Central	4.2	72.0	12.1	3.1	8.6	100.0	1,228
Eastern	1.4	88.1	5.3	1.3	3.9	100.0	1,268
Northern	0.9	83.3	9.1	1.4	5.4	100.0	927
Western	4.1	73.6	14.1	4.1	4.1	100.0	1,351
	p<0.0001						
Residence							
Urban	5.0	68.7	15.6	3.2	7.4	100.0	537
Rural	2.5	80.2	9.6	2.5	5.2	100.0	4,239
	p<0.0001						
Total	2.8	78.9	10.3	2.6	5.5	100.0	4,776

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

Table B.8 Residence of mother's husband

Percent distribution of children under four years by whether mother's husband resides at home or elsewhere, according to region and residence, Uganda 1995

Region and residence	Husband's residence: At home	Elsewhere	Total	Number of children
Region				
Central	84.8	15.2	100.0	1,033
Eastern	88.6	11.4	100.0	1,184
Northern	85.6	14.4	100.0	852
Western	86.9	13.1	100.0	1,177
		p<0.05		
Residence				
Urban	84.3	15.7	100.0	452
Rural	86.9	13.1	100.0	3,794
		NS		
Total	86.6	13.4	100.0	4,246

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

Table B.9 Husband's education

Percent distribution of children under four years by mother's husband's education, according to region and residence, Uganda 1995

Region and residence	Husband's education				Number of children
	No education	Primary	Secondary+	Total	
Region					
Central	6.7	55.8	37.4	100.0	1,053
Eastern	11.4	61.4	27.3	100.0	1,207
Northern	15.0	65.5	19.5	100.0	902
Western	15.5	66.2	18.2	100.0	1,268
		p<0.0001			
Residence					
Urban	3.4	36.6	60.0	100.0	467
Rural	13.2	65.4	21.4	100.0	3,961
		p<0.0001			
Total	12.2	62.3	25.5	100.0	4,428

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

Table B.10 Husband's occupation

Percent distribution of children under four years by mother's husband's occupation category, according to region and residence, Uganda 1995

Region and residence	Husband's occupation					Number of children
	Not working	Profes-sional/ technical/ managerial	Agricultural employee	Household domestic/ Service/ Manual	Total	
Region						
Central	0.8	28.5	42.2	28.5	100.0	1,133
Eastern	1.5	19.6	62.5	16.5	100.0	1,231
Northern	3.1	16.9	71.5	8.4	100.0	891
Western	2.0	19.9	64.4	13.7	100.0	1,259
			p<0.0001			
Residence						
Urban	1.4	51.3	9.3	37.9	100.0	483
Rural	1.8	17.8	65.8	14.6	100.0	4,029
			p<0.0001			
Total	1.8	21.4	59.7	17.1	100.0	4,512

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

Table B.11 Toilet facilities

Percent distribution of children under four years by type of toilet facilities, according to region and residence, Uganda 1995

Region and residence	Type of toilet facilities: Own/ shared flush	Improved/ traditional pit	None	Total	Number of children
Region					
Central	2.0	88.8	9.2	100.0	1,222
Eastern	1.3	73.8	24.9	100.0	1,267
Northern	0.2	55.6	44.2	100.0	923
Western	1.3	94.4	4.3	100.0	1,348
		p<0.0001			
Residence					
Urban	7.3	88.6	4.1	100.0	537
Rural	0.5	78.8	20.6	100.0	4,224
		p<0.0001			
Total	1.3	79.9	18.8	100.0	4,761

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

Table B.12 Source of drinking water

Percent distribution of children under four years by source of household drinking water, according to region and residence, Uganda 1995

Region and residence	Source of drinking water: Private tap	Public tap	Well	Borehole	Surface/ Other	Total	Number of children
Region							
Central	3.5	12.4	14.0	14.8	55.3	100.0	1,223
Eastern	0.6	3.6	32.7	24.1	39.0	100.0	1,267
Northern	0.2	0.3	27.7	25.5	46.2	100.0	924
Western	1.3	1.3	28.3	2.9	66.3	100.0	1,350
			p<0.0001				
Residence							
Urban	11.2	30.0	22.0	14.2	22.6	100.0	536
Rural	0.2	1.3	26.2	16.2	56.1	100.0	4,228
			p<0.0001				
Total	1.5	4.6	25.7	16.0	52.3	100.0	4,764

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

Table B.13 Type of floor

Percent distribution of children under four years by type of floor in household material, according to region and residence, Uganda 1995

Region and residence	Floor material				Number of children
	Earth/Sand	Dung	Cement/ finished/other[1]	Total	
Region					
Central	62.8	2.0	35.1	100.0	1,222
Eastern	39.4	52.7	7.9	100.0	1,263
Northern	66.9	28.2	4.9	100.0	916
Western	82.3	11.2	6.5	100.0	1,347
		p<0.0001			
Residence					
Urban	26.6	5.6	67.8	100.0	534
Rural	67.5	25.4	7.1	100.0	4,212
		p<0.0001			
Total	62.9	23.2	13.9	100.0	4,746

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

Table B.14 Exposure to radio and television

Percentage of children under four years whose mothers listen to the radio daily and watch television at least once a week, according to region and residence, Uganda 1995

Region and residence	Listen to radio daily	Watch TV weekly	Number of children
Region			
Central	61.2	10.3	1,228
Eastern	26.3	2.8	1,269
Northern	15.0	0.0	927
Western	26.6	0.7	1,351
	p<0.0001	p<0.0001	
Residence			
Urban	60.0	22.5	537
Rural	29.8	1.2	4,238
	p<0.0001	p<0.0001	
Total	33.2	3.6	4,775

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

Table B.15 Transport owned

Percent distribution of children under four years by type of transport owned by household, according to region and residence, Uganda 1995

Region and residence	Type of transport owned				Number of children
	None	Bicycle	Car/ motorcycle	Total	
Region					
Central	47.9	47.5	4.6	100.0	1,223
Eastern	50.4	48.7	0.9	100.0	1,256
Northern	53.0	45.8	1.2	100.0	923
Western	65.2	33.0	1.9	100.0	1,349
		p<0.0001			
Residence					
Urban	65.2	27.1	7.7	100.0	535
Rural	53.1	45.5	1.4	100.0	4,215
		p<0.0001			
Total	54.5	43.4	2.1	100.0	4,750

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

Table B.16 Possession score

Percent distribution of children under four years by household possession score, according to region and residence, Uganda 1995

Region and residence	Possession score[1]				Number of children
	0	1	2+	Total	
Region					
Central	30.4	53.1	16.5	100.0	1,222
Eastern	62.1	34.9	3.1	100.0	1,265
Northern	76.6	21.6	1.8	100.0	922
Western	60.7	36.7	2.5	100.0	1,350
		p<0.0001			
Residence					
Urban	23.7	37.8	38.5	100.0	535
Rural	60.5	37.5	2.0	100.0	4,223
		p<0.0001			
Total	56.3	37.5	6.1	100.0	4,758

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.

Table B.17 Antenatal care

Percent distribution of children under four years, by source of mother's antenatal care, according to region and residence, Uganda 1995

Region and residence	Antenatal care provider					Number of children
	Doctor	Nurse/ midwife	Traditional birth attendant	Other/ none	Total	
Region						
Central	17.0	77.8	1.0	4.3	100.0	1,227
Eastern	6.0	87.1	0.9	6.1	100.0	1,267
Northern	4.0	86.9	1.0	8.1	100.0	925
Western	10.5	78.7	0.7	10.1	100.0	1,351
			p<0.0001			
Residence						
Urban	26.8	68.5	0.6	4.1	100.0	537
Rural	7.5	84.0	0.9	7.6	100.0	4,233
			p<0.0001			
Total	9.7	82.3	0.9	7.2	100.0	4,770

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

Appendix C

ANTHROPOMETRIC DATA VERIFICATION

Of the 5,447 children under five years of age who took part in the survey, 93 percent (5,054 children) were weighed and measured. Chronic and/or acute nutritional status could not be ascertained for 671 children. Of these, 58 percent were not weighed and measured, 31 percent had invalid measurements that is at least one of their anthropometric measurements (height-for-age, weight-for-height and/or weight-for-age) were highly unlikely given the other two measurements, the remaining 11 percent did not have a valid date of birth. Invalid measurements were defined as: Z-scores for height-for-age and weight-for-age below -6 standard deviations, Z-scores for weight-for-height below -4 standard deviations, or Z-scores for any index above 6 standard deviations.

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-score of the previous child in the data set who was born in the year and whose mother had attained the same level of education. Table C.1 compares the distribution of all imputed Z-scores with that of valid Z-scores. Forty-four percent of the imputed Z-scores for height-for-age fall in the mild undernutrition to normal nutrition categories. This compares to 57 percent for the valid scores in the same categories. Additionally, 60 percent of weight-for-age Z-scores fall in the mild undernutrition to normal nutrition categories. This compares to 69 percent of the valid Z-scores in the same categories. Sixty-seven percent of the imputed Z-scores for weight-for-height fall in the mild undernutrition to normal nutrition categories. This compares to 83 percent of the valid Z-scores in the same categories.

Over 50 percent of the imputed Z-scores for height-for-age, weight-for-age and weight-for-height fall in the years 1991 and 1992, compared with slightly over 30 percent of the valid Z-scores in these same categories. The imputed Z-scores were virtually the same for male and female children when compared with valid Z-scores.

Table C.2 describes the differences seen in nutritional status depending on whether the imputed data are included in the analysis. For stunting and underweight, the inclusion of imputed values serves to lower the levels of undernutrition, while the affect of the imputed values slightly increases the level of wasting. However, for wasting the difference is minimal when the imputed data are included (a difference of only +0.1 percent). For stunting and underweight, the differences are larger, reaching a high of -1.2 percent for underweight when the imputed values are included in the analysis.

There appears to be a preference in the choice of digits for the height data (Table C.3); clumping appears around the integers of 0,2 and 5. However, the data for weight shows very little integer preference.

Table C.1 Imputed and valid Z-scores

Percent distribution of children under four years of age by nutritional status, year of birth, and sex of child, according to imputed and valid height-for-age, weight-for-age, and weight-for-height Z-scores, Uganda 1995

	Height-for-age		Weight-for-age		Weight-for-height	
	Imputed	Valid	Imputed	Valid	Imputed	Valid
Nutritional status						
Severe malnutrition	11.6	15.1	5.6	6.8	0.3	0.9
Moderate malnutrition	21.3	23.5	11.1	19.3	3.7	4.4
Mild malnutrition	25.3	28.6	30.2	30.7	10.6	18.5
Normal nutrition	18.9	28.8	30.2	38.5	56.2	64.5
Mild overnutrition	1.3	2.3	1.5	3.5	5.9	8.9
Moderate overnutrition	0.2	0.8	0.4	0.8	1.3	2.0
Severe overnutrition	0.4	0.8	0.0	0.4	0.2	0.8
Missing data	20.8	0.0	20.8	0.0	21.7	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Year of birth						
1991	18.9	9.3	18.9	9.3	18.9	9.4
1992	33.9	21.8	33.9	21.8	32.5	22.2
1993	21.2	26.1	21.2	26.1	21.2	26.0
1994	15.3	31.9	15.3	31.9	15.7	31.6
1995	10.8	10.8	10.8	10.8	11.7	10.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sex of child						
Male	48.5	48.9	48.5	48.9	48.2	48.9
Female	51.5	51.1	51.5	51.1	51.8	51.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number	671	4,775	671	4,775	600	4,847

Table C.2 Verification of anthropometric data

Percentage of children under four years by nutritional status, by whether imputed anthropometric data are included or excluded, and the difference in malnutrition when imputed data are included, Uganda 1995

Nutritional status	Imputed values included		Difference
	Yes	No	
Stunted	38.0	38.7	-0.7
Number	5,447	4,775	
Underweight	24.9	26.1	-1.2
Number	5,447	4,775	
Wasted	5.2	5.3	+0.1
Number	5,447	4,775	

Table C.3 Digit preference in anthropometric data

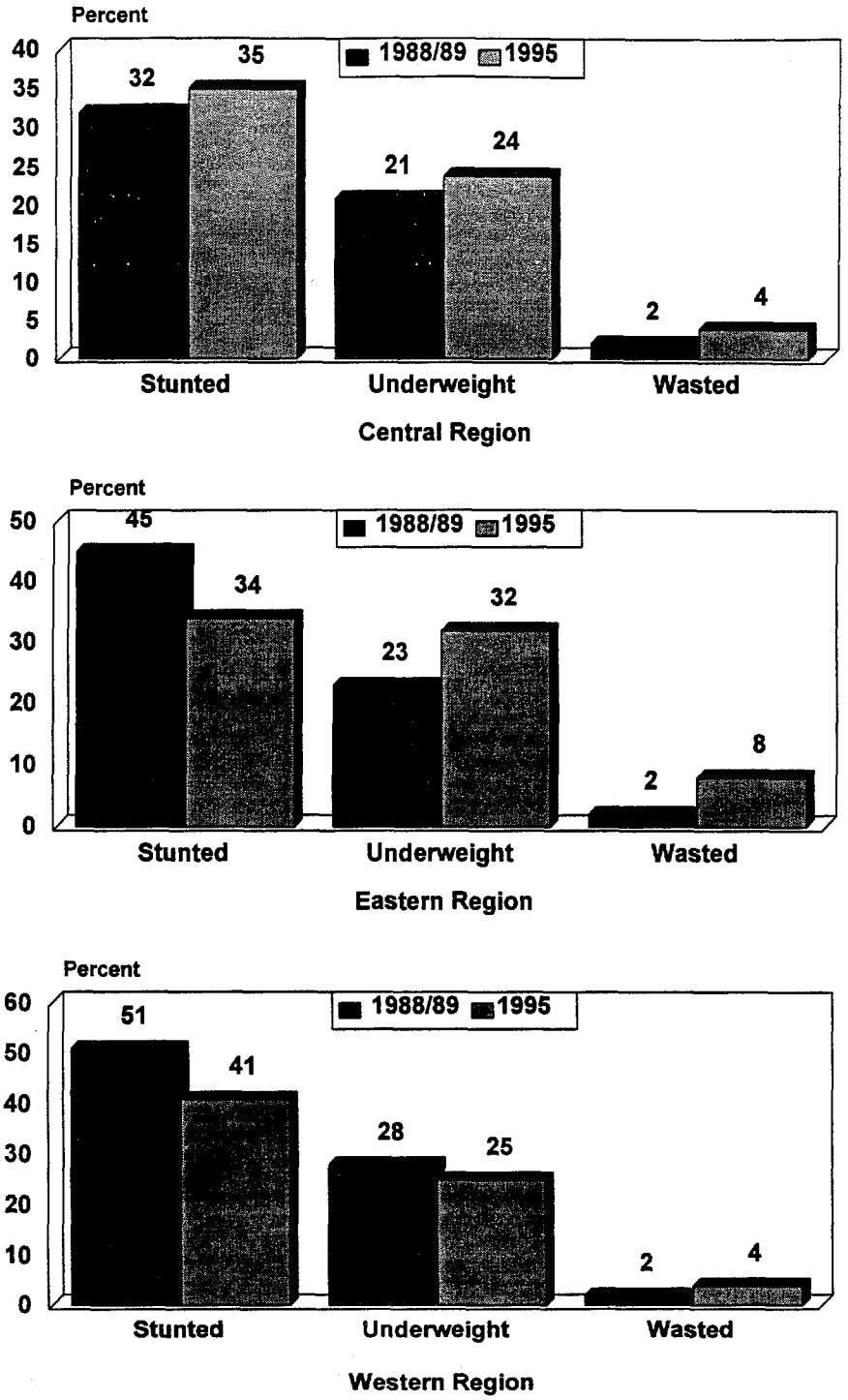
Percentage of weight and height data falling as specific integers, Uganda 1995

Decimal integer	Height	Weight
0	11.0	9.9
1	8.3	8.3
2	11.2	9.7
3	8.8	9.2
4	8.9	8.4
5	12.0	10.3
6	9.2	10.3
7	8.3	9.2
8	7.9	9.6
9	7.2	8.2
Missing	7.1	7.0
Total	100.0	100.0
Number	5,447	5,447

Appendix D

PATTERNS IN MALNUTRITION 1988/89 AND 1995

Figure D.1 Malnutrition among Children under three years by Region, Uganda, 1988/89 and 1995



Note: In the 1988/89 UDHS, the Northern region was not included in the sampling frame. Therefore, for the comparison of malnutrition levels by region between 1988/89 and 1995, only the Central, Eastern and Western regions are included. In addition, only children 3 to 36 months are included, as this is the common age range between the two surveys.

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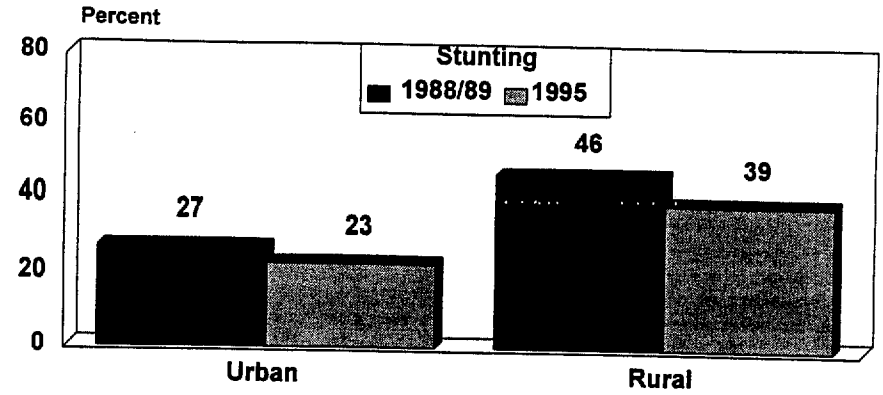
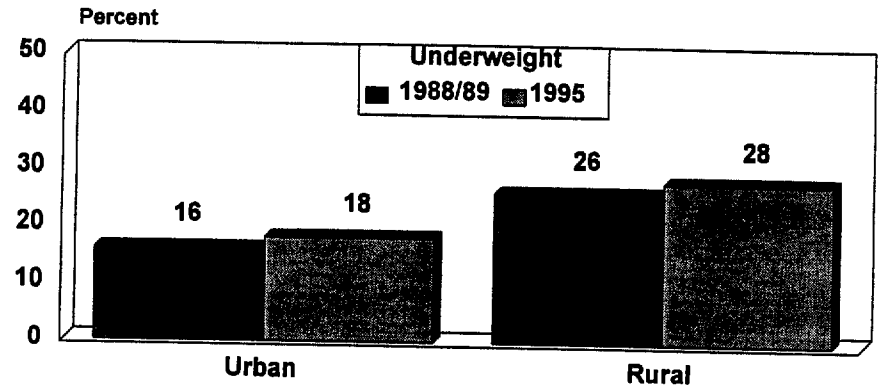
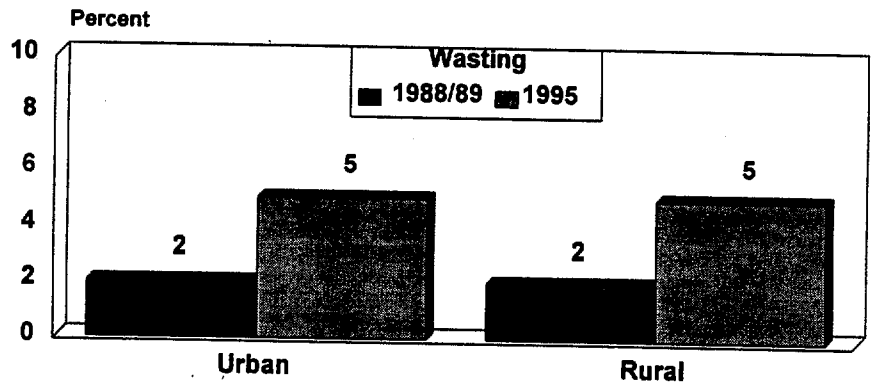
Figure D.2 Malnutrition among Children under three Years by Residence, Uganda 1988/89 and 1995







Note: In the 1988/89 UDHS, the Northern region was not included in the sampling frame. Therefore, for the comparison of malnutrition levels by urban-rural residence between 1988/89 and 1995, only the Central, Eastern and Western regions are included. In addition, only children 3 to 36 months are included, as this is the common age range between the two surveys.

Appendix E

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

Table E.1 Malnutrition by region and age

Percentage of children under four years of age who are undernourished, by region and age, Uganda 1995

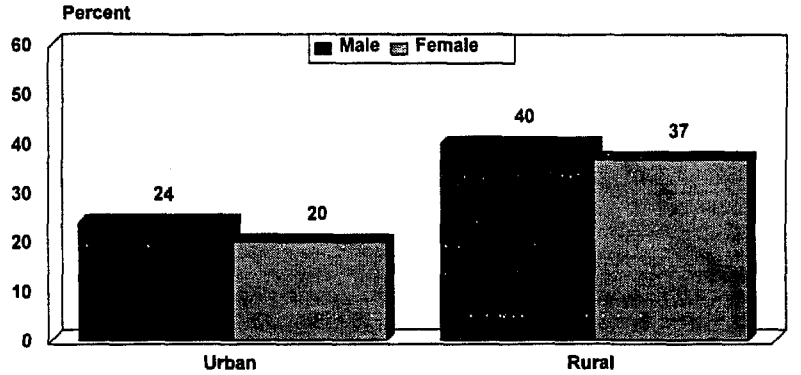
Region and age (months)	Malnutrition			Number of children
	Stunted	Wasted	Underweight	
Central				
0-5	4.5	2.6	2.6	155
6-11	29.4	3.6	25.6	195
12-17	41.8	5.4	32.4	185
18-23	41.8	7.3	27.5	178
24-29	33.9	1.7	25.6	121
30-35	44.5	0.7	17.0	147
36-47	36.0	2.0	16.8	250
Total	33.5	3.4	21.2	1,231
Eastern				
0-5	4.0	3.3	4.0	151
6-11	23.0	7.1	32.5	197
12-17	32.0	15.5	42.6	195
18-23	48.5	11.6	35.9	198
24-29	40.5	3.3	31.4	153
30-35	44.0	0.0	20.0	100
36-47	48.9	2.5	19.9	277
Total	35.5	6.6	27.3	1,271
Northern				
0-5	6.6	1.5	5.2	135
6-11	26.8	18.8	41.4	128
12-17	46.3	13.0	47.5	160
18-23	58.5	8.2	44.9	147
24-29	48.9	5.5	27.8	90
30-35	49.5	6.7	32.7	104
36-47	55.2	0.6	19.0	163
Total	41.9	7.8	31.5	927
Western				
0-5	11.2	1.2	4.3	162
6-11	26.8	4.3	20.9	235
12-17	39.7	5.7	32.1	193
18-23	57.4	5.6	23.6	195
24-29	48.6	3.5	28.5	144
30-35	50.0	1.3	28.9	152
36-47	60.0	5.2	27.0	270
Total	42.8	4.1	23.8	1,351
Uganda				
0-5	6.8	2.0	3.8	602
6-11	26.5	7.3	28.6	753
12-17	39.7	9.8	38.3	733
18-23	51.3	8.2	32.3	718
24-29	42.7	3.3	28.5	508
30-35	47.2	2.2	24.5	502
36-47	49.8	2.9	20.9	959
Total	38.3	5.3	25.5	4,775

Table E.2 Malnutrition by gender, urban/rural residence, and age

Percentage of children under four years of age who are malnourished, by gender, urban/rural residence, and age, Uganda 1995

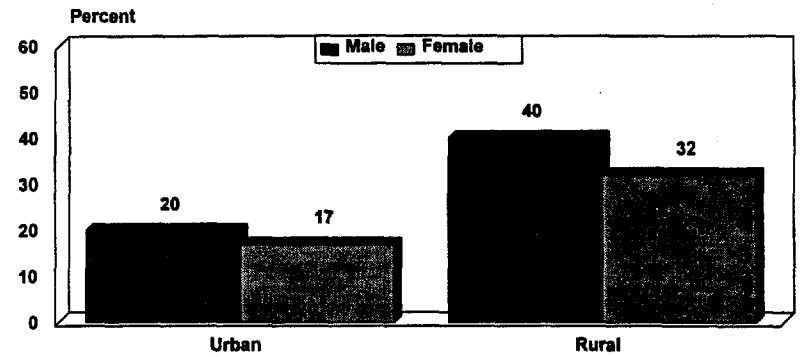
Gender, residence, and age (months)	Malnutrition			Number of children
	Stunted	Wasted	Underweight	
Male				
0-5	9.8	2.7	5.4	296
6-11	29.7	8.9	33.8	370
12-17	44.7	11.5	43.1	357
18-23	51.1	8.0	32.7	352
24-29	42.3	4.5	29.3	246
30-35	45.6	1.6	22.0	250
36-47	51.2	3.5	20.6	462
Total	40.0	6.0	27.1	2,333
Female				
0-5	3.9	1.3	2.8	307
6-11	23.3	5.8	23.6	382
12-17	34.8	8.2	33.8	376
18-23	51.4	8.5	32.0	366
24-29	43.1	2.3	27.9	262
30-35	48.8	2.4	27.0	252
36-47	48.5	2.4	21.1	467
Total	36.7	4.6	24.1	2,442
Urban				
0-5	5.6	4.2	4.2	72
6-11	12.3	3.7	14.8	81
12-17	25.6	9.8	28.0	82
18-23	34.7	5.6	14.1	71
24-29	28.3	7.5	24.5	53
30-35	29.5	3.2	14.8	61
36-47	23.3	2.6	10.3	117
Total	22.4	5.0	15.3	537
Rural				
0-5	6.8	1.7	3.9	532
6-11	28.2	7.7	30.2	672
12-17	41.3	9.7	39.6	651
18-23	53.2	8.7	34.2	646
24-29	44.4	2.9	29.0	455
30-35	49.5	2.0	25.9	441
36-47	53.5	3.0	22.4	843
Total	40.3	5.4	26.8	4,240
Uganda				
0-5	6.8	2.0	3.8	602
6-11	26.5	7.3	28.6	753
12-17	39.7	9.8	38.3	733
18-23	51.3	8.2	32.3	718
24-29	42.7	3.3	28.5	508
30-35	47.2	2.2	24.5	502
36-47	49.8	2.9	20.9	959
Total	38.3	5.3	25.5	4,775

Figure E.1 Stunting by Region, Residence and Gender, Uganda 1995



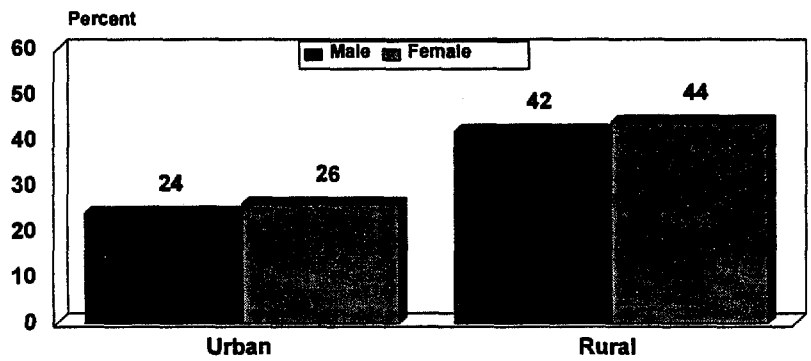
Central Region

UDHS 1995



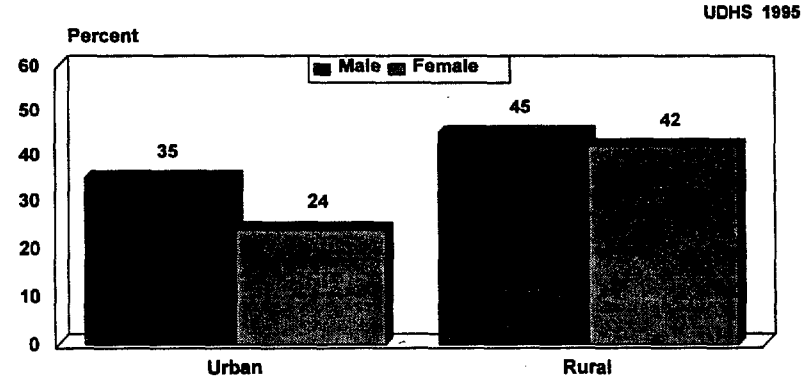
Eastern Region

UDHS 1995



Northern Region

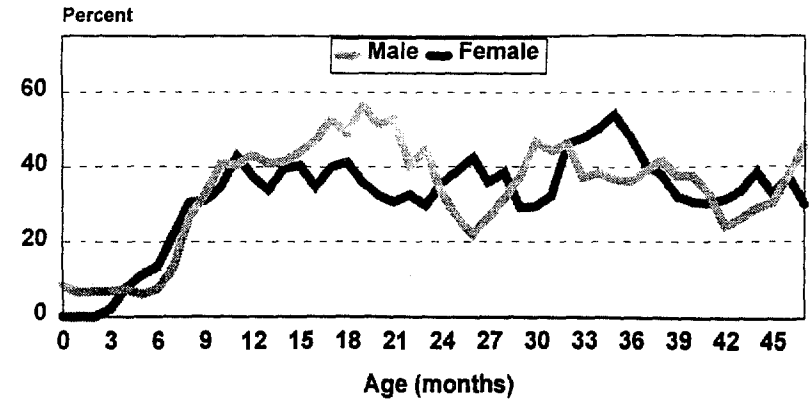
UDHS 1995



Western Region

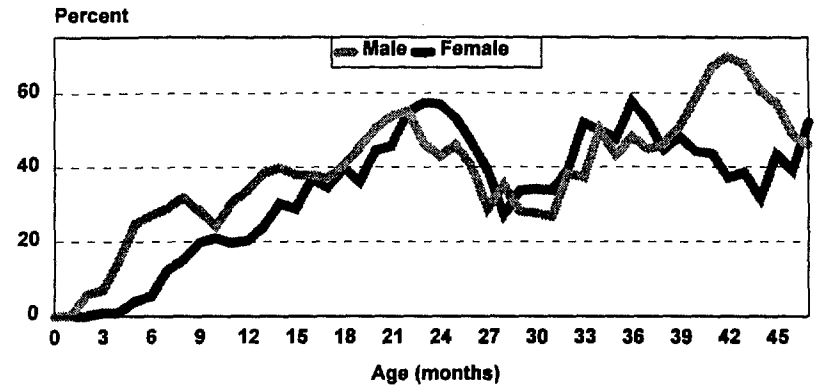
UDHS 1995

Figure E.2 Stunting by Region, Gender and Age in Months, Uganda 1995



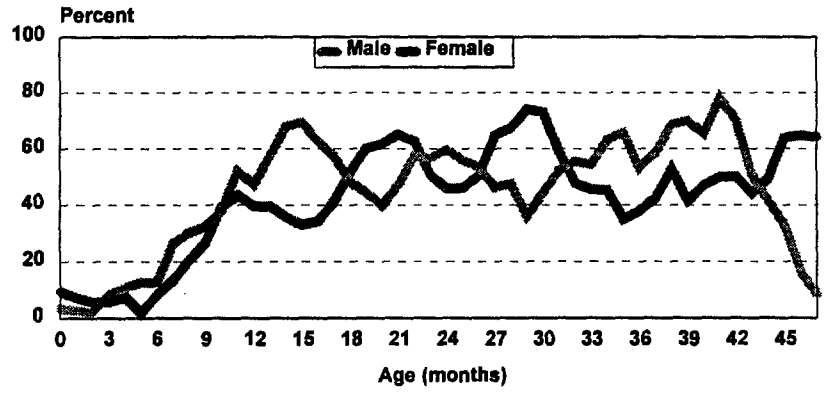
Central Region

UDHS 1995



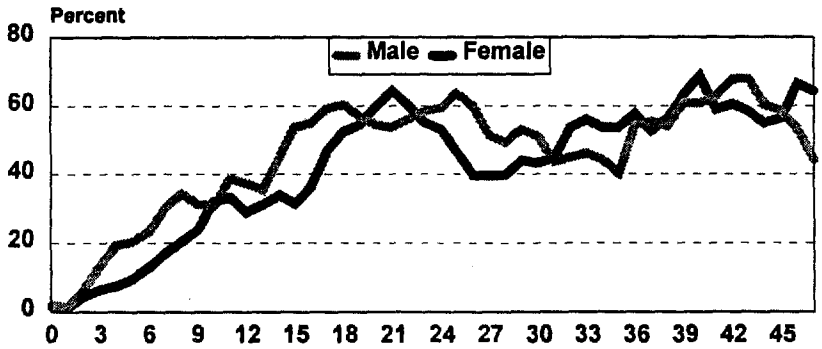
Eastern Region

UDHS 1995



Northern Region

UDHS 1995



Western Region

UDHS 1995

Appendix F

FEEDING PRACTICES BY AGE

Table F.1 Feeding practices by age

Percent distribution of children under two years by feeding practices, according to age group, Uganda 1995

Age (months)	Breastfed and: Nothing	Water	Other liquids	Milk	Solids	Milk and solids	Fully weaned	Total	Number of children
0-1	73.1	5.2	2.2	18.7	0.0	0.7	0.0	100.0	134
2-3	65.0	3.7	6.0	18.0	6.0	0.9	0.5	100.0	217
4-5	36.8	5.1	13.0	22.1	13.4	7.9	1.6	100.0	253
6-7	18.7	5.5	11.5	10.6	33.2	20.0	0.4	100.0	235
8-9	8.9	3.0	2.1	7.2	44.7	30.4	3.8	100.0	237
10-11	4.7	1.8	3.6	4.3	55.2	26.2	4.3	100.0	279
12-13	1.9	0.4	0.0	3.1	59.9	24.9	9.7	100.0	257
14-15	2.9	1.6	1.6	2.4	53.5	24.5	13.5	100.0	245
16-17	1.3	0.0	0.0	1.3	58.5	15.7	23.1	100.0	229
18-19	1.2	0.0	0.8	0.4	45.6	17.8	34.4	100.0	259
20-21	1.2	0.0	1.2	0.8	38.6	7.2	51.0	100.0	249
22-23	0.5	0.0	0.0	0.0	27.4	7.7	64.4	100.0	208

Appendix G

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) six outcomes: bottle use, diarrhoea, stunting, wasting, low and high maternal body mass. 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 wasted, having low or high maternal body mass.

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, but not always, 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. A relative risk estimate greater than 1.00 indicates an increased risk for the outcome, while a relative risk estimate less than 1.00 indicates a decreased risk for the outcome.

For example, in Table 3.2 (Prevalence and estimate of net relative risk for bottle use), "Eastern" is the reference category for region, so it is assigned a value of 1.00. The net relative risk for bottle use for the Central region is 2.91, but is not significant. The relative risk for bottle use in the Northern region is 1.92 and is significant, while the relative risk for the Western region is 3.04 and is also significant. That is the relative risk for bottle use among households in the Northern region and is 92 percent higher than in the Eastern region. In the Western region the risk for bottle use is over three times the level found in the Central region (the reference category).

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Appendix H

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

		Nutrition reports published	
DHS survey	Date of fieldwork	Briefing packet	Country report
Burkina Faso	Dec-Mar 1992/93	1994	
Burundi	Mar-Jul 1987	1993	
Cameroon	Apr-Sep 1991	1993	1993
Central African Rep.	Sep-Mar 1994/95	1995	
Ivory Coast	Jun-Nov 1994	1995	
Ghana	Feb-May 1988	1993	
Ghana	Sep-Dec 1993	1995	1995
Kenya	Feb-Aug 1993	1994	[1996]
Madagascar	May-Nov 1992	1993	
Malawi	Sep-Nov 1992	1994	
Mali	Mar-Aug 1987	1993	1993
Mali	Nov-Apr 1995/96	[1996]	
Namibia	Jul-Nov 1992	1993	
Niger	Mar-Jun 1992	1993	1993
Nigeria	Apr-Oct 1990	1993	1993
Rwanda	Jun-Oct 1992	1994	
Senegal	Nov-Aug 1986	1993	
Senegal	Nov-Aug 1992/93	1994	1996
Tanzania	Oct-Mar 1991/92	1993	
Togo	Jun-Nov 1988	1993	
Uganda	Sep-Feb 1988/89	1993	
Uganda	Apr-Jul 1995	1996	1996
Zambia	Jan-May 1992	1993	1993
Zimbabwe	Sep-Jan 1988/89	1993	
Zimbabwe	Jul-Nov 1994	1996	1996

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[ ] Report in preparation

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