# AFRICA NUTRITION

# Nutrition and Health Status Of Young Children in Zambia

## Findings from the 1992 Zambia Demographic and Health Survey

U.S. Agency for International Development
AFR/ARTS and R&D/N

Macro International Inc.

IMPACT Food Security and Nutrition Monitoring Project

# Nutrition and Health Status of Infants and Young Children in Zambia:

## Findings from the 1992 Zambia Demographic and Health Survey

Chongo D. Kaite, National Food and Nutrition Commission, Zambia
Penelope Nestel, Ph.D., Macro International Inc.
Shea O. Rutstein, Ph.D., Macro International Inc.

Macro International Inc.
11785 Beltsville Dr.
Suite 300
Calverton, MD 20705

October 1993

# CONTENTS

Tables ..... v

Figures ..... ix

Acronyms ..... x

Acknowledgments ..... xi

Summary ..... xiii

Map of Zambia ..... xvi

1. Introduction ..... 1

   1.1 Geography ..... 1
   1.2 Population ..... 1
   1.3 Economy ..... 1
   1.4 Agriculture ..... 2
   1.5 Food Consumption ..... 2
   1.6 National Food and Nutrition Policy ..... 4
   1.7 Data Source and Type of Information Collected ..... 4

2. Basic Indicators of Nutritional Status ..... 5

   2.1 Levels of Undernutrition ..... 5
   2.2 Nonbiological Factors ..... 8
   2.3 Biological Factors ..... 12

3. Infant and Child Feeding Practices ..... 17

   3.1 Initiation of Breastfeeding ..... 17
   3.2 Exclusive Breastfeeding ..... 17
   3.3 Introduction of Complementary Solid Foods ..... 20
   3.4 Bottle Use ..... 21
   3.5 Full Weaning ..... 22

4. Mortality and Health ..... 25

   4.1 Infant and Under-five Mortality ..... 25
   4.2 Morbidity and Use of Health Facilities ..... 26
   4.3 Age-Related Pattern of Diarrhoea ..... 31
   4.4 Nonbiological and Biological Factors Associated with Diarrhoea ..... 32
   4.5 Age-Related Pattern of Fever ..... 34
   4.6 Age-Related Pattern of Cough ..... 34

5. Nutrition and Caring Capacity of the Family ..... 35

5.1 Stunting ..... 36
5.2 Underweight ..... 39
5.3 Wasting ..... 39
5.4 Summary ..... 39

6. Nutritional Status of Mothers ..... 41

6.1 Nutritional Status of Nonpregnant Mothers ..... 41
6.2 Height ..... 41
6.3 Body Mass Index ..... 43
6.4 Pregnancy Weight Gain ..... 46
6.5 Summary ..... 47

7. Recommendations ..... 49

References ..... 51

Appendix A Sample Design ..... 53

Appendix B Household and Respondent Background Characteristics ..... 55

Appendix C Anthropometric Data Verification ..... 67

Appendix D Differences in Prevalence of Undernutrition 1970/72 and 1992 ..... 71

Appendix E Feeding Practises by Child's Age ..... 73

Appendix F Logistic Regression Models ..... 75

# TABLES


Table 1.1 Area under food production . . . . . 3

Table 2.1 Moderate and severe stunting, underweight, and wasting by province and residence . . 7

Table 2.2 Waterlow classification of nutritional status by province and residence . . . . . 8

Table 2.3.1 Stunting, underweight, and wasting by nonbiological factors . . . . . 11

Table 2.3.2 Stunting, underweight, and wasting by nonbiological factors . . . . . 11

Table 2.4 Stunting, underweight, and wasting by biological factors . . . . . 12

Table 2.5 Parturition time and type of delivery . . . . . 13

Table 2.6 Birth weight and size at birth . . . . . 14

Table 3.1 Initial breastfeeding . . . . . 18

Table 3.2 Median duration of breastfeeding . . . . . 22

Table 3.3 Reason for fully weaning last-born child . . . . . 23

Table 3.4 Feeding patterns for children age 12 to 23 months . . . . . 24

Table 4.1 Infant and under-five mortality rates . . . . . 25

Table 4.2 Prevalence of diarrhoea, fever, and cough . . . . . 26

Table 4.3 Source of treatment for fever or cough . . . . . 28

Table 4.4 Source of treatment for diarrhoea . . . . . 28

Table 4.5 Use of oral rehydration therapy for treatment of diarrhoea . . . . . 29

Table 4.6 Changes in feeding practices among children with diarrhoea . . . . . 30

Table 4.7 Prevalence and net relative risk of diarrhoea among children age 1 to 24 months . . . . 33

Table 5.1 Net relative risk of stunting, underweight, and wasting . . . . . 37

Table 6.1 Nutritional status of mothers . . . . . 42

Table 6.2 Mother's height . . . . . 43

Table 6.3 Maternal height and number of dead children . . . . . 43

Table 6.4 Body mass index . . . . . 44

Table 6.5 Prevalence and net relative risk of low body mass and high body mass among mothers age 15 to 49 years . . . . . 45

Table 6.6 Pregnancy weight . . . . . 47

**APPENDIX B**

Table B.1 Mothers and children weighed and measured in the Zambia DHS . . . . . 55

Table B.2 Duration of residence . . . . . 56

Table B.3 Mean and standard deviation for living and dead children . . . . . 57

Table B.4 Mother's age . . . . . 57

Table B.5 Mother's education . . . . . 58

Table B.6 Mother's occupation . . . . . 59

Table B.7 Presence of child at work . . . . . 59

Table B.8 Usual caretaker of children of working mothers . . . . . 60

Table B.9 Residence of mother's husband . . . . . 60

Table B.10 Mother's marital union . . . . . 61

Table B.11 Husband's education . . . . . 62

Table B.12 Husband's occupation . . . . . 62

Table B.13 Toilet facilities . . . . . 63

Table B.14 Source of drinking water . . . . . 63

Table B.15 Type of floor . . . . . 64

Table B.16 Exposure to radio and television . . . . . 64

Table B.17 Transport owned . . . . . 65

Table B.18 Possession score . . . . . 65

Table B.19 Antenatal care provider . . . . . 66

**APPENDIX C**

Table C.1 Imputed and valid Z scores . . . . . 68

Table C.2 Verification of anthropometric data . . . . . 69

Table C.3 Digit preference in anthropometric data . . . . . 69

**APPENDIX E**

Table E.1 Undernutrition by gender, residence, and age group . . . . . 73

Table E.2 Undernutrition by province and age group . . . . . 74

**APPENDIX F**

Table F Feeding practices by age . . . . . 75

# FIGURES


Figure 1.1 Area and production of maize . . . . . 3

Figure 2.1 Undernutrition among children age 1 to 59 months . . . . . 6

Figure 2.2 Undernutrition among children age 1 to 59 months by province . . . . . 9

Figure 2.3 Undernutrition among children age 1 to 59 months by residence . . . . . 10

Figure 2.4 Undernutrition among children age 1 to 59 months by age . . . . . 15

Figure 3.1 Feeding practices by age . . . . . 19

Figure 3.2 Exclusive and full breastfeeding among infants under 4 months by province and residence . . . . . 20

Figure 3.3 Breastfeeding with complementary food among infants age 6 to 9 months by province and residence . . . . . 21

Figure 4.1 Diarrhoea and underweight by age . . . . . 31

Figure 4.2 Fever and cough by age . . . . . 34

Figure 6.1 Mean height and weight of mothers by age . . . . . 42


**APPENDIX D**


Figure D Undernutrition among Zambian children: 1970/72 and 1992 . . . . . 71


PREVIOUS PAGE BLANK

# ACRONYMS

| | |
|---|---|
| ARI | Acute Respiratory Infections |
| BMI | Body Mass Index |
| CDC | Centers for Disease Control |
| CDD | Control of Diarrhoeal Diseases |
| CED | Chronic Energy Deficiency |
| EPI | Expanded Programme of Immunisation |
| FAO | United Nations Food and Agricultural Organisation |
| GDP | Gross Domestic Product |
| IMF | International Monetary Fund |
| NCHS | National Centre for Health Statistics |
| ORS | Oral Rehydration Salts |
| ORT | Oral Rehydration Therapy |
| RHF | Recommended Home Fluid |
| SD | Standard Deviation |
| UNICEF | United Nations Children's Fund |
| WHO | World Health Organisation |

# ACKNOWLEDGMENTS

The production of this report was made possible with the assistance of Betty Thomas and Aylene Kovensky who we gratefully acknowledge.

# SUMMARY

The Zambia Demographic and Health Survey (DHS), a nationally representative survey, provides information on the nutrition status of Zambian children between the ages of 1 and 59 months at the national, provincial and urban/rural levels. Overall, 40 percent of children are stunted, 25 percent are underweight and 5 percent are wasted. Undernutrition is significantly higher in Luapula and Northern provinces than elsewhere. It is also higher in rural areas than in urban areas.

Infant and child feeding practices are far from optimal, increased levels of undernutrition are manifested soon after birth. The prevalence of chronic undernutrition, or stunting, increases dramatically through to 24 months of age to 55 percent and thereafter remains at over 40 percent through the age of 5 years. Acute undernutrition, reflected in wasting, also rises steadily in infancy and remains at about 10 percent among children age 12 to 24 months before declining to around 4 percent. These results show that growth in both height and weight are noticeably retarded up to the age of 24 months and that further deterioration in nutritional status does not occur after this age. Indeed, there is an improvement in acute and, to a much lesser extent, chronic nutritional status among the older children.

Breastfeeding is not begun very early in Zambia: 60 percent of infants are not put to the breast immediately after birth. Mothers in Western province are more likely to delay the initiation of breastfeeding.

A high proportion of infants are fed complementary liquids and solids within the first four months of life. Only 13 percent of infants are exclusively breast fed for the first 4 months of life, which is the optimal infant feeding practice recommended by the World Health Organization.

Although almost all infants receive water and other liquids too early, a sizeable proportion of infants are also given complementary foods too late. The World Health Organization recommends that between 4 and 6 months of age breast-fed infants begin receiving complementary foods. In Zambia, however, 3 percent of infants aged 6 to 9 months are already fully weaned and nearly 14 percent of infants in this age group are not receiving complementary foods.

About one in four children under the age of 5 years had a recent history of diarrhoea, while nearly one in two had fever recently and one in two had a cough. Morbidity patterns follow closely those for undernutrition. The prevalence of diarrhoea, fever, and cough increases with age. Diarrhoea remains high through the ages of 11 to 18 months whereas fever and cough are high among children age 6 to 18 months. More children in rural areas have diarrhoea than in urban areas. The risk of diarrhoea among children under 2 years is 75 percent greater in Eastern province and 45 percent greater in Southern and Western provinces than elsewhere.

Multivariate analysis shows that undernutrition is largely determined by the child's age, size of the child at birth, stopping breastfeeding for reasons other than reaching the appropriate age, morbidity, and factors generally associated with poverty.

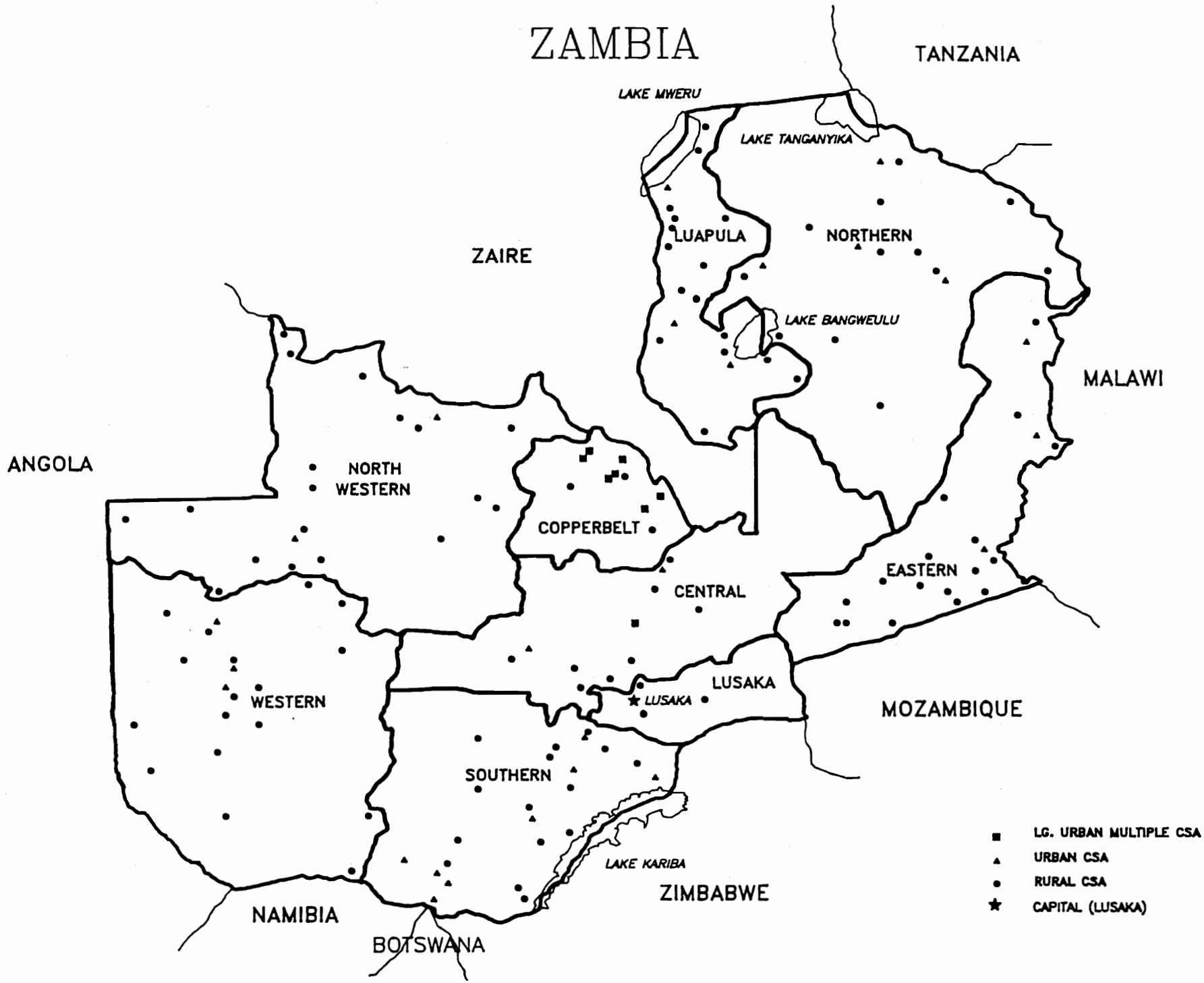
Compared with national-level data from 1970 to 1972, the 1992 ZDHS data show that nutritional status has not changed over the last 20 years.

Efforts to improve undernutrition among children in Zambia need to focus on the first two years of life when undernutrition has its greatest effect on Zambian infants and children. In particular, public health efforts need to focus on increasing the immediate initiation of breast-feeding, increasing the duration of exclusive breastfeeding through to 4 to 6 months, increasing the number of infants receiving complementary

foods at the appropriate time, informing mothers about proper regimens for sick children, and educating parents about the importance of good intrahousehold food distribution. The data also point to a high proportion of children born below average size, which raises important questions about maternal nutritional status.

The DHS maternal anthropometric data show that the mean height of mothers is 158 cm, but there are tribal differences suggesting both genetic diversity and environmental differences in growth patterns. Mothers of short stature have more dead children even after controlling for age and tribal affiliation. These findings indicate that health professionals need to ensure that these high-risk women get the necessary antenatal care and are attended by a health professional at the time of delivery. The DHS data also suggest that weight gain during pregnancy is inadequate. Thus, more attention needs to be given to monitoring weight gain during all pregnancies.

The mean Quetlet body mass index for mothers is around 22; 10 percent of mothers are chronically energy deficient while 20 percent are overnourished. Overnutrition is more common than undernutrition among Zambian mothers, especially among those from wealthier households. Given that overnutrition is associated with an increased risk of cardiovascular disease and diabetes, among other things, health professionals need to be made aware of the consequences of overnutrition and give the appropriate dietary advice to overnourished women.


ZAMBIA
TANZANIA
LAKE MWERU
LAKE TANGANYIKA
LUAPULA
NORTHERN
ZAIRE
LAKE BANGWEULU
MALAWI
ANGOLA
NORTH WESTERN
COPPERBELT
CENTRAL
EASTERN
WESTERN
LUSAKA
LUSAKA
MOZAMBIQUE
SOUTHERN
LAKE KARIBA
ZIMBABWE
NAMIBIA
BOTSWANA
LG. URBAN MULTIPLE CSA
URBAN CSA
RURAL CSA
CAPITAL (LUSAKA)

# Chapter 1

# INTRODUCTION

## 1.1 GEOGRAPHY

Zambia is a landlocked country covering 752,000 $km^2$. It shares borders with Zaire and Tanzania in the north, Malawi and Mozambique in the east, Zimbabwe and Botswana in the south, Namibia in the southwest, and Angola in the west. Administratively, the country is divided into 9 provinces (map, p. xviii) and 57 districts.

Lying on the Central African Plateau, Zambia's altitude varies from 900 m in the southeast to over 2000 m in the northeast. The broad depressions on the edges of the plateau form Lakes Tanganyika, Mweru, and Bangweulu in the north, Luangwa River in the east, and the Kafue Basin and alluvial plains of the Zambezi River in the west. The major rivers include the Kafue, Luangwa and Luapula.

The climate in Zambia is subtropical with three distinct seasons; the warm wet season from November through April, a cool dry season from May to August, and a hot dry season during September and October. During the rainy season, the northern half of the country (Copperbelt, Luapula, Northern, and North Western provinces) receives the highest precipitation, which ranges from 1,100 to over 1,400 mm per year. In contrast, the rest of the country receives between 600 and 1,100 mm of rainfall per year.

## 1.2 POPULATION

The current population is estimated to be 7.8 million people and is growing at the rate of 3.2 percent per year, which is one of the highest rates of population growth in Africa. Fifty eight percent of the population are urban, making Zambia one of the most highly urbanised countries in Africa. Rural to urban migration has been high as a result of people moving to mining towns and urban centers. The Copperbelt and Lusaka provinces account for over 75 percent of the total urban population (Central Statistical Office, 1990).

Children under 15 years of age comprise about 49 percent of the total population and those under 5 years 20 percent of the population.

## 1.3 ECONOMY

Zambia has a mixed economy characterised by a modern, urban industrial sector and a rural agricultural sector. The economy is dominated by copper, of which Zambia produces about seven percent of the world's total, ranking fifth in the world.

In the decade following independence (1964-1975), copper accounted for 95 percent of the country's export earnings and contributed 45 percent of Government revenues. Since then falling copper prices, rising oil prices, and domestic policy failures have placed increasingly serious constraints on the ability of the State and, indeed, households to secure basic needs.

Gross Domestic Product (GDP) growth fell from 3.7 percent per annum in the early 1970s to an average of only 0.1 percent during the period 1974-1990, which is well below the population growth rate of 3.2 percent (Ministry of Health, 1992).

Government attempts to compensate for falling revenues from copper included giving higher priority to agriculture. However, due to price distortions and market controls, agricultural growth remained below potential. Indeed, by 1990, Government spending on agriculture was only 4 percent. In addition, in 1991, spending on social services, such as health and education, were only 5 and 10 percent, respectively. The economic deterioration has been such that by 1990, Zambia's external debt had reached US$ 8 billion, almost three times the level of annual GDP (UNICEF, 1992; World Bank, 1992).

In an effort to revitalise the ailing economy, the Government has embarked on an IMF/World Bank structural adjustment programme, which includes the liberalisation of trade, prices, and foreign exchange rates, and the removal of subsidies on consumer goods including maize - the staple food.

The impact of the poor economic performance on the majority of Zambian households has been severe. Average real income levels have fallen while inflation has increased from 12 percent in 1980 to over 200 percent in 1992. This has increased the cost of a nutritionally adequate food basket beyond the reach of an estimated 60 percent of Zambian households (Prices and Incomes Commisssion, 1991). Similarly, employment stagnated at only 10 percent of the labour force in 1990 compared with 24 percent a decade earlier.

## 1.4 AGRICULTURE

Of an estimated 18 million hectares of potentially arable land in Zambia, only about 2 million hectares (11 percent of the potentially arable area) are used for crops annually (Ministry of Agriculture, Food, and Fisheries, 1992). The underutilisation of land is due mainly to the numerous problems faced by small farmers, who comprise over 75 percent of all farm households, making the pursuit of agricultural expansion difficult. Among these problems are limited access to agricultural services, including inputs, extension advice, and storage facilities, as well as resources, such as credit, labour, and equipment (World Bank, 1993).

A fundamental objective of Government agricultural policy has been to achieve self-sufficiency in food through increased production. Although a wide range of crops are grown in Zambia, maize is by far the most widely grown and is the staple food. Its dominance is the result of a long history of Government support in terms of incentives (prices, subsidies on fertilizer etc.), research, and marketing unlike that provided for traditional staple foods such as millet, sorghum, cassava, and other food crops.

Over 80 percent of the total area planted is in maize compared with 12 percent in sorghum/millet and 7 percent in cassava (Table 1.1). Figure 1.1 shows that the trend in both the area planted and production of maize has increased but there are high annual variations largely due to climatic fluctuations.

## 1.5 FOOD CONSUMPTION

About 65 percent of total energy intake in Zambia comes from maize. The staple dish is "nshima," which is made of water and flour from maize, sorghum, millet, or cassava and is consumed with a relish. The relish can be made from vegetables, meat, fish, beans, or pulses. Although the variety of foods available is sufficient to provide a balanced diet, available data suggest that there are deficiencies in energy and nutrient intakes (FAO, 1991).

During the early 1970s, the average daily per capita energy intake was estimated to range from 1,580 kcal in the North Western province to 1,850 kcal in the Copperbelt province and around 1,700 kcals in the remaining provinces. In 1980, energy intake was estimated to range from 1,185 kcals in Luapula to 2,100 in Lusaka and Central provinces. The current estimate of the national per capita energy intake is 2,025 kcals, which is still less than the recommended daily intake of 2,300 kcals.

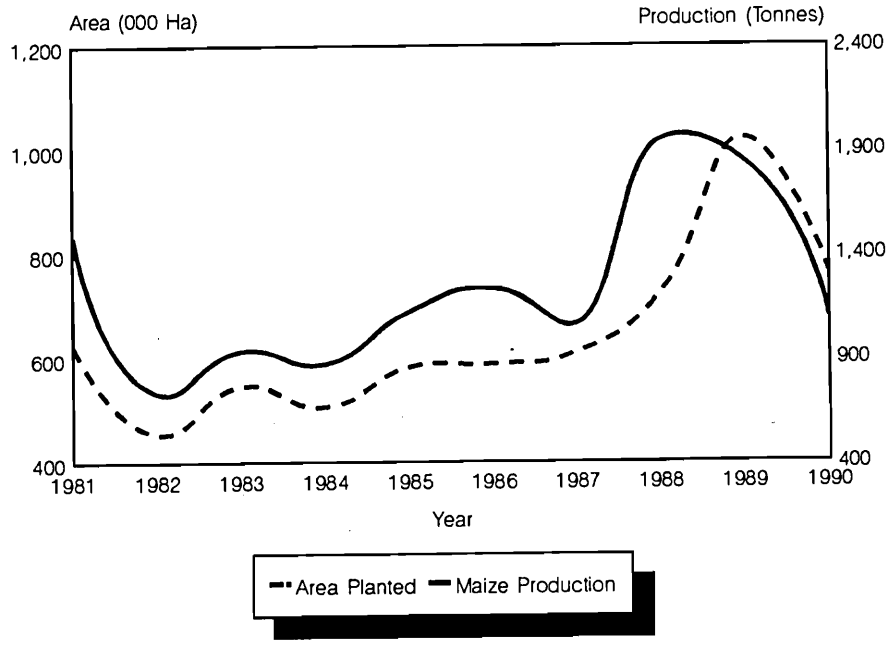
Table 1.1 Area under food production

Distribution of area planted to major staples, Zambia 1989/90

| Province | Area (000 hectares) | | | | Proportion of area under | | |
|---|---|---|---|---|---|---|---|
| | Sorghum | Millet | Maize | Sorghum/ Cassava | millet | Maize | Cassava |
| Central | 5.0 | 5.2 | 103.8 | 5.2 | 7.5 | 87.1 | 4.6 |
| Copperbelt | 7.3 | 0.0 | 22.0 | 0.0 | 24.9 | 75.1 | 0.0 |
| Eastern | 7.3 | 5.8 | 261.8 | 5.8 | 4.7 | 93.3 | 2.1 |
| Luapula | 1.0 | 12.7 | 16.5 | 12.7 | 31.9 | 38.5 | 42.1 |
| Lusaka | 1.4 | 0.0 | 25.5 | 0.0 | 5.2 | 94.8 | 0.0 |
| Northern | 0.7 | 15.1 | 45.1 | 15.1 | 20.8 | 59.3 | 24.8 |
| North Western | 6.1 | 1.1 | 16.5 | 1.1 | 29.0 | 66.5 | 4.6 |
| Southern | 12.4 | 7.1 | 232.8 | 7.1 | 7.5 | 89.7 | 2.8 |
| Western | 7.4 | 11.9 | 39.2 | 11.9 | 27.4 | 55.7 | 20.3 |
| Total | 48.5 | 58.9 | 763.3 | 58.9 | 11.6 | 82.1 | 6.8 |

Source: Ministry of Agriculture, Food and Fisheries, 1990.

Figure 1.1
Area and production of maize




Source: Ministry of Agriculture, Food, and Fisheries, 1991

Inadequate food intake is influenced mostly by the low level of food production at the household level. This is especially so in rural areas where most of the food produced is for subsistence use. Kaite (1990)

found that the majority of households deplete their stored food stocks within four or five months of harvest, a situation that has important implications for food security at both the household and national level.

## 1.6 NATIONAL FOOD AND NUTRITION POLICY

Although Zambia currently has no national food and nutrition policy, a number of goals, actions, and programmes have been articulated in the past by the Government through both the Ministry of Health and the Ministry of Agriculture as well as through bilateral and non-government organisations. These measures have been aimed at alleviating malnutrition in its widest sense, which is currently reported to be among the highest in Africa.

Recently, as part of the follow-up to the 1990 World Summit for Children and the 1992 International Conference on Nutrition, a national workshop was held to lay the foundation for a national programme of action for health and nutrition in Zambia. A document in which the objectives, goals, and activities to combat malnutrition were spelt out was written and has been submitted to the Government for approval. The document includes a description of the activities to be undertaken in growth promotion; micronutrient supplementation; breastfeeding promotion; information, education, and communication; household food security; and monitoring and evaluation.

## 1.7 DATA SOURCE AND TYPE OF INFORMATION COLLECTED

The data for this report were drawn from the Zambia Demographic and Health Survey (ZDHS) conducted by the University of Zambia with the assistance of the Central Statistical Office and Ministry of Health between January and May, 1992[1] (Gaisie et al., 1993). The ZDHS was a national sample survey designed to provide information on fertility and family planning among women of childbearing age, as well as on the health and nutritional status of their children (age 0 to 59 months). A total of 7,060 women between the ages of 15 and 49 years from 6,209 households were interviewed. The ZDHS sampling frame is described in Appendix A.

Full details of the ZDHS sample and data collection procedures are provided in Gaisie et al. (1993). Briefly, information was collected on household characteristics such as type of housing, water supply, type of toilet facilities, availability of electricity, type of transportation owned, and ownership of household amenities such as a radio or television. Information was also collected on the composition of the household, including the age, sex and educational level of all household members. The characteristics of the households containing children under the age of 5 years who participated in the ZDHS are described in Appendix B.

For individual women, detailed information was collected on reproductive intentions and behaviour, knowledge and use of contraceptives, employment, marital status, husband's education and occupation, maternal health, and use of health care facilities. Additional information obtained for children born during the previous five years covered breastfeeding and infant feeding practices, child health and vaccination status. The heights and weights of these children were measured using standard anthropometric techniques (WHO, 1989).

The survey was funded by the US Agency for International Development, with technical support from MACRO International Inc., located in Columbia, Maryland, USA.

---

[1] Unless otherwise noted, all data presented in this report are from the sample of all living children under five years of age drawn from the 1992 Zambia Demographic and Health Survey.

# Chapter 2

# BASIC INDICATORS OF NUTRITIONAL STATUS

Measures of height and weight in combination with age are used to determine nutritional status; three different indicators of nutritional status are commonly used. Stunting,[1] a failure to grow adequately in height in relation to age, reflects past or chronic undernutrition; it results from an inadequate intake of food over a period of time and is also affected by chronic illness. Wasting,[2] a failure to gain weight in relation to height, reflects recent or acute undernutrition; it results from a recent failure to receive adequate nutrition and is affected by acute illness, in particular diarrhoea. Underweight,[3] or a low weight in relation to age, can be due to either chronic or acute undernutrition. The quality of the ZDHS nutrition data and anthropometric measurements is discussed in Appendix C.

In this chapter, the association between nutritional status and a number of nonbiological (geographic, and social and economic) and biological (health and age-specific) factors are examined.

## 2.1 LEVELS OF UNDERNUTRITION

The ZDHS data show that 40 percent of Zambian children under five years[4] are stunted, 25 percent are underweight and 5 percent are wasted (Figure 2.1). This means that two in five children are short, one in four is underweight, and one in twenty is thin; these are about 17, 11 and 2 times, respectively, the levels expected in a well nourished healthy population.[5] The ZDHS results are similar to those in the 1991 Zambia Priority Survey 1 (Hunt *et al.*, in preparation). Compared with the results from the 1970 to 1972 National Nutrition Survey for children under five years (WHO, 1989), there has been little change in the level of undernutrition over the last 20 years (Appendix D); stunting, underweight and wasting were 37, 23, and 5 percent, respectively, in 1970-1972.

The ZDHS data show that nearly 40 percent of the stunted (i.e., below -2 SD of the reference median) children are severely stunted (i.e., below -3 SD of the reference median). In addition more than one-fifth of the underweight children are severely underweight and one-fifth of the wasted children are severely wasted (Table 2.1). In a healthy, well nourished population only one in 1,000 children is expected to be severely undernourished. The data for Zambia indicate that levels of severe stunting, severe underweight, and severe

---

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

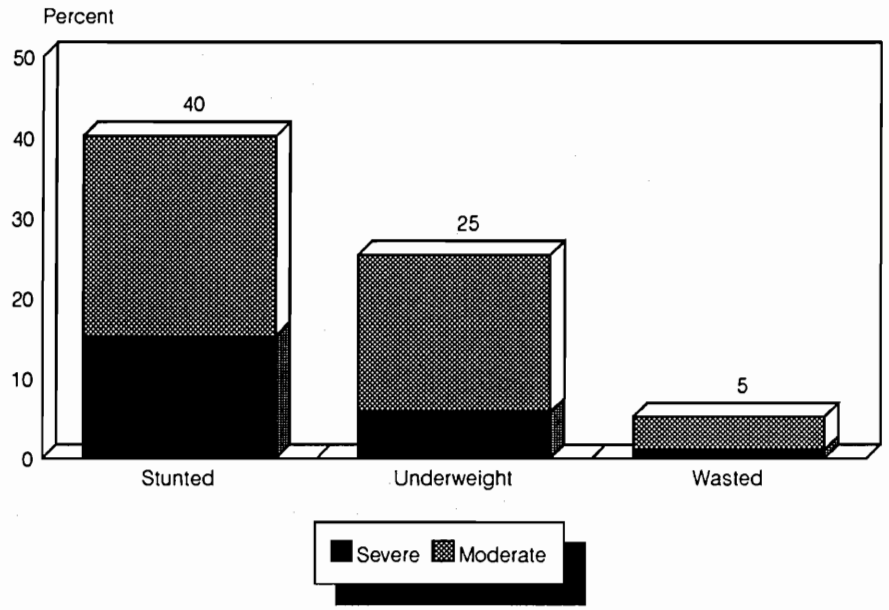
[2] Wasted children are those whose weight-for-age Z score is more than 2 standard deviations below the median of the NCHS/CDC/WHO reference population.

[3] Underweight children are those whose weight-for-age is more than 2 standard deviations below the median of the NCHS/CDC/WHO reference population.

[4] Children born in the month of interview are excluded. Children for whom there are data on wasting, but not stunting and underweight (because age is unavailable or incompletely reported), are included in the analyses presented in this report.

[5] In a healthy, well nourished population 2.2 percent of children are expected to be moderately undernourished and 0.1 percent severely so.

Figure 2.1
Undernutrition among children age 1 to 59 months, Zambia




ZDHS 1992

wasting are extremely high at 153, 58, and 11 times, respectively, that expected in a healthy, well nourished population.

Table 2.2 shows the nutritional status of Zambian children based on the Waterlow classification[6] (Waterlow, 1972). Two percent of children are both stunted and wasted, which is nearly five times the level expected in a healthy, well nourished population. A further 38 percent of the children are stunted only and 3 percent are wasted only; together these are 16 times the level expected in a healthy, well nourished population. Only 57 percent of the children are neither stunted nor wasted, which is 40 percent lower than the expected value.

[6] In a healthy, well nourished population, it is expected that 97.5 percent of the children are neither stunted nor wasted, 2.5 percent are wasted or stunted, and 0.5 percent are both stunted and wasted.

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

Among children age 1 to 59 months, the percentage moderately undernourished and the percent severely undernourished, by region and residence, Zambia 1992

| Region and residence | Stunted | | | Underweight | | | Wasted | | |
|---|---|---|---|---|---|---|---|---|---|
| | Moderate[1] | Severe[2] | Number | Moderate[1] | Severe[2] | Number | Moderate[1] | Severe[2] | Number |
| **Province** | | | | | | | | | |
| Central | 24.8 | 14.3 | 475 | 16.9 | 4.7 | 477 | 2.8 | 0.7 | 475 |
| Copperbelt | 22.4 | 11.5 | 1142 | 18.9 | 4.0 | 1141 | 3.9 | 1.4 | 1146 |
| Eastern | 27.3 | 20.6 | 479 | 19.5 | 5.4 | 476 | 3.0 | 0.2 | 480 |
| Luapula | 26.2 | 29.3 | 310 | 28.2 | 11.8 | 310 | 5.0 | 0.9 | 310 |
| Lusaka | 21.4 | 11.0 | 764 | 17.9 | 5.1 | 763 | 7.1 | 1.4 | 766 |
| Northern | 27.8 | 29.2 | 490 | 23.4 | 12.5 | 489 | 5.4 | 1.6 | 489 |
| North Western | 23.6 | 18.5 | 131 | 18.7 | 7.4 | 131 | 2.8 | 1.4 | 131 |
| Southern | 26.8 | 8.7 | 804 | 18.1 | 3.7 | 805 | 2.5 | 0.8 | 807 |
| Western | 29.4 | 12.4 | 252 | 21.3 | 4.6 | 252 | 2.7 | 0.8 | 254 |
| | p<0.001 | | | p<0.001 | | | a | | |
| **Residence** | | | | | | | | | |
| Urban | 22.4 | 10.7 | 2303 | 17.2 | 3.9 | 2301 | 4.1 | 1.2 | 2306 |
| Rural | 27.1 | 19.4 | 2551 | 21.9 | 7.5 | 2551 | 4.1 | 1.0 | 2559 |
| | p<0.001 | | | p<0.001 | | | NS | | |
| Overall | 24.9 | 15.3 | 4854 | 19.6 | 5.8 | 4852 | 4.1 | 1.1 | 4865 |

Note: Level of significance determined using Chi-square test.
[1] Between -2 and -3 standard deviations of the median NCHS/WHO/CDC reference population.
[2] Below -3 standard deviations of the median NCHS/WHO/CDC reference population.
NS = Not significant.
a = Cell numbers too small for valid Chi-square test.

Table 2.2 Waterlow classification[1] of nutritional status by region and residence

Among children age 1 to 59 months, the percentage both stunted and wasted, stunted only, wasted only, and neither stunted nor wasted, by province and residence, Zambia 1992

| Region and residence | Stunted and wasted | Stunted only | Wasted only | Neither stunted nor wasted | Number |
|---|---|---|---|---|---|
| **Province** | | | | | |
| Central | 1.6 | 37.6 | 1.9 | 58.9 | 474 |
| Copperbelt | 1.8 | 32.1 | 3.5 | 62.5 | 1138 |
| Eastern | 1.9 | 46.2 | 1.4 | 50.5 | 477 |
| Luapula | 3.1 | 52.3 | 2.8 | 41.8 | 310 |
| Lusaka | 2.4 | 29.9 | 6.1 | 61.5 | 761 |
| Northern | 5.2 | 52.0 | 1.8 | 41.0 | 486 |
| North Western | 2.2 | 39.9 | 2.1 | 55.9 | 130 |
| Southern | 1.5 | 33.7 | 1.7 | 63.1 | 800 |
| Western | 1.4 | 40.2 | 2.2 | 56.2 | 251 |
| | | p<0.001 | | | |
| **Residence** | | | | | |
| Urban | 1.9 | 31.2 | 3.4 | 63.5 | 2295 |
| Rural | 2.6 | 43.9 | 2.5 | 51.0 | 2540 |
| | | p<0.001 | | | |
| Overall | 2.3 | 37.9 | 2.9 | 56.9 | 4835 |

Note: Level of significance determined using Chi-square test.
[1] Below -2 standard deviations of the median NCHS/WHO/CDC reference population for height-for-age (stunting) and weight-for-height (wasting).

## 2.2 NONBIOLOGICAL FACTORS

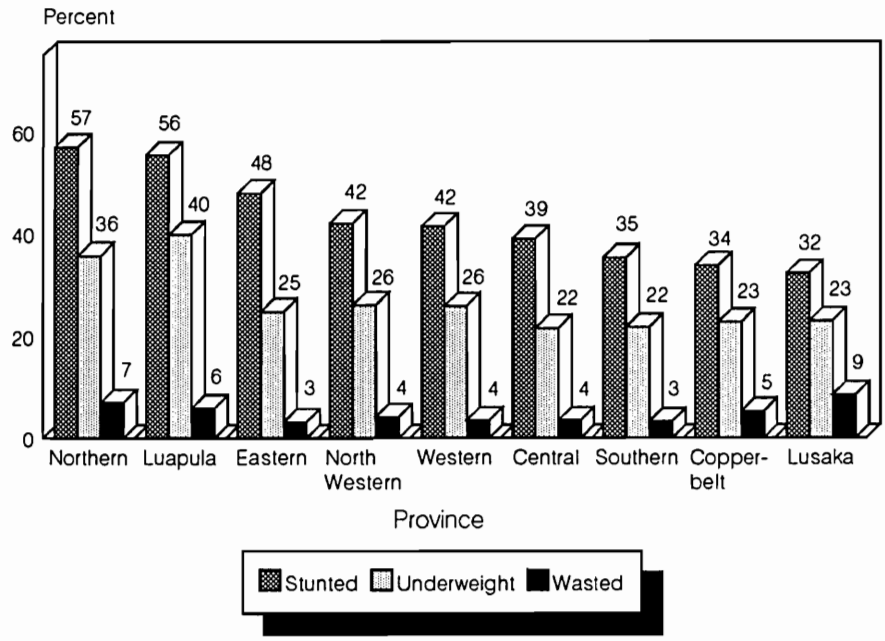
### Geographic Characteristics

There are noticeable provincial[7] differences in nutritional status (Figure 2.2). Stunting is highest in the Northern and Luapula provinces where nearly 60 percent of the children are stunted. Furthermore, nearly 40 percent of children are underweight in these two provinces, which is at least 10 percent more than the level found elsewhere. Between 6 and 7 percent of children in these provinces are wasted, which is higher than in the other provinces except Lusaka where more than 8 percent of children are wasted. Overall, chronic undernutrition is lowest in the "line-of-rail" provinces, namely Central, Southern, Copperbelt, and Lusaka provinces.

Historically, undernutrition has been higher in the non-line-of-rail provinces than elsewhere, the situation being the worst in both the Northern and Luapula provinces. The latter are the least developed provinces with the poorest infrastructural facilities including close access to health services and markets. With the exception of Eastern province, the non-line-of-rail provinces are not the major maize-producing areas. Thus, they have not benefitted from Government support for maize production to the same extent as the line-of-rail provinces. In addition, the main staple in the Luapula, Northern and, to a lesser extent, Western provinces is cassava, whereas maize is the main staple in the other provinces. For this, reason, it is believed that the diet in the Luapula and Northern provinces is poorer than elsewhere but there are no data to substantiate this.

[7] Province in which the child usually lives (as opposed to province in which he/she was at the time of the survey).

Figure 2.2
Undernutrition among children age 1 to 59 months by province, Zambia




ZDHS 1992

The slightly higher level of wasting in the Lusaka province may be a consequence of the structural adjustment programme because urban households are more vulnerable to food price increases than rural ones.

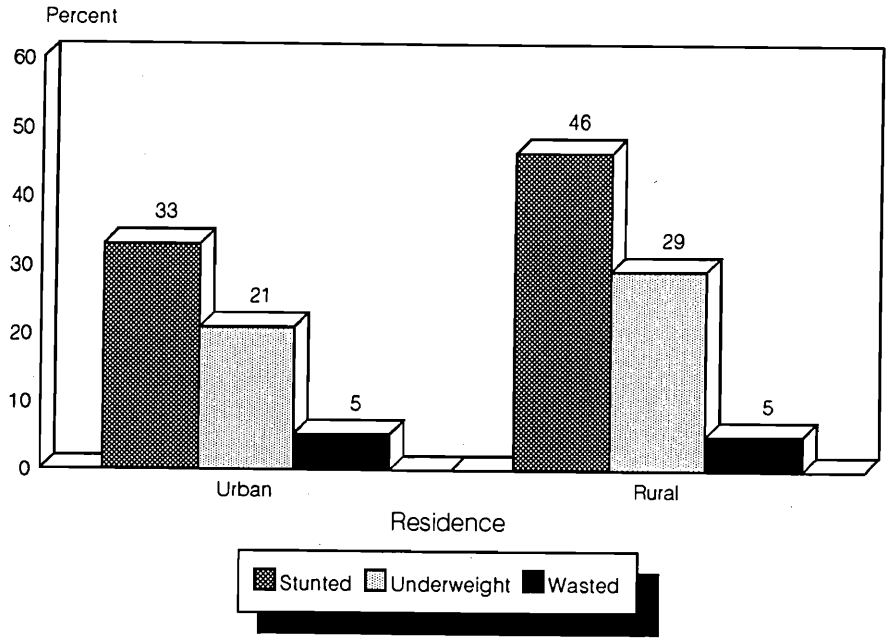
Undernutrition is also associated with the type of area of residence[8], that is, whether children live in urban[9] or rural areas. Rural areas have nearly 30 percent more stunted (46 versus 33 percent) and underweight (29 versus 21 percent) children than urban areas but the level of wasting (5 percent) is the same (Figure 2.3). Using the same age group (6 to 60 months), the DHS findings for stunting and wasting among rural children are similar to those of a 1989/90 survey (Cogill and Zaza, 1990) but those for underweight are higher; 50 versus 54 percent for stunting, respectively; 32 versus 25 percent for underweight, respectively; and 5 versus 4 percent for wasting, respectively.

The DHS data show more severe than moderately stunted children in the Luapula and Northern provinces (Table 2.1) but the proportion who are severely stunted is also extremely high in the Eastern and North Western provinces and in rural areas. Severe underweight, severe wasting, and the most severe form

[8] Area of residence in which the child usually lives (as opposed to the area in which he/she was at the time of the survey).

[9] Levels of stunting, underweight, and wasting are the same in Lusaka/large cities, small cities, and towns hence the data have been combined as urban areas.

Figure 2.3
Undernutrition among children age 1 to 59 months by residence, Zambia




ZDHS 1992

of undernutrition, i.e., being both stunted and wasted (Table 2.2) are also higher in the Northern and Luapula provinces. Severely undernourished children are at much greater risk of morbidity and subsequent death. Indeed, mortality rates are highest in the Northern/Luapula regions and in rural areas than elsewhere; this is discussed in Chapter 4.

These results suggest that there are factors more important than provincial and residential differences in food production and access to food that determine the nutritional status of children under five years old. Social and cultural practices or morbidity may indeed be more critical.

**Social and Economic Characteristics**

Social and economic data collected by the ZDHS and associated with undernutrition are presented in Tables 2.3.1 and 2.3.2. Children are less likely to be chronically undernourished if their parents migrated to their current place of residence or if their parents have attended school, especially secondary school or higher; if their mothers can read a newspaper, listen to the radio, watch television, or are not farmers; or if their fathers are not farmers (Table 2.1.1). Although occupation is associated with chronic undernutrition, the effects vary. The extent of this variation depends on the net result of the effects of two factors: the positive effect of additional income from the mother's working and the negative effect of loss of time for childcare. Thus, compared to non-working women, working as a professional has a net positive effect on nutritional status, whereas working as a farmer has a net negative effect.

Table 2.3.1 Stunting, underweight, and wasting by nonbiological factors

Percentage of children age 1 to 59 months who are stunted, underweight, and wasted, by nonbiological factors, Zambia 1992

| Nonbiological factor | Stunted | Underweight | Wasted |
|---|---|---|---|
| **Length of residence** | | | |
| < 5 years | 38.9 | 24.9 | 5.5 |
| 5 to 9 years | 37.4 | 23.6 | 5.2 |
| 10+ years | 40.2 | 24.2 | 4.5 |
| Always | 45.7 | 29.7 | 5.1 |
| | p<0.002 | p<0.02 | NS |
| **Mother's education** | | | |
| None | 46.7 | 29.5 | 5.5 |
| Primary | 42.0 | 26.9 | 5.5 |
| Secondary+ | 28.8 | 17.6 | 3.9 |
| | p<0.001 | p<0.001 | NS |
| **Can read a newspaper** | | | |
| Easily | 39.7 | 23.8 | 5.1 |
| With difficulty | 39.6 | 27.2 | 6.0 |
| Not at all | 47.4 | 30.3 | 5.6 |
| | p<0.001 | p<0.001 | NS |
| **Listens to radio** | | | |
| Yes | 35.8 | 22.5 | 5.2 |
| No | 45.5 | 29.1 | 5.2 |
| | p<0.001 | p<0.001 | NS |
| **Watches TV** | | | |
| Yes | 31.4 | 19.1 | 5.2 |
| No | 41.9 | 26.7 | 5.2 |
| | p<0.001 | p<0.001 | NS |
| **Mother's occupation** | | | |
| Professional | 12.6 | 9.6 | 4.0 |
| Intermediate | 37.9 | 22.0 | 5.2 |
| Manual | 39.8 | 23.7 | 6.7 |
| Agriculture | 50.7 | 32.7 | 5.6 |
| Housewife | 38.8 | 25.6 | 4.8 |
| | p<0.001 | p<0.001 | NS |
| **Husband's education** | | | |
| None | 51.4 | 29.3 | 3.0 |
| Primary | 44.8 | 27.9 | 5.8 |
| Secondary+ | 33.5 | 22.2 | 5.1 |
| | p<0.001 | p<0.001 | NS |
| **Husband's occupation** | | | |
| Professional | 26.2 | 16.5 | 3.3 |
| Intermediate | 35.7 | 24.2 | 6.7 |
| Skilled/unskilled | 35.5 | 21.0 | 4.4 |
| Agriculture | 48.8 | 31.1 | 5.4 |
| Other | 39.5 | 24.3 | 5.5 |
| | p<0.001 | p<0.001 | NS |
| **Marital status** | | | |
| Currently married | 39.6 | 25.1 | 5.0 |
| Not currently married | 45.7 | 28.4 | 7.3 |
| | p<0.02 | NS | p<0.05 |
| **In a polygamous union** | | | |
| Yes | 45.4 | 27.3 | 4.8 |
| No | 38.8 | 24.9 | 5.0 |
| Not married | 45.8 | 28.5 | 7.3 |
| | p<0.001 | NS | NS |
| Overall | 40.1 | 25.4 | 5.2 |
| Number | 4865 | 4866 | 4886 |

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

Table 2.3.2 Stunting, underweight, and wasting by nonbiological factors

Percentage of children age 1 to 59 months who are stunted, underweight, and wasted, by nonbiological factors, Zambia 1992

| Nonbiological factor | Stunted | Underweight | Wasted |
|---|---|---|---|
| **Possession score**[1] | | | |
| 0 | 46.4 | 29.9 | 5.6 |
| 1 | 38.7 | 24.0 | 5.2 |
| 2 | 31.1 | 17.3 | 3.4 |
| 3 | 24.4 | 15.5 | 2.2 |
| 4 | 18.1 | 14.1 | 6.2 |
| | p<0.001 | p<0.001 | NS |
| **Transport owned** | | | |
| None | 41.3 | 26.6 | 5.6 |
| Bicycle | 39.2 | 24.0 | 4.5 |
| Car/motorbike | 28.0 | 15.1 | 2.6 |
| | p<0.001 | p<0.001 | NS |
| **Drinking water source** | | | |
| Private pipe | 30.0 | 18.7 | 5.0 |
| Public pipe | 36.7 | 25.2 | 6.0 |
| Well with pump | 42.5 | 26.0 | 4.3 |
| Well no pump | 62.0 | 38.8 | 6.4 |
| Open sources | 48.2 | 30.6 | 5.4 |
| | p<0.001 | p<0.001 | NS |
| **Type of toilet** | | | |
| Flush | 29.5 | 18.9 | 4.8 |
| Pit | 41.8 | 25.6 | 5.1 |
| None | 47.0 | 30.9 | 5.6 |
| | p<0.001 | p<0.001 | NS |
| **Floor material** | | | |
| Earth | 48.6 | 30.3 | 5.2 |
| Cement | 33.0 | 21.4 | 5.0 |
| Tiles | 22.0 | 13.7 | 4.6 |
| | p<0.001 | p<0.001 | NS |
| Overall | 40.1 | 25.4 | 5.2 |
| Number | 4865 | 4866 | 4886 |

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.

The presence of the husband is not associated with nutritional status but the type of marital union is. Children whose parents are in a monogamous union are less likely to be chronically undernourished than those whose mothers are currently not married or whose fathers are polygamous (Table 2.3.1). The number of cowives or the wife rank of a mother, however, are not associated with nutritional status.

Mother's age, religious denomination, number of children currently living at home, and total number of children are not associated with nutritional status. Other indicators that reflect higher social and economic status are associated with better nutrition (Table 2.3.2). These include possession of appliances (possession score), ownership of a car/motorbike[10], piped water or a flush toilet in the house, and tiled floors. Many of these social and economic factors, however, not only interact with each other but also with province and residence; they are discussed further in Chapter 5.

## 2.3 BIOLOGICAL FACTORS

### Health Characteristics

The sex of a child is not associated with undernutrition.[11] However, twins are more likely to be chronically undernourished and acutely undernourished than singletons, which reflects their greater vulnerability (Table 2.4). Children reportedly born premature, perceived by the mother to have been small or very small at birth, or born as low birth-weight babies are more likely to be chronically undernourished than other children which indicates that these children fail to compensate for the nutritional insult inflicted during foetal growth. In addition, children who were weaned because of maternal factors, i.e., the mother was pregnant or sick, are more likely to be undernourished than those weaned because they were considered to be at the appropriate age or for factors intrinsic to the child, e.g., the child was sick or refused to suckle.

Table 2.4 Stunting, underweight, and wasting by biological factors

Percentage of children age 1 to 59 months who are stunted, under-weight, and wasted, by biological factors, Zambia 1992

| Biological factor | Stunted | Underweight | Wasted |
|---|---|---|---|
| **Twin** | | | |
| No | 39.5 | 24.9 | 5.1 |
| Yes | 61.4 | 42.5 | 9.5 |
| | p<0.001 | p<0.001 | p<0.02 |
| **Premature birth** | | | |
| No | 39.6 | 25.0 | 5.1 |
| Yes | 52.7 | 37.2 | 7.7 |
| | p<0.002 | p<0.001 | NS |
| **Birth size** | | | |
| Average+ | 38.8 | 24.1 | 5.2 |
| Small | 51.7 | 36.9 | 5.8 |
| Very small | 56.7 | 42.4 | 4.0 |
| | p<0.001 | p<0.001 | NS |
| **Birth weight** | | | |
| Low[1] | 47.9 | 32.1 | 5.2 |
| Normal | 31.8 | 19.5 | 4.6 |
| | p<0.001 | p<0.001 | NS |
| **Reason for stopping breastfeeding** | | | |
| Maternal factors | 51.2 | 30.9 | 6.0 |
| Child factors | 48.4 | 29.1 | 4.5 |
| Age to wean | 45.5 | 25.2 | 4.0 |
| Currently breastfed | 29.5 | 23.0 | 6.1 |
| | p<0.001 | p<0.001 | p<0.05 |
| **Diarrhoea (2 weeks)** | | | |
| Yes | 45.4 | 34.0 | 7.4 |
| No | 38.5 | 22.8 | 4.5 |
| | p<0.001 | p<0.001 | p<0.001 |
| **Fever (2 weeks)** | | | |
| Yes | 42.9 | 30.3 | 6.2 |
| No | 37.7 | 21.4 | 4.3 |
| | p<0.001 | p<0.001 | p<0.005 |
| **Cough** | | | |
| No | 40.2 | 24.2 | 5.1 |
| Cough | 38.9 | 25.7 | 4.9 |
| Cough & rapid breathing | 42.1 | 29.3 | 6.0 |
| | NS | p<0.05 | NS |
| **Measles immunisation[2]** | | | |
| No | 48.4 | 33.7 | 7.6 |
| Yes | 45.4 | 28.3 | 5.3 |
| | NS | p<0.02 | p<0.05 |
| **No. dead children** | | | |
| 0 | 38.0 | 24.5 | 5.3 |
| 1 | 40.9 | 26.6 | 4.8 |
| 2 | 49.8 | 29.5 | 5.4 |
| 3+ | 47.7 | 25.4 | 5.2 |
| | p<0.001 | NS | NS |
| Overall | 40.1 | 25.4 | 5.2 |
| Number | 4865 | 4866 | 4886 |

Note: Level of significance determined using Chi-square test. NS=Not significant.
[1] Below 2.5 kg.
[2] Children 9 months and older only.

[10] Very few children come from households owning a motorbike; hence these children are grouped with those households owning a car.

[11] This differs from the findings of 1970-72 where more boys than girls were stunted (943 versus 33 percent) and underweight (26 versus 20 percent) (WHO), 1989.)

Children who had diarrhoea and those who had a fever in the preceding two weeks are more likely to be chronically undernourished and acutely undernourished. Cough, especially cough with rapid breathing, are associated with a higher level of underweight but not stunting. Overall, among children 9 months[12] and older, being immunized against measles is protective against acute undernutrition. These results may reflect, in part, better maternal care and/or access to health services.

Chronic undernutrition is also associated with the number of deceased children a mother has. Children with one dead sibling are more likely to be stunted than those with no dead siblings, whereas those with two or more dead siblings are more likely to be stunted and underweight than those with one dead sibling. The deceased children may also have been undernourished. These results reflect the importance of the home environment on nutritional status.

**Gestational Age, Birth Weight, and Birth Size**

Overall, 3.3 percent of the children are reported to have been born prematurely and 2.7 percent delivered by caesarian section (Table 2.5). The data indicate both provincial and residential differences in the prevalence of prematurity and caesarian sections; prematurity is higher in the Central and Copperbelt provinces than elsewhere and caesarian sections are particularly high in the North Western province. Both premature births and caesarian sections are more common in urban areas. No definitions were given for prematurity, hence it is not appropriate to compare it with other data on rates of preterm delivery.

About one-half of the children in the ZDHS were weighed at birth -- many more in the Copperbelt and Lusaka provinces and in urban areas than in the other areas (Table 2.6). However, birth weights are reported for only 44 percent of the children in the sample and there is no information on whether the data were obtained from birth records or mother's recall. Therefore, caution should be exercised in using the data. Overall, mean birth weight is 3.2±0.6 kg. There are no provincial or residential differences in mean birth weight but newborn boys are slightly heavier (about 160 grams) than newborn girls. This result, which indicates that newborn boys are heavier than girls, is consistent with the results of other studies in Africa (Defo and Partin, 1993; Dole *et al.*, 1990; Sprudel *et al.*, 1988).

Table 2.5 Parturition time and type of delivery

Percentage of children age 1 to 59 months born prematurely and delivered by caesarian section, Zambia 1992

| Province and residence | Born prematurely | Caesarian section |
|---|---|---|
| **Province** | | |
| Central | 4.7 | 3.9 |
| Copperbelt | 4.6 | 3.5 |
| Eastern | 1.9 | 2.7 |
| Luapula | 1.7 | 2.3 |
| Lusaka | 3.1 | 3.1 |
| Northern | 1.9 | 1.0 |
| North Western | 3.0 | 6.3 |
| Southern | 3.1 | 0.8 |
| Western | 4.0 | 3.2 |
| | p<0.02 | p<0.001 |
| **Residence** | | |
| Urban | 4.0 | 4.1 |
| Rural | 2.7 | 1.4 |
| | p<0.01 | p<0.001 |
| Overall | 3.3 | 2.7 |
| Number | 5321 | 5228 |

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

Among children for whom birth weight data are reported, 10 percent had a low birth weight (below 2.5 kg), which is lower than the 1990 figure of 13 percent cited by UNICEF (1993). The ZDHS provides no evidence of provincial differences in the prevalence of low birth-weight babies but low birth weights are apparently more evident in rural areas than urban areas and in girls than in boys (Table 2.6).

[12] The age by which a child should be immunised with measles vaccine.

Table 2.6 Birth weight and size at birth

Among children under 5 years, the percentage weighed at birth, mean birth weight, the percentage of low birth weight (LBW) births, and the percentage of births that were average+, small, and very small, by region, residence, and sex of child, Zambia 1992

| Region, residence, and sex of child | Weighed at birth | Mean weight (kg) and (SD) | LBW births[1] | Size at birth: Average+ | Small | Very small | Number |
|---|---|---|---|---|---|---|---|
| **Province** | | | | | | | |
| Central | 41.1 | 3.2 (0.7) | 7.3 | 88.3 | 10.7 | 1.0 | 535 |
| Copperbelt | 82.5 | 3.1 (0.6) | 10.0 | 88.7 | 8.6 | 2.6 | 1233 |
| Eastern | 35.4 | 3.1 (0.6) | 11.6 | 89.1 | 10.9 | 0.0 | 539 |
| Luapula | 32.8 | 3.1 (0.6) | 15.3 | 93.0 | 6.3 | 0.7 | 341 |
| Lusaka | 75.7 | 3.2 (0.5) | 9.9 | 94.0 | 4.6 | 1.4 | 833 |
| Northern | 19.8 | 3.3 (0.6) | 7.0 | 94.5 | 5.3 | 0.2 | 522 |
| North Western | 55.0 | 3.1 (0.5) | 11.0 | 85.0 | 13.1 | 1.8 | 147 |
| Southern | 30.8 | 3.2 (0.7) | 10.5 | 87.7 | 8.8 | 3.5 | 880 |
| Western | 32.9 | 3.2 (0.6) | 5.5 | 85.1 | 13.5 | 1.4 | 272 |
| | p<0.001 | NS | NS | | p<0.001 | | |
| **Residence** | | | | | | | |
| Urban | 80.8 | 3.2 (0.6) | 9.2 | 90.2 | 7.6 | 2.1 | 2508 |
| Rural | 24.7 | 3.1 (0.7) | 12.7 | 89.6 | 9.0 | 1.3 | 2804 |
| | p<0.001 | NS | p<0.02 | | p<0.02 | | |
| **Sex of child** | | | | | | | |
| Male | 52.3 | 3.2 (0.6) | 8.6 | 92.0 | 6.7 | 1.3 | 2634 |
| Female | 50.0 | 3.1 (0.6) | 11.3 | 87.9 | 10.0 | 2.1 | 2682 |
| | p<0.001 | p<0.05 | p<0.001 | | | | |
| Overall | 51.1 | 3.2 (0.6) | 9.9 | 89.9 | 8.4 | 1.7 | 5317 |
| Number | 5380 | 2350 | 2379 | | | | |

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

Overall, 10 percent of mothers perceived their children to be small or very small at birth (Table 2.6) and there are provincial, residential, and gender differences in reported birth size. Fewer mothers in the Lusaka, Luapula and Northern provinces than in the other provinces reported their children were small or very small at birth. More urban infants are likely to be reported as very small at birth than rural ones, whereas more rural infants are likely to be reported as small than very small. Newborn girls are reportedly smaller at birth than boys.

There appears to be an association between mean birth weight and prematurity ($p<0.001$) and mean birth weight and birth size ($p<0.001$). Overall, children born prematurely weighed $2.2 \pm 0.6$ kg while those born at term weighed $3.2 \pm 0.6$ kg. Similarly, children classified as very small at birth weighed $2.0 \pm 0.4$ kg, those who were small weighed $2.4 \pm 0.4$ kg, and those who were average or above weighed $3.3 \pm 0.5$ kg.

Despite the limitations of these data, they suggest that there is a tendency for newborn infants in the less accessible provinces and newborn girls to be smaller (and thus more likely to be classified as undernourished) than other newborn infants. Although girls appear to be born smaller than boys they are physiologically better able to cope under nutritional stress and this probably accounts for the absence of an overall association between nutritional status and sex of children.

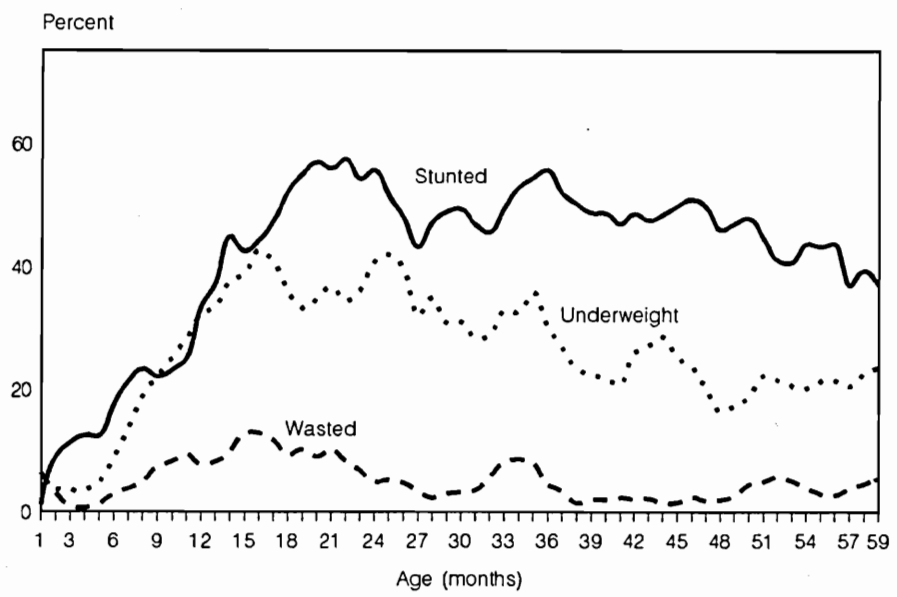
## Age-Specific Patterns of Undernutrition

The ZDHS shows that there are clear age-specific patterns in the prevalence of undernutrition. Among infants age 1 to 5 months, the prevalence of stunting, underweight, and wasting are 10, 4, and 2 percent respectively (Figure 2.4 and Appendix Table E.1). After 6 months of age, the prevalence of stunting increases steadily up to 20 months of age and the prevalence of underweight and wasting increase up to 16 month of age. Between 18 and 23 months of age, over one-half of all children are stunted, over one-third are underweight, and 10 percent are wasted. Inasmuch as deficits in height are not readily made up, the prevalence of stunting remains above 40 percent even among older children. However, the prevalence of underweight and wasting does diminish and level out among older children.

Although chronic undernutrition is the greater nutritional problem in Zambia, the prevalence of acute undernutrition exceeds 10 percent among children age 12 to 23 months. Inappropriate infant and child feeding practices, which are discussed in Chapter 3, and high levels of morbidity are strongly associated with the high levels of undernutrition seen in this age group.

The age-specific pattern of undernutrition is similar in all provinces and urban/rural areas (Appendix Tables E.1 and E.2) despite the significant differences in the prevalence of undernutrition between provinces and residence. This indicates that the critical period of nutritional vulnerability for children throughout Zambia is during the first 24 months of life. In some provinces, for example the Eastern and Luapula provinces, children under five years old do not recover from the nutritional insult inflicted on them early in life to the same extent as children in the Central, Copperbelt and Southern provinces.

Figure 2.4
Undernutrition among children age 1 to 59 months by age, Zambia




ZDHS 1992

# Chapter 3

# INFANT AND CHILD FEEDING PRACTICES

## 3.1 INITIATION OF BREASTFEEDING

The initiation of breastfeeding in Zambia is nearly universal and does not differ by sex of the infant; province; maternal age, education, occupation, or wealth (using a possession score as a proxy); source of antenatal care; or place of delivery (Table 3.1).

Although nearly all women breastfeed their infants, initial breastfeeding practices are far from optimal. Only about two out of five newborn infants are put to the breast immediately, indicating that only these infants receive colostrum, whereas over ten percent are not put to the breast within the first day of life (Table 3.1). Mothers in the North Western province are more likely to start breastfeeding immediately. Mothers who live in urban areas, who are under 40 years, who have been educated to at least secondary school level, who work, who come from wealthier households, who go to a doctor for antenatal care, and who deliver at a public or private health facility are more likely to postpone breastfeeding. There is, however, considerable overlap in all these characteristics; mothers in the North Western province tend to be younger and go for antenatal care as well as deliver at a private or public health facility. In addition, mothers who have been to at least secondary school are more likely to give birth at a public or private health facility while mothers with no education are more likely to give birth at home.

Delaying the initiation of breastfeeding is also associated with premature births, low birth-weight infants, and infants perceived to be small or very small at birth (data not shown). In other words, the most nutritionally vulnerable infants are denied the full benefits of colostrum. These results suggest that the timing of the first breastfeeding is probably related to health care facility practices.

One possible explanation for the general delay in initiating breastfeeding is that mothers with little access to current medical information are more likely to follow cultural traditions, which may discourage the giving of colostrum, hence delaying the initiation of breastfeeding. The data, however, suggest strongly that public and private maternity facilities do not promote early breastfeeding. Given that as many as 60 percent of women may fail to give their infants the immunological and nutritional benefits of colostrum, there is an urgent need to educate both health professionals and mothers of its importance.

## 3.2 EXCLUSIVE BREASTFEEDING

The WHO recommends that infants be exclusively breastfed for the first 4 to 6 months of life. However, exclusive breastfeeding is rarely practiced in Zambia. Over two-thirds of all last-born infants were given plain water in addition to breast milk within the first two months of life (Figure 3.1 and Appendix F). Although the giving of plain water in tropical climates has long been recognized as an accepted medical practice as well as a cultural pattern, recent research has conclusively established that healthy, exclusively breastfed infants do not need additional water (Sachdev *et al.* 1992). The prevalence of exclusive and full breastfeeding (breast milk and water) among infants younger than 4 months of age is less than 75 percent in all provinces except the Central, Southern, and Western provinces where 85 percent or more infants are fully breastfed. Furthermore, fewer than 60 percent of mothers in urban areas practice exclusive or full breastfeeding, which is about one-fifth lower than the level found in rural areas (Figure 3.2).

PREVIOUS PAGE BLANK

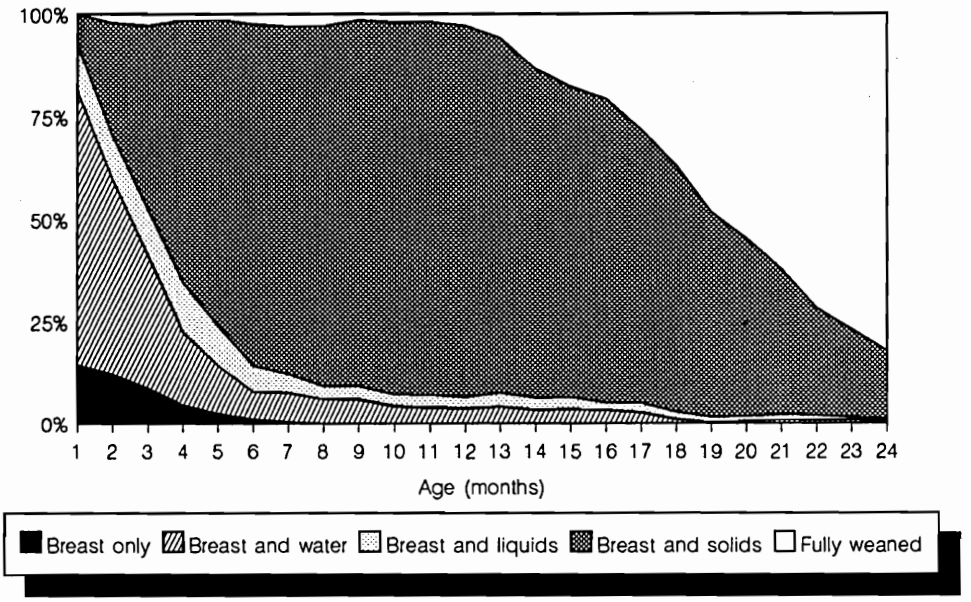
Table 3.1 Initial breastfeeding

Percentage of children under 5 years who were ever breastfed and the percentage who started breastfeeding immediately, within 24 hours, and after 24 hours or more, by background factors, Zambia 1992

| Background factor | Ever breastfed | Started breastfeeding: Immediately | First 24 hours | After 24 hours | Number |
|---|---|---|---|---|---|
| **Province** | | | | | |
| Central | 99.8 | 39.6 | 52.0 | 8.3 | 337 |
| Copperbelt | 98.7 | 38.4 | 48.5 | 13.1 | 820 |
| Eastern | 100.0 | 48.0 | 40.7 | 11.3 | 381 |
| Luapula | 100.0 | 37.4 | 52.5 | 10.1 | 216 |
| Lusaka | 99.5 | 40.6 | 44.3 | 15.1 | 567 |
| Northern | 100.0 | 40.8 | 52.7 | 6.5 | 339 |
| North Western | 100.0 | 62.2 | 27.8 | 10.0 | 101 |
| Southern | 99.6 | 45.5 | 49.5 | 5.0 | 591 |
| Western | 100.0 | 27.1 | 58.3 | 14.6 | 197 |
| | a | p<0.001 | | | |
| **Residence** | | | | | |
| Urban | 99.6 | 38.2 | 48.5 | 13.4 | 1682 |
| Rural | 99.9 | 44.2 | 47.7 | 8.2 | 1874 |
| | p<0.05 | p<0.001 | | | |
| **Mother's age** | | | | | |
| 15 to 19 | 99.8 | 40.5 | 44.1 | 15.9 | 480 |
| 20 to 24 | 99.8 | 42.5 | 47.8 | 11.8 | 940 |
| 25 to 29 | 99.6 | 41.3 | 48.3 | 9.2 | 831 |
| 30 to 34 | 99.8 | 38.5 | 50.8 | 8.0 | 609 |
| 35 to 39 | 99.8 | 44.3 | 51.9 | 9.6 | 392 |
| 40 to 44 | 100.0 | 53.2 | 46.5 | 9.2 | 229 |
| 45 to 49 | 100.0 | | 36.9 | 9.8 | 78 |
| | a | | p<0.005 | | |
| **Mother's education** | | | | | |
| None | 99.9 | 44.4 | 46.5 | 9.2 | 613 |
| Primary | 99.7 | 43.5 | 46.8 | 9.7 | 2201 |
| Secondary+ | 99.7 | 32.5 | 53.0 | 14.5 | 743 |
| | a | p<0.001 | | | |
| **Mother works** | | | | | |
| Yes | 99.7 | 38.2 | 50.6 | 11.2 | 1909 |
| No | 99.8 | 44.9 | 45.1 | 9.9 | 1649 |
| | NS | p<0.001 | | | |
| **Posession score** | | | | | |
| 0 | 99.8 | 43.6 | 46.4 | 10.0 | 1789 |
| 1 | 99.9 | 40.8 | 49.7 | 9.5 | 1096 |
| 2 | 99.4 | 37.3 | 51.0 | 11.7 | 353 |
| 3 | 99.5 | 37.7 | 52.5 | 9.8 | 132 |
| 4 | 99.6 | 32.6 | 45.5 | 21.9 | 188 |
| | a | p<0.001 | | | |
| **Source of antenatal care** | | | | | |
| Doctor | 98.2 | 28.4 | 54.0 | 17.5 | 180 |
| Nurse/Midwife | 99.8 | 41.9 | 47.6 | 10.5 | 2988 |
| Clinical officer | 100.0 | 43.8 | 47.8 | 8.3 | 130 |
| TBA[1]/Other | 100.0 | 39.3 | 56.4 | 4.3 | 49 |
| No one | 100.0 | 43.4 | 47.7 | 8.8 | 211 |
| | a | p<0.01 | | | |
| **Place gave birth** | | | | | |
| At home | 99.9 | 45.9 | 46.5 | 7.6 | 1729 |
| Public facility | 99.6 | 37.8 | 48.9 | 13.4 | 1422 |
| Private facility | 99.7 | 34.0 | 52.2 | 13.8 | 407 |
| | a | p<0.001 | | | |
| Overall | 99.1 | 41.3 | 48.1 | 10.6 | 3558 |
| Number | 5385 | | | | |

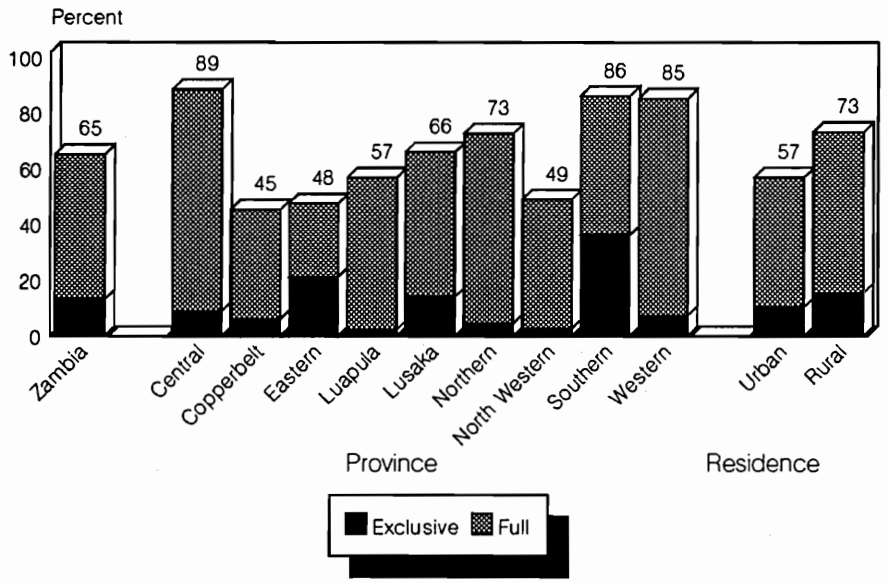
Note: Level of significance determined using Chi-square test.
NS = Not significant.
a = Cell numbers too small for valid Chi-square test.
[1]Traditional birth attendant.

Figure 3.1
Feeding practices by age, Zambia




ZDHS 1992

Figure 3.2
Exclusive and full breastfeeding among infants under 4 months by province and residence, Zambia



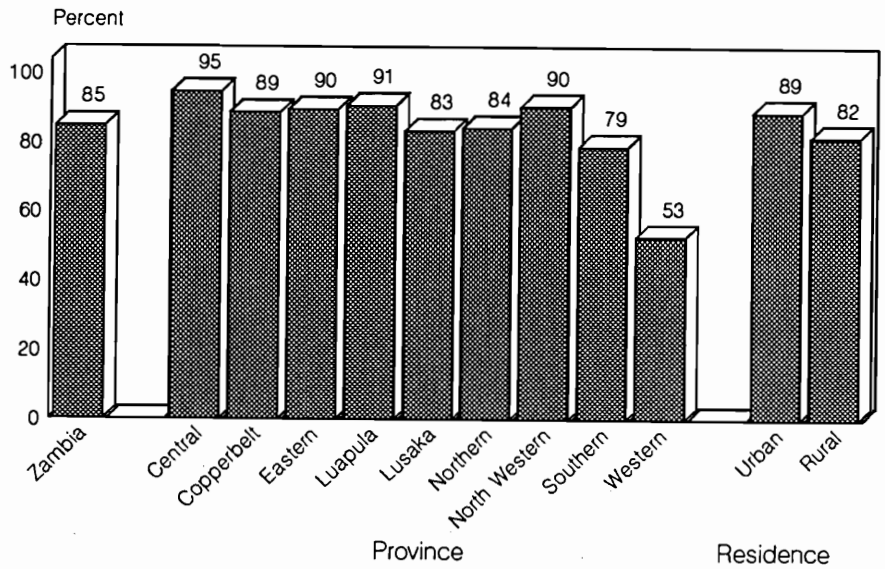

ZDHS 1992

The use of breast milk substitutes (for example, juice; formulae; fresh, tinned or powdered milk; tea; solid and semisolid foods) is prevalent in Zambia. During the first 2 months of life, about 15 percent of all infants are given breast milk substitutes (Figure 3.1 and Appendix E). This figure increases over three-fold, to about 50 percent, for infants age 2 to 3 months. There are three major causes for concern in the too early introduction of plain water, other liquids, and complementary solid foods to breastfed infants under the age of 4 months. First, the liquids and solid foods offered are nutritionally inferior to breast milk. Second, the intake of other liquids and foods results in lower breast milk intake which, in turn, reduces the mother's supply of milk, because breast milk production is determined, in part, by both the frequency and intensity of suckling. Third, feeding young infants other liquids and food increases their exposure to pathogens and consequently puts them at higher risk of diarrhoeal disease.

## 3.3 INTRODUCTION OF COMPLEMENTARY SOLID FOODS

The ZDHS data show that at 6 months of age over 95 percent of infants are still breastfed (Figure 3.1 and Appendix E). Nevertheless, a delay in introducing complementary solid foods to older breastfed infants is a problem equally as important as the inappropriate feeding practices for infants under 4 months of age. The WHO recommends that complementary solid foods be introduced to infants between 4 and 6 months of age. In Zambia, 3 percent of infants age 6 to 9 months are already completely weaned and, at the same time, more than one in ten is still not receiving complementary solid foods (Figure 3.1 and Appendix E). This is particularly a problem in the Western province, where almost half of the infants are not given complementary

Figure 3.3
Breastfeeding with complementary food among infants age 6 to 9 months by province and residence, Zambia




ZDHS 1992

solid foods (Figure 3.3). An additional problem with infant feeding practices is that the nutritional quality of complementary solid foods is often poor (Ng'andu and Watts, 1990).

## 3.4 BOTTLE USE

Bottles are not often used in Zambia. Among infants 12 months and younger, 6 percent are fed using a bottle. Bottle use is higher in urban areas than rural ones (9 percent versus 2 percent) and much higher in the North Western (11 percent) and Copperbelt (10 percent) provinces than elsewhere (1 to 6 percent).

## 3.5 FULL WEANING

The duration of breastfeeding is long; over 95 percent of all infants are breastfed throughout their first year of life and over one-half are breastfed well into their second year (Figure 3.1 and Appendix E). The median duration of breastfeeding is 19 months (Gaisie et al, 1993). Residence in the Western and North Western provinces is associated with a longer duration of breastfeeding (Table 3.2). In contrast, area of residence, maternal education, and attendant at birth, and sex of the child are not associated with the duration of breastfeeding.

Table 3.2 Median duration of breastfeeding

Median duration of breastfeeding among children under 3 years, by selected background factors, Zambia 1992

| Nonbiological factors | Median duration of breastfeeding (months) | | Number |
|---|---|---|---|
| | Any | Full | |
| **Sex of child** | | | |
| Male | 18.9 | 2.3 | 2048 |
| Female | 18.3 | 2.4 | 2013 |
| **Province** | | | |
| Central | 17.4 | 3.7 | 378 |
| Copperbelt | 18.1 | 1.9 | 955 |
| Eastern | 17.8 | 0.7 | 440 |
| Luapula | 18.6 | 2.3 | 270 |
| Lusaka | 17.7 | 2.2 | 638 |
| Northern | 19.4 | 2.4 | 412 |
| North Western | 22.2 | 2.0 | 114 |
| Southern | 19.4 | 3.5 | 644 |
| Western | 22.9 | 3.6 | 211 |
| **Residence** | | | |
| Urban | 18.2 | 2.2 | 1912 |
| Rural | 19.0 | 2.6 | 2149 |
| **Mother's education** | | | |
| None | 19.1 | 2.3 | 664 |
| Primary | 18.8 | 2.4 | 2596 |
| Secondary+ | 18.2 | 2.1 | 800 |
| **Assistant at delivery** | | | |
| Medically trained | 18.5 | 2.1 | 2046 |
| Traditional midwife | 18.7 | 2.4 | 385 |
| Other or none | 19.1 | 3.7 | 1628 |
| Overall | 18.7 | 2.3 | 4061 |

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

Source: Gaisie et al., 1993.

Over two-thirds of mothers ceased to breastfeed their last child because they considered the child old enough to be weaned (Table 3.3). About 25 percent of mothers stop breastfeeding because of "maternal factors" of which pregnancy is the main cause and just under 10 percent cited intrinsic child factors. These

Table 3.3 Reason for fully weaning last-born child

Among last-born children under 5 years, the percent distribution fully weaned because of maternal factors, because of child factors, and because mother considered it time to wean, by selected background factors, Zambia 1992

| Background factor | Maternal factors[1] | Child factors[2] | Time to wean | Number |
|---|---|---|---|---|
| **Province** | | | | |
| Central | 23.9 | 7.9 | 68.3 | 337 |
| Copperbelt | 24.7 | 9.0 | 66.2 | 768 |
| Eastern | 27.3 | 7.1 | 65.7 | 329 |
| Luapula | 19.9 | 4.2 | 75.9 | 205 |
| Lusaka | 25.1 | 11.7 | 63.2 | 510 |
| Northern | 21.0 | 3.3 | 75.7 | 305 |
| North Western | 33.2 | 6.2 | 60.6 | 78 |
| Southern | 19.0 | 10.8 | 70.2 | 563 |
| Western | 24.4 | 8.7 | 66.9 | 147 |
| | | p<0.001 | | |
| **Mother's age** | | | | |
| 15 to 19 | 26.6 | 15.0 | 58.4 | 185 |
| 20 to 24 | 28.2 | 8.7 | 63.2 | 840 |
| 25 to 29 | 23.2 | 10.4 | 66.4 | 903 |
| 30 to 34 | 22.9 | 6.2 | 70.9 | 612 |
| 35 to 39 | 23.2 | 5.4 | 71.4 | 415 |
| 40 to 44 | 11.3 | 8.7 | 80.0 | 216 |
| 45 to 49 | 8.0 | 3.7 | 88.3 | 77 |
| | | p<0.001 | | |
| **Possession score[3]** | | | | |
| 0 | 23.1 | 8.4 | 68.5 | 1568 |
| 1 | 21.8 | 7.8 | 70.3 | 1016 |
| 2 | 23.7 | 8.3 | 68.0 | 367 |
| 3 | 29.0 | 8.9 | 62.1 | 135 |
| 4 | 32.2 | 13.8 | 54.0 | 165 |
| | | p<0.01 | | |
| **Stunted (<-2SDht/age)** | | | | |
| Yes | 25.9 | 8.8 | 65.3 | 1366 |
| No | 22.0 | 8.3 | 69.6 | 1533 |
| | | p<0.05 | | |
| **Underweight (<-2SDwt/age)** | | | | |
| Yes | 27.4 | 9.2 | 63.4 | 781 |
| No | 22.6 | 8.3 | 69.1 | 2118 |
| | | p<0.02 | | |
| Overall | 23.5 | 8.5 | 68.0 | 3250 |

Note: Level of significance determined using Chi-square test.
[1]Ill, nipple/breast problem, working, became pregnant.
[2]Ill, refused, no milk.
[3]Score of one for availability/ownership of electricity, radio, television or refrigerator.

findings are similar to those of a national survey undertaken in 1985 (Kaite, 1991). Mothers are more likely to cite maternal factors or factors intrinsic to the child as the reasons for weaning if they are from the North Western, Lusaka, Eastern, Copperbelt, Western and Central provinces, are under 20 years old, and come from wealthier households. However, area of residence, maternal education, and whether the mother works are not associated with any reason for full weaning. Among the fully weaned children, those fully weaned because of maternal factors, in other words a new pregnancy, are more likely to be stunted and to be wasted, suggesting that greater efforts are needed to educate mothers about the importance of child spacing in terms of their own health, the health of the unborn child, and that of the youngest child.

Over 35 percent of children age 12 to 23 months are fully weaned, thus losing the benefits of breast milk (Table 3.4). Early weaning is more evident in the Lusaka and Central provinces and in urban areas than elsewhere.

Efforts to improve the nutritional status of infant and children in Zambia need to focus on:

- Ensuring that breastfeeding is initiated immediately after birth
- Extending the duration of exclusive breastfeeding
- Advising on the appropriate time to introduce complementary solid foods
- Improving the nutrient content of the foods offered to infants and young children
- Advising about the appropriate regimens to give children who are fully weaned at an early age
- Continued discouragement of bottle use
- Family planning programs to reduce pregnancy-induced weaning.

Table 3.4 Feeding patterns for children age 12 to 23 months

Feeding patterns among children age 12 to 23 months, by province and residence, and sex of child, Zambia 1992

| Background factor | Breastfed and solids | Fully weaned | Number |
|---|---|---|---|
| **Province** | | | |
| Central | 59.6 | 40.4 | 109 |
| Copperbelt | 60.7 | 39.3 | 265 |
| Eastern | 62.4 | 37.6 | 103 |
| Luapula | 62.6 | 37.4 | 80 |
| Lusaka | 58.0 | 42.0 | 163 |
| Northern | 74.3 | 25.7 | 107 |
| North Western | 80.9 | 19.1 | 37 |
| Southern | 64.3 | 35.7 | 199 |
| Western | 87.0 | 13.0 | 56 |
| | $p<0.001$ | | |
| **Residence** | | | |
| Urban | 59.0 | 41.0 | 519 |
| Rural | 69.0 | 31.0 | 602 |
| | $p<0.001$ | | |
| Overall | 64.4 | 35.6 | 1122 |

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

# Chapter 4

# MORTALITY AND HEALTH

## 4.1 INFANT AND UNDER-FIVE MORTALITY

Infant and under-five mortality rates in Zambia are high and increasing; between 1987 and 1991 nearly one out of ten infants died before reaching their first birthday and about one out of five children died before reaching their fifth birthday. Between 1981 and 1986 the infant and child mortality rates were less than one out of ten and less than two out of ten, respectively, (Table 4.1) (Gaisie et al, 1993). In order to reach the target under-five mortality rate set by the 1990 World Summit for Children (below 70 per 1,000 live births by the year 2000), the under-five mortality rate in Zambia will have to fall by about two-thirds between 1990 and 2000. This is equivalent to reducing the under-five mortality rate by 8.1 deaths per 1,000 births each year, which is higher than the figure cited by the World Food Council (1992) (5.6 per 1,000 births) and is unachievable.

Infant and under-five mortality rates differ by province and residence. The infant mortality rate in the Luapula/Northern provinces is about twice that in the Copperbelt, Southern and Lusaka provinces, 30 percent greater than in the Eastern/Central provinces and over 10 percent greater than in the North Western/Western provinces. Under-five mortality follows a similar pattern; nearly one in four children does not live to see his/her fifth birthday in the Luapula/Northern provinces. Unlike the other provinces, the childhood mortality rate (deaths among children age 1 to 4 years) in the Copperbelt province is higher than the infant mortality rate (data not shown). Overall, infant and under-five mortality rates in rural areas are about 20 and 15 percent greater, respectively, than in urban areas.

Infant and under-five mortality rates for boys are 15 and 10 percent greater, respectively, than for girls. Both infant and under-five mortality rates also differ by maternal age and education, birth order, and previous birth interval (Table 4.1). Infants and children of adolescent mothers and mothers with no formal education are at greatest risk of dying, as are first-born children, and those with a preceding birth interval of less than two years. The high mortality rates among first-born children are probably associated

Table 4.1 Infant and under-five mortality rates

Infant and under-five mortality rates for the ten-year period preceding the survey, by selected background factors, Zambia 1992

| Background factor | Mortality rates (per 1000) Infant | Under-five |
|---|---|---|
| Overall (preceding 0-4 yrs) | 107 | 191 |
| (preceding 5-9 yrs) | 88 | 162 |
| **Province** | | |
| Copperbelt | 69 | 144 |
| Eastern/Central | 114 | 210 |
| Lusaka | 77 | 141 |
| Luapula/Northern | 149 | 244 |
| Southern | 71 | 134 |
| North Western/Western | 132 | 210 |
| **Residence** | | |
| Urban | 98 | 178 |
| Rural | 116 | 201 |
| **Sex of child** | | |
| Male | 106 | 188 |
| Female | 90 | 168 |
| **Mother's age at birth of child** | | |
| Under 20 years | 123 | 220 |
| 20 to 29 years | 92 | 170 |
| 30 to 39 years | 87 | 157 |
| 40 to 49 years | (102) | (173) |
| **Mother's education** | | |
| None | 115 | 204 |
| Primary | 99 | 182 |
| Secondary+ | 79 | 135 |
| **Birth order** | | |
| 1 | 122 | 213 |
| 2 to 3 | 96 | 180 |
| 4 to 6 | 86 | 154 |
| 7 or more | 94 | 171 |
| **Previous birth interval** | | |
| Less than 2 years | 156 | 244 |
| 2 to 3 years | 76 | 151 |
| 4 or more years | 56 | 122 |

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

Source: Gaisie et al., 1993.

with adolescent mothers. These findings are consistent with other studies that show that young maternal age and birth intervals of less than 2 years are associated with greatest risk of infant and child mortality.

Mortality risks are inevitably associated with acute undernutrition. Indeed, the ZDHS data show that the highest levels of chronic and acute undernutrition are in the Luapula and Northern province followed by the North Western, Western and Eastern provinces where the infant and child mortality rates are highest. The fact that mortality rates among boys is greater than among girls, but nutritional status does not differ, suggests that the undernourished boys may have died due to the greater frailty of boys.

## 4.2 MORBIDITY[1] AND USE OF HEALTH FACILITIES

Overall, 23 percent of the children reportedly had diarrhoea in the two weeks preceding the survey, 44 percent had fever, and 47 percent had cough (Table 4.2). Morbidity varies, however, by both province and residence. Diarrhoea is more prevalent in the Eastern followed by Northern province; fever is more prevalent in the Western, Eastern, Northern and Southern provinces; and cough is much more prevalent in the Eastern

Table 4.2 Prevalence of diarrhoea, fever, and cough

Percentage of children age 1 to 59 months with diarrhoea, fever, and cough in the two weeks preceding the survey, and the percentage for whom advice or treatment was sought, by province, residence, and sex of child, Zambia 1992

| Province, residence, and sex of child | Percentage of children with: | | | | Advice/treatment sought for: | | | |
|---|---|---|---|---|---|---|---|---|
| | Diarrhoea | Fever | Cough | Number | Diarrhoea | Number | Fever/Cough | Number |
| **Province** | | | | | | | | |
| Central | 21.9 | 36.6 | 42.8 | 532 | 81.4 | 117 | 85.8 | 288 |
| Copperbelt | 18.0 | 35.2 | 47.7 | 1238 | 88.8 | 223 | 91.7 | 711 |
| Eastern | 32.2 | 59.2 | 64.8 | 530 | 83.1 | 171 | 85.2 | 403 |
| Luapula | 21.6 | 45.8 | 42.2 | 337 | 84.9 | 73 | 82.8 | 188 |
| Lusaka | 20.1 | 30.3 | 40.8 | 827 | 85.5 | 165 | 92.5 | 414 |
| Northern | 28.5 | 53.7 | 48.0 | 530 | 71.2 | 151 | 76.5 | 357 |
| North Western | 18.3 | 46.9 | 43.4 | 144 | 72.5 | 26 | 86.4 | 86 |
| Southern | 25.3 | 53.2 | 46.2 | 855 | 81.0 | 216 | 79.2 | 565 |
| Western | 26.0 | 64.4 | 45.8 | 271 | 67.5 | 70 | 77.1 | 204 |
| | p<0.001 | p<0.001 | p<0.001 | | p<0.001 | | p<0.001 | |
| **Residence** | | | | | | | | |
| Urban | 202 | 34.4 | 45.3 | 2497 | 88.8 | 503 | 92.7 | 1328 |
| Rural | 256 | 53.1 | 48.6 | 2774 | 76.3 | 711 | 79.2 | 1843 |
| | p<0001 | p<0.001 | p<0.02 | | p<0.001 | | p<0.001 | |
| **Sex of Child** | | | | | | | | |
| Male | 246 | 44.7 | 46.7 | 2611 | 82.0 | 643 | 85.1 | 1599 |
| Female | 215 | 43.8 | 47.5 | 2664 | 80.8 | 572 | 84.8 | 1629 |
| | p<001 | NS | NS | | NS | | NS | |
| Overall | 23.0 | 44.2 | 47.1 | 5275 | 81.4 | 1216 | 85.0 | 3228 |

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

[1] The discussion on morbidity focusses on diarrhoea, fever, and cough. In the survey diarrhoea was defined as three or more watery stools per day. No definitions were given for fever or cough as it assumed that mothers are familiar with the terms. Fever may be associated with malaria, diarrhoea, infections, etc.

province. The prevalence of diarrhoea, fever, and cough are higher in rural areas than in urban areas, which is probably a reflection of poorer sanitation and housing conditions (making children more exposed to pathogens) as well as more limited access to health care.

The reported prevalence of diarrhoea in the DHS is considerably less than that found in 1987 (Ministry of Health, 1987) where 45 percent of children under 5 years of age had diarrhoea in the previous two weeks.

More boys than girls had a recent history of diarrhoea. It is not clear whether the finding for gender differences in diarrhoea mean that more male children do in fact have diarrhoea or whether mothers are more likely to report diarrhoea for their male children. Evidence of the latter comes from the fact that the gender difference in the prevalence of diarrhoea is only found among children over 24 months of age. However, there are no sex differences in feeding patterns or underweight among children age 24 to 59, suggesting that feeding patterns are not likely to be the cause of the gender difference in diarrhoea among older children.

The mothers of 15 percent of the children with a recent history of fever or cough did not seek advice and/or treatment for their child's illness nor did 20 percent of mothers of children with diarrhoea (Table 4.2). There are both provincial and residential differences in seeking advice and/or treatment for both fever or cough and diarrhoea. Children with diarrhoea in the Copperbelt province are more likely to have sought advice for them or be taken for treatment than those living in the other provinces, whereas those in the Western province are less likely to have advice sought and/or be taken for treatment. Children with fever or cough in the Copperbelt and Lusaka provinces are also more likely to have advice sought for them or be taken for treatment than those living in other provinces but the opposite is true for children living in the Western, Northern, and Southern provinces. More children with diarrhoea, fever or cough in urban areas have advice sought for them or are taken for treatment than in rural areas.

The mothers of about one-half of children with fever or cough and about one-half of children with diarrhoea sought treatment at a public health centre. In addition, the mothers of 10 percent of children with fever or cough and mothers of 20 percent of children with diarrhoea sought treatment from a traditional healer or relatives and friends (other) (Tables 4.3 and 4.4).

There are noticeable provincial and residential differences in seeking advice for fever or cough (and diarrhoea although the small sample size precludes statistical analysis). Children with fever or cough are more likely to be taken to a public health facility in the Luapula and Western provinces, whereas private health facilities are more likely to be used in the Copperbelt province, pharmacies/shops in the Lusaka province and traditional/other in the Eastern and Northern provinces than elsewhere.

The provincial patterns in the person to treat children with diarrhoea differs somewhat from that to treat children with a fever or cough. Children with diarrhoea are more likely to be taken to a public health facility (hospital or health centre) in the North Western and Southern provinces, private facilities in the Copperbelt province, pharmacies/shops in the Lusaka province and traditional/other in the Eastern and Northern provinces than elsewhere.

Sick rural children are more likely to be taken to a public health centre and, to a much lesser extent, a traditional healer or other person than in urban areas where health facilities are more likely to be used.

The findings for seeking and source of treatment for sick children probably reflect access to health facilities, promotion of specific programs (e.g., CDD and ARI programs), mothers' concern about the illness, and time available to seek treatment for a sick child, as well as cultural factors that determine the norm in

Table 4.3 Source of treatment for fever or cough

Among children age 1 to 59 months sick with fever or cough, the percentage taken for treatment to a public hospital, public health centre, private hospital or doctor, pharmacy or shop, and traditional healer or other person, by province and residence, Zambia 1992

| Region and residence | Public hospital | Public health centre | Private hospital/ Doctor | Pharmacy/ Shop | Traditional/ Other | Number |
|---|---|---|---|---|---|---|
| **Province** | | | | | | |
| Central | 20.5 | 49.6 | 6.5 | 6.4 | 17.0 | 188 |
| Copperbelt | 11.6 | 40.6 | 34.4 | 9.6 | 3.8 | 608 |
| Eastern | 15.7 | 45.5 | 5.4 | 9.5 | 23.8 | 266 |
| Luapula | 9.8 | 67.7 | 4.6 | 2.8 | 15.1 | 111 |
| Lusaka | 6.3 | 55.4 | 11.6 | 23.5 | 3.2 | 337 |
| Northern | 13.2 | 54.3 | 5.2 | 4.1 | 23.3 | 215 |
| North Western | 21.5 | 50.6 | 15.1 | 6.1 | 6.7 | 67 |
| Southern | 11.3 | 49.8 | 18.4 | 11.2 | 9.3 | 415 |
| Western | 21.1 | 55.3 | 7.7 | 4.4 | 11.5 | 149 |
| | | | p<0.001 | | | |
| **Residence** | | | | | | |
| Urban | 18.1 | 42.8 | 21.5 | 13.8 | 3.8 | 1113 |
| Rural | 8.3 | 55.3 | 12.0 | 7.3 | 17.2 | 1247 |
| | | | p<0.001 | | | |
| Overall | 12.9 | 49.3 | 16.5 | 10.3 | 10.8 | 2361 |

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

Table 4.4 Source of treatment for diarrhoea

Among children age 1 to 59 months sick with diarrhoea the percentage taken for treatment to a public hospital, public health centre, private hospital or doctor, pharmacy or shop, and traditional healer or other person, by province and residence, Zambia 1992

| Region and residence | Public hospital | Public health centre | Private hospital/ Doctor | Pharmacy/ Shop | Traditional/ Other | Number |
|---|---|---|---|---|---|---|
| **Province** | | | | | | |
| Central | 15.1 | 48.0 | 9.6 | 2.8 | 24.5 | 81 |
| Copperbelt | 18.0 | 37.8 | 24.0 | 6.2 | 14.0 | 175 |
| Eastern | 22.0 | 44.6 | 5.6 | 0.9 | 26.9 | 120 |
| Luapula | 10.6 | 57.5 | 1.3 | 0.0 | 30.6 | 50 |
| Lusaka | 5.2 | 62.1 | 9.5 | 12.1 | 11.2 | 126 |
| Northern | 7.1 | 49.5 | 3.6 | 0.0 | 39.8 | 92 |
| North Western | 27.0 | 62.9 | 2.5 | 0.0 | 7.5 | 16 |
| Southern | 10.3 | 60.2 | 14.4 | 2.0 | 13.1 | 169 |
| Western | 24.3 | 43.4 | 3.0 | 1.5 | 27.8 | 46 |
| | | | a | | | |
| **Residence** | | | | | | |
| Urban | 20.8 | 46.3 | 12.6 | 6.9 | 13.4 | 393 |
| Rural | 8.2 | 54.2 | 10.2 | 1.3 | 26.2 | 481 |
| | | | p<0.001 | | | |
| Overall | 14.0 | 50.6 | 11.2 | 3.8 | 20.4 | 876 |

Note: Level of significance determined using Chi-square test.
a = Cells too small for valid Chi-square test.

terms of a child's health status. Seventy-five percent of the population apparently have access[2] to maternal and child health services, 100 percent in the urban areas and 50 percent in the rural areas (UNICEF, 1993). Kaite (1991) reports that over 75 percent of rural people live more than 30 minutes away from the nearest health centre. Given this, the ZDHS results suggest that health facilities are underutilized by sick children, especially in urban areas.

Over one-half of mothers whose children had diarrhoea in the preceding two weeks gave oral rehydration therapy (ORT) of any kind. Almost one-half used oral rehydration salt (ORS) in solution, one-fifth gave recommended home fluids (RHF), and about 10 percent both ORS and RHF (Table 4.5). The proportion of mothers using ORT is considerably lower than the level (89 percent) indicated by UNICEF (1993) for 1987-1991. There are no provincial differences in the use of ORS but RHF use is greater in the Copperbelt and Southern provinces than elsewhere. This, and the fact that children with diarrhoea in the Copperbelt and Southern provinces are also more likely to be taken to private facilities for treatment than in the other provinces, suggests that there may be differences between health care provider's knowledge of CDD programs in the public and private health sector. ORT use is also higher in urban than rural areas. It is im-

Table 4.5 Use of oral rehydration therapy for treatment of diarrhoea

Percentage of children age 1 to 59 months 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 province and residence, Zambia 1992

| Providence and residence | Received | | | |
|---|---|---|---|---|
| | ORS[1] | RHF[2] | ORT[3] | Number |
| **Province** | | | | |
| Central | 56.3 | 16.7 | 63.3 | 125 |
| Copperbelt | 50.5 | 33.8 | 67.1 | 241 |
| Eastern | 47.6 | 19.6 | 56.5 | 186 |
| Luapula | 45.8 | 22.7 | 59.4 | 81 |
| Lusaka | 50.2 | 12.9 | 60.2 | 186 |
| Northern | 39.9 | 12.3 | 50.0 | 153 |
| North Western | 45.2 | 7.4 | 47.8 | 31 |
| Southern | 50.7 | 26.4 | 56.1 | 249 |
| Western | 38.4 | 10.9 | 45.8 | 77 |
| | NS | p<0.001 | p<0.01 | |
| **Residence** | | | | |
| Urban | 53.4 | 26.4 | 65.8 | 557 |
| Rural | 44.5 | 16.8 | 52.5 | 774 |
| | p<0.002 | p<0.001 | p<0.001 | |
| Overall | 48.2 | 20.8 | 58.1 | 1331 |

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

[2] Access is defined as the ability to reach a health facility within one hour using the usual means of transport, be it walking or by a vehicle.

important to note that because there are no data on the severity of diarrhoea it is not necessarily appropriate to relate ORT usage rate to diarrhoeal levels, because mothers do not systematically use ORT for mild short-term cases of diarrhoea. Nevertheless, the moderate ORT use rate and relatively high dependency on traditional/other sources for treating children with diarrhoea can not go unheeded.

The WHO recommends that during a diarrhoeal episode children should receive additional liquids and breastfed children should receive additional breast milk. At the same time, food should not be withheld from diarrhoeic children. Among breastfed children having diarrhoea, nearly three-quarters of mothers do not change their frequency of breastfeeding, only 14 percent increase it, but 12 percent decrease it (Table 4.6). Among all children with diarrhoea, just over 40 percent of mothers increase the volume of fluids given during the episode, about 50 percent give the same amount, and about 10 percent reduce the volume of fluids. Mothers in the North Western province are more likely to increase the frequency of breastfeeding than elsewhere but the opposite is true for mothers in the Eastern province. The latter, however, are more likely to increase the volume of liquids given during a diarrheal episode as are mothers in the Central and Copperbelt provinces. There are no urban/rural residential patterns in the frequency of breastfeeding during a diarrhoeal episode. However, slightly more urban mothers increase the volume of liquids given during a diarrhoeal episode than rural mothers whereas the opposite is true for rural mothers. This may reflect urban biases in the implementation of CDD programs.

Table 4.6 Changes in feeding practices among children with diarrhoea

Among children age 1 to 59 months sick with diarrhoea the percentage of those breastfeeding who receive the same, increased, or decreased feedings and the percentage of those who received the same, more, or less fluids by province and residence, Zambia 1992

| | Frequency of breastfeeding | | | | Amount of other fluids given | | | |
|---|---|---|---|---|---|---|---|---|
| Region and residence | Same | In-creased | De-creased | Number | Same | In-creased | De-creased | Number |
| **Province** | | | | | | | | |
| Central | 73.4 | 22.8 | 3.7 | 58 | 33.0 | 60.3 | 6.7 | 115 |
| Copperbelt | 68.6 | 18.4 | 13.0 | 101 | 43.9 | 50.7 | 5.4 | 223 |
| Eastern | 64.2 | 11.5 | 24.3 | 86 | 27.7 | 58.1 | 14.2 | 164 |
| Luapula | 74.7 | 6.6 | 18.7 | 36 | 48.6 | 43.2 | 8.2 | 73 |
| Lusaka | 82.9 | 10.0 | 7.2 | 76 | 54.7 | 35.3 | 10.0 | 163 |
| Northern | 81.6 | 5.0 | 13.4 | 67 | 72.8 | 16.1 | 11.1 | 151 |
| North Western | 38.0 | 50.8 | 11.2 | 18 | 52.5 | 32.7 | 14.8 | 26 |
| Southern | 76.6 | 13.4 | 10.0 | 99 | 46.0 | 42.8 | 11.3 | 216 |
| Western | 90.0 | 2.8 | 7.1 | 49 | 53.1 | 35.9 | 11.0 | 69 |
| | | p<0.001 | | | | p<0.001 | | |
| **Residence** | | | | | | | | |
| Urban | 72.3 | 15.0 | 12.7 | 231 | 47.5 | 45.6 | 6.9 | 500 |
| Rural | 75.4 | 12.2 | 12.3 | 361 | 46.9 | 41.3 | 11.8 | 702 |
| | | NS | | | | p<0.02 | | |
| Overall | 74.1 | 13.5 | 12.4 | 593 | 47.1 | 43.1 | 9.8 | 1204 |

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

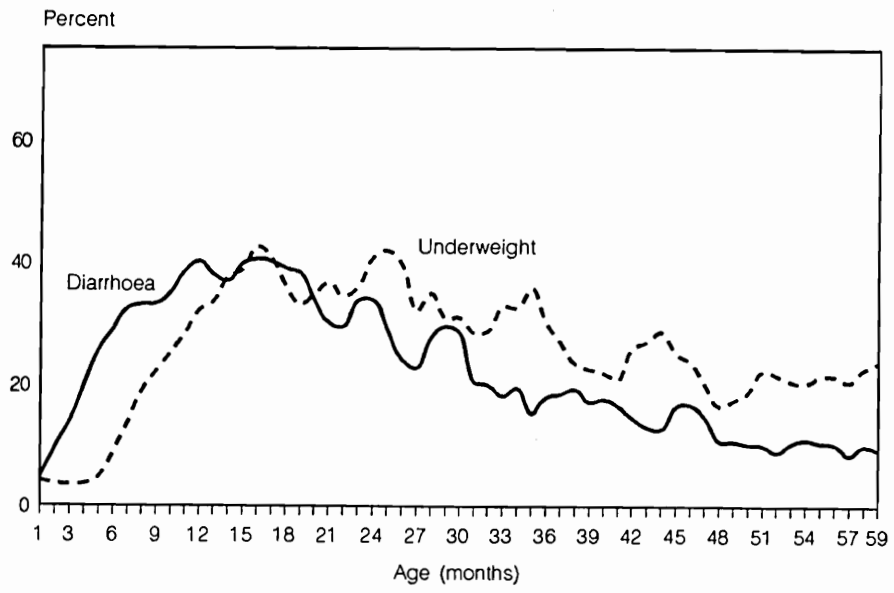
Compared to the 1987 national CDD survey (Ministry of Health, 1987), the DHS data suggest that slightly more mothers now breastfeed during a diarrhoeal episode than 5 years ago (88 versus 81 percent). However, the proportion of mothers increasing the amount of fluids during a diarrhoeal episode appears to have fallen (63 versus 40 percent), those giving the same amount of fluids has increased (23 versus 50 percent), those reducing the volume of liquids is about the same (13 versus 10 percent) and those who stopped breastfeeding altogether has declined (13 versus 0 percent).

## 4.3 AGE-RELATED PATTERN OF DIARRHOEA

It is well established that morbidity, especially diarrhoeal disease, has a negative influence on nutritional status among children under age five. In Zambia, the age-specific prevalence of diarrhoea follows approximately the same trend as that for underweight, but there appears to be about a three-month time lag between having diarrhoea and being underweight (Figure 4.1). This pattern may be reflecting the short-term cumulative effect of repeated diarrhoeal episodes.

Among infants age one month, the prevalence of diarrhoea is already five percent, and increases dramatically to more than 35 percent by the age of 10 months. Beyond the age of 18 months there is a steady decline in diarrhoea prevalence. The high prevalence of diarrhoea among young infants most probably is related to the widespread practice of introducing complementary liquids and foods at too early an age.

Figure 4.1
Diarrhoea and underweight by age, Zambia




ZMDS 1992

Similar age-specific patterns for diarrhoea are found in the different provinces and residential areas, despite significant differences in absolute prevalence. In addition, the prevalence of diarrhoea in all provinces and residential areas matches closely that for undernutrition; the prevalence of diarrhoea is significantly higher in the Northern province and in rural areas.

## 4.4 NONBIOLOGICAL AND BIOLOGICAL FACTORS ASSOCIATED WITH DIARRHOEA

Because children age two years and younger are generally recognized as being the most vulnerable to undernutrition and diarrhoea, further analyses have been undertaken to determine the nonbiological and biological factors associated with diarrhoea. Table 4.7 shows that, aside from the province and area of residence, children who come from homes that have better quality floors, piped water to the house, a flush toilet and a higher possession score, and whose mothers are more educated are less likely to have diarrhoea.[3]

Among the biological variables examined in addition to age, children who are not fed solid foods are more likely to have diarrhoea than children who receive complementary liquids irrespective of whether they are fully weaned. The latter are also more likely to have diarrhoea than children who are exclusively or fully breastfed. In addition, children who have a recent history of fever or a cough, who are stunted, who are underweight, or who are wasted are more likely to have a recent history of diarrhoea.

The factors associated with a recent history of diarrhoea have been used to develop a logistic regression[4] model to predict diarrhoea among children 2 years and younger. Children have been grouped into three age groups (1 to 10 months, 11 to 18 months and 19 to 24 months) during which the prevalence of diarrhoea first rises, remains high, and then declines (see Figure 4.1).

Regression estimates of net relative risk greater than one indicate that the risk of having diarrhoea is greater than for the reference category. Thus, wasted children are over 40 percent and stunted children about 20 percent more likely to have diarrhoea even after removing the effects of the other variables. Because so few children under 24 months are both stunted and wasted, the net relative risk of this condition and diarrhoea is not significant. Children age 11 to 18 months are about 65 percent more likely to have diarrhoea than those age 1 to 10 months and this difference is significant. In addition, children age 19 to 24 months are at over 30 percent greater risk of having diarrhoea but this difference is not significant (Table 4.7). Children with a recent history of fever are at 60 percent greater risk of having diarrhoea than children without a fever, and those with a recent history of cough only or cough with rapid breathing are 23 and 38 percent, respectively, more likely to have diarrhoea than those without a cough. Children who are breastfed and receiving solid foods are at 70 percent greater risk of having diarrhoea whereas those who are fully weaned are at 75 percent more risk. These data suggest that pathogen contamination from food, and thus food hygiene, probably is an important determinant of diarrhoea.

The risk of being diarrhoeic for children in the Northern, Central, Southern, Western, and Eastern provinces is between 32 and 65 percent greater than in the other provinces.

The type of flooring material in the home is correlated with maternal education which, in turn, is closely correlated with wealth (using the possession index as a proxy) as are the source of drinking water and type of toilet. Removing the effect of wealth on diarrhoea also removes the effects of type of floor, maternal

---

[3] In contrast, maternal age and occupation, whether the mother works, and being fed using a bottle are not associated with diarrhoea. The latter is because few children are bottle fed.

[4] Logistic regression models are explained in Appendix G.

Table 4.7 Prevalence and net relative risk of diarrhoea among children age 1 to 24 months

Percentage of children 1-24 months who have diarrhoea and the net relative risk of having diarrhoea, by selected background factors, Zambia 1992

| Background factor | Diarrhoea | Net relative risk |
|---|---|---|
| **Province** | | |
| Copperbelt | 23.9 | 1.00[a] |
| Central | 30.4 | 1.34[b] |
| Eastern | 47.3 | 1.65[b] |
| Luapula | 29.0 | 1.09 |
| Lusaka | 24.4 | 1.05 |
| Northern | 33.4 | 1.32[b] |
| North Western | 28.8 | 1.08 |
| Southern | 35.1 | 1.40[b] |
| Western | 38.0 | 1.40[b] |
| | p<0.001 | |
| **Residence** | | |
| Urban | 26.4 | |
| Rural | 34.2 | |
| | p<0.001 | |
| **Floor material** | | |
| Earth/sand | 34.4 | |
| Cement | 27.1 | |
| Tiles | 23.2 | |
| | p<0.001 | |
| **Source of drinking water** | | |
| Private pipe | 23.8 | |
| Public pipe | 31.9 | |
| Well with pump | 33.3 | |
| Well without pump | 27.8 | |
| Open sources | 36.4 | |
| | p<0.001 | |
| **Type of toilet** | | |
| Flush | 22.4 | |
| Pit | 31.1 | |
| None | 36.5 | |
| | p<0.001 | |
| **Possession score**[1] | | |
| 0 | 34.7 | |
| 1 | 29.0 | |
| 2 | 23.0 | |
| 3 | 25.4 | |
| 4 | 16.6 | |
| | p<0.001 | |
| **Mother's education** | | |
| None | 37.4 | |
| Primary | 31.2 | |
| Secondary+ | 23.0 | |
| | p<0.001 | |

Table 4.7—*Continued*

Percentage of children 1-24 months who have diarrhoea and the net relative risk of having diarrhoea, by selected background factors, Zambia 1992

| Background factor | Diarrhoea | Net relative risk |
|---|---|---|
| **Child age's (months)** | | |
| 1 to 10 | 22.9 | 1.00[a] |
| 11 to 18 | 39.7 | 1.64[b] |
| 19 to 24 | 33.9 | 1.34 |
| | p<0.001 | |
| **Feeding pattern** | | |
| Breast (+ water) | 14.8 | 1.00[a] |
| Breast and liquids | 23.3 | 1.37 |
| Breast and solids | 33.2 | 1.70[b] |
| Fully weaned | 34.4 | 1.75[b] |
| | p<0.001 | |
| **Fever (2 weeks)** | | |
| No | 20.7 | 1.00 |
| Yes | 40.7 | 1.61[b] |
| | p<0.001 | |
| **Cough (2 weeks)** | | |
| No | 24.1 | 1.00[a] |
| Cough only | 34.2 | 1.23[b] |
| Cough and rapid breathing | 41.5 | 1.38[b] |
| | p<0.001 | |
| **Nutritional status** | | |
| Neither stunted nor wasted | 26.3 | 1.00[a] |
| Wasted only | 38.7 | 1.42[b] |
| Stunted only | 36.9 | 1.19[b] |
| Stunted and wasted | 43.0 | 1.24 |
| | p<0.001 | |
| Overall | 30.5 | |
| Number | 2453 | |

Note: Level of significance determined using Chi-square test.
[a] overall 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.

education, source of drinking water and type of toilet. Urban/rural residence is closely correlated with province; thus the association between urban/rural residence and diarrhoea can be explained by the effects of province.

The results of the logistic regression essentially confirm that weaker children, i.e. those who are ill and undernourished, are more vulnerable to diarrhoea. Vulnerable children include those exposed to pathogens from food. In addition, children in the Eastern, Western, Southern, Central, and Northern provinces are more vulnerable to diarrhoea, suggesting an association between an increased risk of diarrhoea and poorer infant feeding practices, environmental conditions, lack of health facilities, and non-use of existing health facilities.

## 4.5 AGE-RELATED PATTERN OF FEVER

Although the prevalence of fever is extremely high among all age groups (Figure 4.2) and in all provinces, it is significantly lower in the Lusaka, Central and Copperbelt provinces and in urban areas (Table 4.2). Malaria, the most common cause of fever, is highly prevalent throughout Zambia.

## 4.6 AGE-RELATED PATTERN OF COUGH

The prevalence of cough is very similar to that for fever and is particularly high throughout the first 9 months of life after which there is a decline (Figure 4.2). The prevalence of cough is much higher in the Eastern province than elsewhere. Children living in rural areas are more likely to have had a cough, which is probably related to poorer living conditions, which makes people more susceptible to diseases and infections.

Figure 4.2
Fever and cough by age, Zambia

ZMDS 1992

# Chapter 5

## NUTRITION AND CARING CAPACITY OF THE FAMILY

The social and economic, health, and child variables identified as important in the bivariate analyses in Chapter 2 have been included in multivariate analyses in order to determine their net effects on nutritional status.

The following variables have been used to develop the best possible model to explain stunting, underweight, and wasting among children under five years of age. Only those variables that are significant are discussed in the sections that follow.

**Nonbiological variables:**

1. Province (Central, Copperbelt, Eastern, Luapula, Lusaka, Northern, North Western, Southern, Western)
2. Residence (urban, rural)
3. Length of residence (less than 5 years, 5 to 9 years, 10 or more years, always)
4. Mother's education (none, primary, secondary+)
5. Mother can read a newspaper (easily, with difficulty, not at all)
6. Mother listens to the radio at least once a week (yes, no)
7. Mother watches TV at least once a week (yes, no)
8. Mother's occupation (professional, intermediate, manual, agriculture, housewife)
9. Father's education (none, primary, secondary+)
10. Father's occupation (professional, intermediate, manual, agriculture, other)
11. Mother in a polygamous union (yes, no, not currently married)
12. Possession score (maximum score of 4 based on the availability of electricity and ownership of a TV, radio and/or refrigerator)
13. Transport (none, bicycle, car/motorbike)
14. Source of drinking water (piped to house, public pipe, well with pump, well without pump, river/stream)
15. Type of toilet (flush, pit, none)
16. Type of floor (earth, cement, tiles)

**Biological variables:**

1. Child age group (1 to 5 months, 6 to 11 months, 12 to 17 months, 18 to 23 months, 24 to 35 months, 36 to 47 months, 48 to 59 months)
2. Twin (no, yes)
3. Premature birth (no, yes)
4. Birth size (average+, small, very small)
5. Birth weight (normal, low)
6. Reason for stopping breastfeeding (maternal factors, child factors, age to wean, not yet weaned)
7. Diarrhoea (no, yes)
8. Fever (no, yes)
9. Child immunized against measles (yes, no)
10. Number of dead children mother has (0, 1, 2, 3, 4+)
11. Diet

a. 1 to 3 months[1] (exclusive and fully breastfed, partially breastfed)
b. 4 to 6 months[2] (breastfed, fully weaned)
c. 7 to 11 months[3] (breastfed and complementary foods, breastfed only)
d. 12 to 23 months[4] (breastfed and compementary foods, fully weaned)
e. 24 to 59 months[5] (fully weaned, breastfed and complementary foods)

Analyses were carried out for all children under five years old in the following age groups: infants 1 to 3 months old, infants 4 to 6 months, infants 7 to 11 months, children 12 to 23 months, and children 24 to 59 months old. Separate analyses were done for these age groups because optimal and appropriate feeding patterns are dependent on age. Risks of undernutrition were compared with the optimal feeding practice for each age group. The age-specific bivariate analyses between diet and stunting, diet and underweight, and diet and wasting show an association only for children age 24 to 59 months.[6] Breastfed children in this age group are more likely to be underweight, indicating that they do not receive sufficient complementary solid foods. Because the diet variable was not sufficiently specific and thus could not predict nutritional status in each of the different age groups, the models presented here include all children under five years.

## 5.1 STUNTING

The important determinants of stunting among Zambian children under the age of 5 years are child age group, recent history of diarrhoea, being a twin, birth size, reason for full weaning, maternal literacy and occupation, household possession score, floor material, and province (Table 5.1). The risk of stunting increases significantly with child age. Indeed, children fall into one of three groups; those 5 months and younger, those 6 to 11 months, who are 7 percent more likely to be stunted than infants under 6 months; and those 12 to 59 months, who are around 10 percent more likely to be stunted than children under 6 months. Because the pernicious effects of poor nutrition take time to manifest themselves in stunting this finding is not unexpected.

Children with a recent history of diarrhoea are 7 percent more likely to be stunted. The finding that a recent history of diarrhoea predicts chronic undernutrition suggests that these children have suffered from repeated bouts of diarrhoea over an extended period of time.

---

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

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

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

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

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

[6] It would appear that diet was not a good predictor of nutritional status largely because there were relatively few breastfed children who were being fed inappropriately and for whom data on nutritional status were available.

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

Net relative risk of stunting, underweight, and wasting for children 1 to 59 months, Zambia 1992

| Background factor | Stunting | Underweight | Wasting |
|---|---|---|---|
| **Age group (months)** | | | |
| 1 to 5 | 1.00[a] | 1.00[a] | 1.00[a] |
| 6 to 11 | 1.07[b] | 1.03[b] | 1.01[b] |
| 12 to 17 | 1.10[b] | 1.04[b] | 1.02[b] |
| 18 to 23 | 1.11[b] | 1.04[b] | 1.01[b] |
| 24 to 35 | 1.11[b] | 1.04[b] | 1.01[b] |
| 36 to 47 | 1.11[b] | 1.04[b] | 1.00 |
| 48 to 59 | 1.11[b] | 1.04[b] | 1.01[b] |
| **Diarrhoea** | | | |
| No | 1.00 | 1.00 | |
| Yes | 1.07[b] | 1.07[b] | |
| **Fever** | | | |
| No | 1.00 | | |
| Yes | 1.04[b] | | |
| **Twin** | | | |
| No | 1.00 | 1.00 | 1.00 |
| Yes | 1.34[b] | 1.17[b] | 1.03[b] |
| **Birth size** | | | |
| Average+ | 1.00[a] | 1.00[a] | |
| Small | 1.24[b] | 1.14[b] | |
| Very small | 1.29[b] | 1.16[b] | |
| **Stop breastfeeding** | | | |
| Currently breastfeeding | 1.00[a] | 1.00[a] | |
| Maternal factors | 0.96 | 0.92[b] | |
| Child factors | 0.93 | 0.91 | |
| Age to wean | 0.85[b] | 0.84[b] | |
| **Can read a newspaper** | | | |
| Easily | 1.00[a] | 1.00[a] | |
| With difficulty | 1.01 | 1.03 | |
| Not at all | 1.07[b] | 1.06[b] | |
| **Mother's occupation** | | | |
| Professional | 1.00[a] | | |
| Intermediate | 1.09[b] | | |
| Manual | 1.09[b] | | |
| Agriculture | 1.09[b] | | |
| Housewife | 1.08[b] | | |
| **Possesion score**[1] | | | |
| 3 | 1.00[a] | 1.00[a] | |
| 2 | 1.07[b] | 1.02 | |
| 1 | 1.10[b] | 1.06[b] | |
| 0 | 1.11[b] | 1.07[b] | |
| **Floor material** | | | |
| Tile | 1.00[a] | | |
| Cement | 1.07[b] | | |
| Earth/Sand | 1.12[b] | | |
| **Province** | | | |
| Copperbelt | 1.00[a] | 1.00[a] | 1.00[a] |
| Central | 0.97 | 0.95 | 0.98 |
| Eastern | 1.04 | 0.92[b] | 0.97 |
| Luapula | 1.21[b] | 1.13[b] | 1.01 |
| Lusaka | 0.99 | 1.02 | 1.02[b] |
| Northern | 1.15[b] | 1.08[b] | 1.02 |
| North Western | 0.97 | 0.98 | 0.99 |
| Southern | 0.86[b] | 0.91[b] | 0.97 |
| Western | 0.87[b] | 0.93 | 0.98 |
| Number | 4989 | 4990 | 5012 |

[a] Overall $p<0.05$.
[b] $p<0.05$ compared with reference category.
[1] Score of one for availability/ownership of electricity, radio, television, and/or refrigerator.

Twins are one third more likely to be stunted than singletons, which is probably the result of mothers not being able to meet the additional childcare demands of having two young children. Children whose mothers stated that they were small or very small at birth are between 24 and 29 percent more likely to be stunted than children who were of average or large size at birth. Whether this finding is indeed true, and thus an indicator of maternal nutrition, or a reflection of the current size of the child, is unknown. The evidence that children born small or very small at birth may be more stunted than children born average or large size comes from the data showing the association between mother's perception of birth size and mean birth weight (see Chapter 2). Nevertheless, these findings suggest that small newborn infants are unable to make up for the nutritional insult incurred during gestation.

The reason for fully weaning a child is associated with chronic undernutrition. The risk of being stunted does not differ between children who are currently breastfed and those who were fully weaned because of maternal factors or factors intrinsic to the child. However, children fully weaned because they were considered to be at the appropriate age are at 15 percent less risk of being stunted than those currently breastfed. These findings reflect the importance of early childcare practices and the long-term nutritional status of children. Indeed, mothers need to be made aware of the risks associated with fully weaning a child because he/she is sick or has a poor appetite or because the mother is pregnant; they also need to be given the appropriate advice on how to feed children who are weaned early.

Children whose mothers cannot read are 7 percent more likely to be stunted than other children, indicating that maternal literacy is important for good nutritional status. Printed materials (bill boards, pamphlets, etc.) would appear to be a good medium for nutrition and health education messages. Children whose mothers have a professional occupation are at about 10 percent less risk of being stunted. This suggests that these children receive better childcare because their mothers are more knowledgeable about, and practice, good childcare practices as well as being able to provide a better living environment, including a higher quality diet.

The household possession score, which is used as a proxy for wealth, also predicts stunting. Children from households that have electricity, a radio, a television, and a refrigerator are between 7 and 10 percent less likely to be stunted than children from households that own few or none of these items. Irrespective of where they live, or the relative wealth of the household, children from households that have tiled floors are at 17 percent less risk of being stunted compared with those from households with an earth floor. This finding probably reflects that these children come from households with a higher social and economic status.

Children living in the Luapula and Northern provinces are at over 15 percent greater risk of being stunted than those from the Copperbelt province, whereas the opposite is true for children from the Southern and Western provinces. Because living in a particular province does not by itself cause undernutrition, the province must be acting as a proxy for other factors associated with poor nutrition, such as access to food, feeding practices, childcare practices, and parasitic infestations that were not measured in the ZDHS.

Other nonbiological factors that can be taken as proxies for wealth, such as maternal education and marital status, paternal education and occupation, type of transport owned, source of drinking water, and type of toilet are not good predictors for stunting among young children in Zambia. The reason is that parental education and marital union are associated with maternal literacy and once the effects of the latter on stunting are removed, the former are no longer significant. Similarly, paternal occupation is associated with type of floor material and, along with area of residence and length of residence, source of water. The source of drinking water is associated with province which, in turn, overrides the effect of source of water on stunting. Type of toilet and transport owned are associated with wealth and once the effects of wealth are removed these variables are no longer associated with stunting.

Among the biological variables, premature births, low birth weight, a recent history of fever, and number of deceased siblings are not good predictors of stunting. This is because the effect of fever on stunting is overridden by the effect of birth weight, which in turn is overridden by the effect of province. Similarly, birth size is associated with premature birth and once the effect of birth size on stunting is removed, prematurity is no longer significant. Finally, the number of dead children is associated with maternal literacy. Thus, by removing the effect of maternal literacy on stunting, the effect of the number of dead children is no longer significant.

## 5.2 UNDERWEIGHT

A number of the nonbiological and biological factors that predict underweight among children age 1 to 59 months are similar to those that predict stunting, although the biological factors are better than nonbiological factors in predicting underweight. Compared with children age 1 to 5 months, older children are at a small (3 to 4 percent) but significantly greater risk of being underweight probably because of inappropriate feeding practices (including a poor diet) and greater exposure to pathogens, both of which increase the risk of morbidity.

Diarrhoea, which has an immediate effect on energy balance, increases the risk of being underweight by 7 percent. In addition, children who have a recent history of fever are about 4 percent more likely to be underweight than those who have not had a fever, reflecting better health status. Twins, as well as children perceived to have been small or very small at birth, are about 15 percent more likely to be underweight than other children. Children weaned because they were at the right age and because of maternal factors are at significantly less risk of being underweight than those currently breastfed. As with stunting, high maternal literacy and increased wealth are associated with a 6 percent lower risk of being underweight.

Children in the Luapula and Northern provinces are at 13 and 8 percent, respectively, greater risk of being underweight, while those in the Eastern and Southern provinces are at about 8 percent less risk of being undernourished than children living elsewhere even after taking account of the other factors.

Other social and economic variables, which are also proxies for wealth, fell out of the logistic regression model because of their associations with drinking water and maternal education, which are associated with wealth and maternal literacy. Except for cough, which is associated with child's age, biological variables that were significant in the bivariate analysis dropped out of the logistic regression model for underweight for the same reasons as in the model to predict stunting.

## 5.3 WASTING

Although the net effects are very small, infants 6 months and older are at 1 to 2 percent greater risk of being wasted than those over 6 months. Twins are also more likely to be wasted than singletons. In addition, children in the Lusaka province are at greater risk of being wasted than children living in the other provinces. None of the other factors tested are good predictors of wasting.

## 5.4 SUMMARY

In summary, nutritional status is largely determined by the child's age, size at birth, reason for weaning, exposure to diarrhoeal disease, and factors generally associated with poverty. Because infants and young children are not being fed optimally, undernutrition manifests itself soon after birth. The situation is exacerbated by high levels of diarrhoea at a very young age. The prevalence of undernutrition increases dramatically up to 24 months. Between 18 and 23 months of age the prevalence of stunting, underweight and wasting rise to over 50 percent, 30 percent and about 10 percent, respectively. After 24 months of age

improvements are seen in measures of nutritional status and morbidity levels fall dramatically, which indicate a decline in nutritional risk for children once they enter the third year of life. This is most likely because, once they are older, children are more able to actively partake in the traditional family diet. Furthermore, the worst nourished have died.

These results indicate that efforts to improve child nutrition in Zambia should focus on the first two years of life when dietary intake and diarrhoeal morbidity have their greatest effect on undernutrition. The data strongly suggest that the main components of the primary health care system, particularly the CDD program and nutrition activities, need to be more vigorously pursued in order to improve the nutritional status of Zambian children.

# Chapter 6

# NUTRITIONAL STATUS OF MOTHERS

Women of childbearing age are particularly vulnerable to malnutrition because of the nutritional costs associated with reproduction (pregnancy and lactation) on top of everyday heavy workloads. Indeed, Merchant and Martorell (1988) refer to the "maternal depletion syndrome," which is the deleterious cumulative effect of repeated pregnancies on the nutritional status of mothers above and beyond that caused by poverty.

During the ZDHS, data were collected on the height and weight of mothers having living children under the age of five years. Women age 15 to 19 and 45 to 49 years are less likely to have a child under the age of five years and therefore are less likely to have been weighed and measured. For this reason they are underrepresented in the findings presented here. Mothers were weighed on a digital scale; weight was recorded in kilograms to the nearest 100 grams. Height was measured using a standard anthropometer specifically made for the survey and recorded to the nearest millimeter.

A total of 4117 mothers were eligible to be weighed and measured. Valid data are available for 97.7 percent of mothers; 2.0 percent had missing height or weight data and 0.3 percent had unlikely data (i.e., unrealistically low or high). Among the eligible mothers 15.8 percent were pregnant.

## 6.1 NUTRITIONAL STATUS OF NONPREGNANT MOTHERS

Little is known about how to assess the nutritional status of nonpregnant women (Rasmussen and Habicht, 1989) because of the lack of agreed indices to define undernutrition. Nevertheless, height, weight, and body mass index (BMI) are used as indicators of maternal nutritional status.

Weight is predominantly a measure of current nutritional status and is often used as an indicator of overall health and nutritional status. However, its use is limited largely because the desirable or appropriate level of weight at different stages of the life cycle is still unknown.

Height, unlike weight, 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. Stunting in adult women is associated with obstetric risk because short stature is associated with small pelvic size. Furthermore, stunting is correlated with low birth-weight infants, high risk of stillbirth, and high rate of miscarriage (Krasovec and Anderson, 1991). High obstetric-risk women are those whose height falls below 145 cm and whose weight is below 40 kg.

Table 6.1 shows the mean, standard deviation, median and range for height and weight of nonpregnant Zambian mothers. On average, mothers were 158 cm tall and weighed 55 kg. No mother was *both* below 145 cm and 40 kg but there were mothers under 145 cm and mothers under 40 kg.

## 6.2 HEIGHT

Figure 6.1 shows mean height by age for all Zambian mothers in the survey and Table 6.2 shows mean height by age group and tribe. The data suggest that Zambian women continue to grow in height until the age of about 22 years (Figure 6.1). By the age of 40 years, however, women's stature decreases. This may reflect a secular trend of increased growth or a small decrease in stature among older women due to osteo-

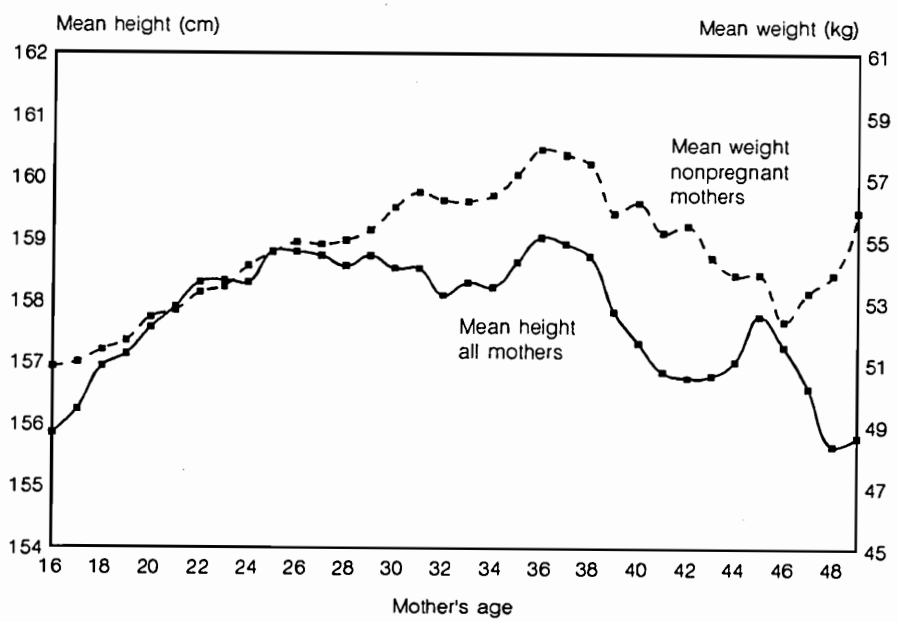
Table 6.1 Nutritional status of mothers

Mean, standard deviation, median, and range for height, weight, and body mass index (BMI) of mothers age 15 to 49 years, Zambia 1992

| Anthropometric variable | Mean | Standard deviation | Median | Range |
|---|---|---|---|---|
| Height | 158.1 | 5.9 | 158.1 | 138.4 - 184.7 |
| Weight | 54.5 | 8.5 | 53.2 | 35.2 - 91.8 |
| BMI[1] | 21.7 | 3.0 | 21.2 | 15.3 - 35.2 |
| Number | 3229 | | | |

[1]Body mass index

Figure 6.1
Mean height and weight of mothers by age, Zambia




ZDHS 1992

porosis associated with aging. Table 6.2 shows that mothers between 15 and 19 years and those between 40 and 49 years are significantly shorter than mothers between 20 and 39 years old.

Until relatively recently, Zambian marriages were within the same tribe. Given this and the fact that maternal height is partly an expression of genetic potential, the height data were analyzed by tribe. Table 6.2 shows that, on average, Baroste mothers are taller and Tumbuka mothers are shorter than mothers belonging to other tribal groups.

Because shorter stature is associated with an increased risk of adverse pregnancy outcomes, an analyses of variance was carried out to see whether maternal height is related to the number of child deaths per mother. Mothers whose height is below minus two standard deviations of the mean, that is below 141 cm, had 0.2 more dead children than mothers whose height is greater than minus two standard deviations (Table 6.3) after controlling for the total number of times a mother had given birth (which is highly correlated with age), the household possession score (a proxy for wealth), and tribal affiliation.

Table 6.2 Mother's height

Mean, standard deviation height by mother's age group and tribe, Zambia 1992

| Background variable | Mean | Standard deviation | Number |
|---|---|---|---|
| Mother's age (years) | | | |
| 15 to 19 | 157.0 | 5.8 | 458 |
| 20 to 24 | 158.1 | 5.8 | 845 |
| 25 to 29 | 158.7 | 6.0 | 730 |
| 30 to 34 | 158.3 | 6.1 | 530 |
| 35 to 39 | 158.7 | 5.8 | 366 |
| 40 to 49 | 156.9 | 5.8 | 300 |
| | p<0.001 | | |
| **Tribe** | | | |
| Barotse | 159.8 | 5.9 | 209 |
| Other | 159.6 | 6.4 | 68 |
| Tonga | 159.3 | 5.5 | 645 |
| North Western[1] | 158.7 | 5.7 | 289 |
| Nyanja | 157.5 | 5.9 | 569 |
| Mambwe | 157.5 | 6.0 | 173 |
| Bemba | 157.4 | 6.1 | 1090 |
| Tumbuka | 156.8 | 5.3 | 182 |
| | p<0.001 | | |

Note: Level of significance determined using ANOVA.
[1]Includes Luvale, Lunda, Mbunda, Luchazi, Ndembu, Mbowe, Chokwe, and Kaonde.

From a programmatic perspective, mothers of shorter stature (that is below 141 cm), who are at greater risk of obstetric complications, should receive more antenatal care and be attended at birth by trained health personnel. The DHS data, however, show that the above is not the case. Indeed, mothers whose height is below -2 standard deviations of the mean are more likely not to go for antenatal care as well as to be attended by a relative, neighbour, or no one at the time of giving birth. Thus, women at greatest risk of pregnancy complications are not receiving the care they need.

Table 6.3 Maternal height and number of dead children

Difference in mean number of child deaths per mother[1] according to maternal height (Z-score) after controlling for total number of times given birth, household possession score, and tribe, Zambia 1992

| Characteristic | Overall mean | Deviation from overall mean |
|---|---|---|
| **No. dead children** | 0.68 | |
| **Height z-score** | | |
| Below -2 | | 0.20 |
| -1.99 to -1.00 | | 0.06 |
| -0.99 to 0 | | 0.00 |
| 0 to 0.99 | | -0.01 |
| 1.00 to 1.99 | | -0.07 |
| 2.00 and above | | -0.05 |

[1]ANOVA multiple classification analyses, p<0.05.

## 6.3 BODY MASS INDEX

Body mass indices (BMIs) are used to assess thinness and obesity. The Quetlet BMI[1] was originally developed to diagnose obesity but, more recently, James et al. (1988) have advocated its use for assessing chronic energy deficiency (CED). Because the Quetlet BMI

[1]Quetlet BMI=wt/ht$^2$.

divides weight by height squared, it is disproportionately weighted and thus highly correlated with weight itself. The main advantage of using the Quetlet BMI is that it is a self-contained ratio and does not require reference tables. Data for ideal reference populations for women show that the normal range for the Quetlet BMI is between 21.5 and 23.1. Women who are 20 percent overweight have Quetlet BMIs between 25.8 and 27.3 whereas those who are severely overweight, i.e., 40 percent overweight, have Quetlet BMIs between 30.1 and 32.3. At the other extreme, the International Dietary Energy Consultative Group (James et al., 1988) suggests that Quetlet BMIs between 17.0 and 18.5 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. A Quetlet BMI of 12 is the absolute lower limit compatible with life.

Table 6.1 shows that the mean Quetlet BMI for Zambian mothers is 22, which is just inside the normal range, and similar to the value of 23 for urban Lusaka women (Kaite and Luneta, 1992). The distribution of Quetlet BMIs are shown in Table 6.4 using the James et al. classification. Ten percent of mothers are CED, of which 8.4 percent have Grade 1 CED, 1.4 percent have Grade II CED, and 0.1 percent have Grade III CED. Nearly 20 percent of mothers are overweight and 1.6 percent are severely so.

Table 6.4 Body mass index

Percent distribution for body mass index (BMI) of mothers age 15 to 49 years, Zambia 1992

| Body mass index | Percent |
|---|---|
| Below 16 | 0.1 |
| 16.0 to 16.9 | 1.4 |
| 17.0 to 18.4 | 8.4 |
| 18.5 to 23.9 | 71.0 |
| 24.0 to 25.9 | 9.6 |
| 26.0 to 29.9 | 7.9 |
| 30.0 or greater | 1.6 |
| Total | 100.0 |
| Number | 3229 |

A number of social and economic variables are associated with low (below 18.5) and high (24.0 and higher) Quetlet BMIs. These are shown in Table 6.5. The variables identified as important in the bivariate analyses have been included in multivariate analyses in order to determine their net effects on low and high BMI.

**Low Body Mass**

The important determinants of low body mass, or under-nutrition, among Zambian mothers are the household possession score, which is used as a proxy for wealth, and tribe. Mothers from households that have electricity, radio, television, and a refrigerator are nearly one-half less likely to have a low body mass than mothers from households that own none of these items.

The tribe to which a mother belongs is closely associated with the province in which a mother lives, thus by including both variables in the model the effects of each on low body mass are canceled out. Because living in a particular province does not by itself determine nutritional status but the tribe to which a mother belongs may reflect both genetic variation in growth and environmental factors, tribe has been used instead of province in the model to predict nutritional status. Table 6.5 shows that Baroste mothers are 80 percent more likely to have a low body mass than other mothers. Two-thirds of the Baroste mothers surveyed lived in the Western province.

In the model, the number of times a mother had given birth was closely correlated with mother's age, and by including both variables the effects of each canceled out. The household possession score also eliminated the effects of mother's age and the number of times a mother had given birth, as well as other proxies for social and economic status and environmental hygiene. Variables directly related to the latter, for which no data are available, are considered important in terms of their possible association with maternal morbidity. The variables that fell out of the model once the household possession score was included were the source of drinking water, availability of a toilet, type of floor material, type of transport owned, husband's education, and urban/rural residence.

Table 6.5 Prevalence and net relative risk of low body mass and high body mass among mothers age 15 to 49 years

Percentage of mothers age 15 to 49 years who have low body mass and high body mass and the net relative risk of having low body mass and high body mass by background factors, Zambia 1992

| Background factor | BMI[1] Low | Net relative risk | BMI[2] High | Net relative risk |
|---|---|---|---|---|
| **Age group (years)** | | | | |
| 15 to 19 | 11.6 | | 10.1 | 0.57[b] |
| 20 to 24 | 11.5 | | 12.3 | 0.72[b] |
| 25 to 29 | 8.4 | | 18.2 | 1.00[a] |
| 30 to 34 | 7.7 | | 27.3 | 1.49[b] |
| 35 to 39 | 8.3 | | 30.0 | 1.62[b] |
| 40 to 49 | 12.4 | | 25.8 | 1.61[b] |
| | p<0.05 | | p<0.001 | |
| **Number of times given birth** | | | | |
| 1 to 3 | 11.3 | | 13.3 | |
| 4 to 6 | 7.8 | | 24.6 | |
| 7 to 9 | 8.9 | | 24.8 | |
| 10 or more | 9.9 | | 29.2 | |
| | p<0.05 | | p<0.001 | |
| **Residence in childhood** | | | | |
| City | 25.9 | | | |
| Town | NS | | 21.7 | |
| Village | 15.8 | | | |
| | p<0.001 | | | |
| **Education** | | | | |
| None | 13.1 | | | |
| Primary NS | 17.4 | | | |
| Secondary+ | 28.1 | | | |
| | p<0.001 | | | |
| **Husband's education** | | | | |
| None | 12.6 | | 9.6 | |
| Primary | 11.2 | | 15.3 | |
| Secondary+ | 8.2 | | 25.8 | |
| | p<0.02 | | p<0.001 | |
| **Occupation** | | | | |
| Professional | | | 46.1 | 1.49 |
| Intermediate | | | 26.5 | 1.28[b] |
| Skilled/Unskilled | NS | | 21.6 | 1.26 |
| Farmer | | | 9.6 | 0.86 |
| Housewife | | | 16.3 | 1.00[a] |
| | | | p<0.001 | |
| **Husband's occupation** | | | | |
| Professional | | | 36.4 | |
| Intermediate | | | 22.2 | |
| Skilled/Unskilled | NS | | 23.7 | |
| Farmer | | | 11.0 | |
| Other | | | 16.6 | |
| | | | p<0.001 | |
| **Toilet** | | | | |
| Yes | 7.7 | | 32.6 | |
| No | 10.7 | | 14.4 | |
| | p<0.02 | | p<0.001 | |
| **Floor material** | | | | |
| Earth/Sand | 11.8 | | 10.8 | 1.00 |
| Cement/Tiles | 8.2 | | 26.7 | 1.43[b] |
| | p<0.001 | | p<0.001 | |
| **Source of drinking water** | | | | |
| Private pipe | 7.4 | | 32.6 | 1.70[b] |
| Public pipe | 8.8 | | 18.4 | 1.23 |
| Well with pump | 12.1 | | 12.8 | 1.07 |
| Well without pump | 17.3 | | 6.7 | 0.50[b] |
| Open sources | 9.8 | | 11.0 | 1.00[a] |
| | p<0.001 | | p<0.001 | |
| **Transport owned** | | | | |
| None | 10.7 | | 18.1 | |
| Bicycle | 8.7 | | 18.2 | |
| Car/Motorbike | 4.0 | | 37.3 | |
| | p<0.02 | | p<0.001 | |

Table 6.5 Prevalence and net relative risk of low body mass and high body mass among mothers age 15 to 49 years—*Continued*

| Background factor | BMI[1] Low | Net relative risk | BMI[2] High | Net relative risk |
|---|---|---|---|---|
| **Possession score[3]** | | | | |
| 0 | 12.7 | 1.94b | 13.3 | 1.00a |
| 1 | 7.8 | 1.19 | 18.1 | 1.06 |
| 2 | 4.8 | 0.72 | 29.9 | 1.22 |
| 3 | 7.2 | 1.00a | 41.8 | 1.68b |
| | p<0.001 | p<0.001 | | |
| **Tribe** | | | | |
| Bemba | 9.8 | 1.00a | 21.2 | 1.00a |
| Tonga | 7.5 | 0.74 | 17.7 | 1.00 |
| North Western[4] | 13.2 | 1.32 | 14.5 | 0.62b |
| Baroste | 18.7 | 1.80b | 12.1 | 0.59b |
| Nyanja | 9.7 | 1.02 | 19.8 | 0.96 |
| Mambwe | 8.2 | 0.85 | 19.5 | 0.85 |
| Tumbuka | 7.8 | 0.79 | 19.1 | 0.88 |
| Other | 6.5 | 0.70 | 28.9 | 1.21 |
| | p<0.001 | p<0.01 | | |
| **Residence** | | | | |
| Large city | 7.0 | | 28.7 | |
| Small city | 11.2 | | 25.0 | |
| Town | 7.1 | | 26.4 | |
| Rural | 11.7 | | 11.9 | |
| | p<0.001 | | p<0.001 | |
| **Province** | | | | |
| Central | 6.9 | | 20.3 | |
| Copperbelt | 9.8 | | 26.8 | |
| Eastern | 9.1 | | 11.8 | |
| Luapula | 13.8 | | 11.0 | |
| Lusaka | 8.8 | | 27.8 | |
| Northern | 10.9 | | 10.4 | |
| North Western | 11.7 | | 12.7 | |
| Southern | 8.0 | | 16.9 | |
| Western | 18.8 | | 7.6 | |
| | p<0.001 | | p<0.001 | |
| Overall | 9.9 | | 19.0 | |
| Number | 3229 | 3330 | 3229 | 3330 |

Note: Level of significance determined using Chi-square test.
[a]Overall p<0.05.
[b]p<0.05 compared with reference category.
[1]Below 18.5.
[2]24.0 and above.
[3]Score of one for availability/ownership of electricity, radio, television, and/or refrigerator.
[4]Includes Luvale, Lunda, Mbunda, Luchazi, Ndembu, Mbowe, Chokwe, and Kaonde.

### High Body Mass

The important determinants of high body mass, or overnutrition, among Zambian mothers are mother's age group and occupation, type of floor material in the home, source of drinking water, household possession score, and tribal affiliation (Table 6.5).

Mothers under 25 years of age are about 30 to 40 percent less likely to be overnourished and those between 30 and 49 years of age about 50 to 60 percent more likely to be overnourished than mothers between the age of 25 and 29 years. The fact that these results were independent of the number of times a mother had given birth and wealth status suggests a number of things. First, younger mothers have not stopped growing and are therefore not laying down energy stores. Second, mothers may become more sedentary with increasing age. Third, mothers' metabolism may slow down with age and thus they lay down more fat. Fourth, older mothers may indeed eat a better diet.

Mothers whose occupation is classified as being in the intermediate category according to the International Labour Office, are nearly 30 percent more likely to be overnourished than mothers who do not work outside the home. Although the net relative risk of being overnourished for professional women is much higher at 50 percent, it is not statistically significant because few mothers have occupations that are defined as professional.

The household possession score, a proxy for household wealth, was positively associated with overnutrition. Mothers from households that have electricity, radio, television, and a refrigerator are over two-thirds more likely to be overnourished than mothers that own few or none of these items.

Irrespective of where they live or the relative wealth of the household, mothers from households that have cement or tiled floors are over 40 percent more likely to be overnourished than those from households with an earth or sand floor. Similarly mothers from households with a private supply of water are 70 percent more likely to be overnourished, whereas those who get their water from a well without a pump are 50 percent less likely to be overnourished, than other mothers. These results suggest that better environmental sanitation results in mothers being at less risk of morbidity and the weight loss frequently associated with morbidity.

Mothers who belong to the North Western and Baroste tribes are about 40 percent less likely to be overnourished than other mothers. The majority of the former mothers live in both the North Western and Western provinces; most of the latter live in Western province.

In the model, the number of times a mother had given birth was closely correlated with mothers age and by including both variables in the model the effects of each were canceled out. Mother's occupation eliminated the effect of mother's education suggesting a wealth effect. Including type of floor material in the model eliminated the effect of both husband's occupation and area of residence in childhood. Similarly, adding the source of drinking water to the model eliminated the effect of having a toilet and type of transport owned. Finally, the household possession score eliminated the effect of husband's education and urban/rural residence.

## 6.4 PREGNANCY WEIGHT GAIN

Data are available for 608 mothers at different stages of pregnancy. Table 6.6 shows that mothers gain, on average, 7.0 kg throughout their pregnancy. This value falls within the average weight gains for women in developing countries (5 to 9 kg) cited in Krasovec and Anderson (1991) and is much lower than the recommended 11.5 to 16 kg for normal weight women (National Academy of Sciences, 1990). In the

absence of data on prepregnancy weight it is not possible to comment on weight gain as a percentage of initial weight during pregnancy.

Table 6.6 Pregnancy weight

Mean and standard deviation weight of mothers age 15 to 49 years by month of pregnancy, Zambia 1992

| Months pregnant | Mean | Standard deviation | Number |
|---|---|---|---|
| 1 | 53.9 | 9.1 | 32 |
| 2 | 54.2 | 7.3 | 62 |
| 3 | 54.9 | 6.8 | 85 |
| 4 | 55.2 | 7.5 | 88 |
| 5 | 57.6 | 8.3 | 91 |
| 6 | 58.9 | 7.5 | 69 |
| 7 | 58.6 | 9.0 | 64 |
| 8 | 60.3 | 7.9 | 81 |
| 9 | 60.9 | 8.3 | 37 |

## 6.5 SUMMARY

Because anthropometric measurements were taken only once, and the DHS maternal weight data reflect the current nutritional status of mothers, it is not possible to relate past events such as infant and neonatal mortality to current body mass index or weight gain during pregnancy.

The DHS maternal anthropometry data show that there are tribal differences in maternal height, which reflects both genetic and environmental influences on linear growth during childhood. Mothers whose height is more than 2 standard deviations below the mean are at greater risk of having more dead children. However, these high-risk mothers, who need more antenatal care and to be attended by trained health personnel at the time of delivery, are less likely to get either compared to other mothers. These results indicate that there is a need to identify mothers with a high risk of pregnancy complications and to ensure that these women receive proper antenatal and delivery care.

In the absence of data to reflect the health status of mothers, the DHS data indicate that the nutritional status of nonpregnant mothers, based on body mass index, is largely determined by factors directly and indirectly associated with wealth as well as by tribal affiliation. Maternal age is also an important determinant of overnutrition but not of undernutrition. Indeed, overnutrition is more common than undernutrition among Zambian mothers.

Average weight gain during pregnancy is 7 kg, which is similar to findings from other developing countries but is well below the recommended level.

# Chapter 7

# RECOMMENDATIONS

The ZDHS is one of three surveys in 20 years to provide nationally representative data on the nutritional status of children under five years old, and the findings indicate that there are important challenges ahead.

The associations between the child's age and the risks for undernutrition and morbidity coupled with that of infant feeding patterns point to six major areas that need attention if child nutrition in Zambia is to be improved.

1. Policy makers, administrators, professionals and the public at large need to be made more aware of the nutritional problems in Zambia.

2. The ZDHS data reveal clear provincial differences in health status, nutritional status, and the use of health facilities, which suggests that there are also large provincial disparities in the availability of health services. This subject needs to be addressed.

3. Children under two years of age are the most vulnerable to undernutrition. For this reason, nutrition programs need to focus on the first two years of life. Specifically, health professionals, paramedics, and traditional health care workers need to:

   - Be made aware of the importance of feeding colostrum to newborn infants, so that they will advise mothers to initiate breastfeeding immediately. Feeding newborns other liquids, such as water, before beginning to breastfeed must be actively discouraged.

   - Advise mothers to exclusively breastfeed their infants until they are 4 to 6 months old.

   - Advise mothers that by the age of 6 months their infants must receive nutritionally adequate complementary solid foods made from locally available foods.

   - Advise mothers who get pregnant or who work and, therefore, say they are unable to breastfeed about appropriate age-related diets.

   - Advise mothers of the importance of getting sick children to eat no matter how mild or insignificant they consider the illness. At the same time mothers need to be taught about the degrees of diarrhoea and fever, what action to take at home, and when to seek medical attention.

4. Health professionals and paramedics must play a more active role in addressing the issue of good maternal nutrition especially given that one out of ten newborn babies is below average size.

5. The high and slowly declining level of chronic undernutrition among children two to five years old suggests that there is either insufficient food at the household level or an unequal distribution of food within the household. To increase food supply, households need to be told about low-cost methods for reducing storage losses and/or low-cost methods of food preservation, including solar drying of fruits and vegetables during the season of surplus. To alter behavior patterns associated with the distribution of food within the household, nutrition and health education messages must be addressed

to both parents -- not just mothers. This will increase the likelihood of education messages having an impact on the welfare of children.

6. The rapid and high increase in the prevalence of diarrhoea among children under 12 months old suggests that pathogen contamination from food and/or serving utensils is common. Efforts to improve food hygiene (washing hands, cleaning serving utensils, etc.) will benefit children's nutritional status. It must be borne in mind, however, that once infants begin to crawl and explore their environment, they are exposed to many diarrhoea-causing pathogens in addition to those in contaminated food.

Clearly improvements in the care and feeding of children are unlikely, by themselves, to solve Zambia's nutritional problems. In addition to the issue of poverty, certain other areas need direct attention: maternal health and nutrition need to be improved as does environmental sanitation, including ready access to safe drinking water and adequate toilet facilities. In order to meet the challenge of improving the nutrition and health of Zambian children, nutrition-related activities must be coordinated between the different sectors.

Women under 145 cm in height are known to be at greater risk of adverse pregnancy outcomes. The DHS data show that women of short stature do indeed have more dead children. These findings indicate that health professionals need to ensure that these high-risk women get the necessary antenatal care and are attended by a health professional at the time of delivery.

The DHS data also suggest that weight gain during pregnancy is inadequate. More attention, therefore, needs to be given to making sure that antenatal care providers monitor weight gain during pregnancy and give mothers appropriate advice. Improved antenatal care will ensure that more infants are born both healthy and at term.

Overnutrition is more common than undernutrition among Zambian mothers, especially among those from households that are better off. Given that overnutrition is associated with an increased risk of cardiovascular disease and diabetes, among other things, health professionals need to be made aware of the consequences of overnutrition and give the appropriate dietary advice to the overnourished women.

# REFERENCES


Central Statistical Office. 1990. *Census of population, housing, and agriculture*. Lusaka.

Cogill, B. and M. Zaza. 1990. *Report of a survey of rural Zambia undertaken as part of the crop forecasting survey 1990*. Zambia: Central Statistical Office/National Food and Nutrition Commission/UNICEF.

Defo, B.K. and M. Partin. 1993. Determinants of low birth weight: A comparative study. *Journal of Biosocial Science* 25: 78-100.

Dole, N., K. Gleiter, D.A. Savitz, T.H. Chimbira, and M.T. Mbizvo. 1990. *Birthweight patterns in Harare, Zimbabwe*. International Journal of Epidemiology 19(1):98-100.

Food and Agricultural Organisation. 1991. *Food balance sheets; 1984-1986 average*. Rome.

Gaisie, K., A. Cross, and G. Nsemukila. 1993. *Zambia Demographic and Health Survey 1992*. Columbia, MD: University of Zambia/Central Statistical Office/Macro International Inc.

Grant, J. 1993. *The state of the world's children*. New York: Oxford University Press.

Hunt, S., C. Kaite, P. Kasonde, and F. Campbell. (in preparation). *The nutrition and food security analyses of Zambia Priority Survey No. 1*. Preliminary report. Lusaka: National Food and Nutrition Commission.

James, W.P.T., A. Ferro-Luzzi, and J.C. Waterlow. 1988. Definition of chronic energy deficiency in adults; report of a working party of the International Dietary Energy Consultative Group. *European Journal of Clinical Nutrition* 42: 969-981.

Kaite, C.D. 1990. *Consumption and utilisation of traditional food crops in Zambia*. Lusaka: National Food and Nutrition Commission.

Kaite, C.D. 1991. *Report on the nutrition module of the household budget survey conducted by the Prices and Incomes Commission and the Central Statistical Office in 1985*. Lusaka: National Food and Nutrition Commission.

Kaite, C.D. and A.K. Luneta. 1992. *Nutritional assessment of women and children in Lusaka urban district*. Lusaka: National Food and Nutrition Commission.

Krasovec, K. and M.A. Anderson (eds). 1991. *Maternal nutrition and pregnancy outcomes*. Pan American Health Organisation Scientific Publication No. 529. Washington, D.C.

Merchant, K. and R. Martorell. 1988. Frequent reproductive cycling: Does it lead to nutritional depletion of mothers? *Progress in Food and Nutrition Science* 12: 339-369.

Ministry of Agriculture, Food, and Fisheries. 1992. *A framework for agricultural policies to the year 2000 and beyond*. Lusaka.

Ministry of Agriculture, Food, and Fisheries. 1993. *1989/90 Agricultural Statistics Bulletin*. Lusaka: Planning Division.

Ministry of Health. 1987. *Zambia CDD/EPI baseline survey*. Lusaka.

Ministry of Health. 1992. *National programme of action*. Lusaka.

National Academy of Sciences, Institute of Medicine. 1990. *Nutrition during pregnancy*. Washington, D.C.: National Academy Press.

Ng'andu, N. and T. Watts. 1990. Child growth and duration of breastfeeding in urban Zambia. *Journal of Epidemiology and Community Health* 44:(4) 281-285.

Prices and Incomes Commission. 1991. *Household expenditures and income survey*. Lusaka.

Rasmussen, K. and J-P. Habicht. 1989. Malnutrition among women: Indicators to estimate prevalence. *Food and Nutrition Bulletin* 11: 29-37.

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

United Nations Children's Fund (UNICEF). 1992. *Statistical profile of the Zambian child*. Lusaka.

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

World Bank. 1992. *World development report*. New York: Oxford University Press.

World Bank. 1993. *Zambia: Towards improved food security*. Lusaka.

World Health Organisation (WHO). 1989a. *Measuring change in nutritional status*. Geneva.

World Health Organisation (WHO). 1989b. *Global nutritional status: Anthropometric indicators update 1989*. Geneva.

World Food Council. 1992. The global state of hunger and malnutrition. Eighteenth Ministerial Session, Nairobi.

# Appendix A

## SAMPLE DESIGN FOR THE ZAMBIA DHS

Zambia is divided administratively into nine provinces and 57 districts. In preparation for the 1990 census the entire country was demarcated into 4240 Census Supervisory Areas (CSAs) which have been further divided into Standard Enumeration Areas (SEAs) of approximately equal size. To obtain a sampling frame, the CSAs were stratified into urban and rural areas within each province, with the districts ordered geographically within provinces, thus providing further implicit stratification.

The sample was selected in three stages. First, 262 CSAs (149 in urban and 113 in rural areas) were selected with probability proportional to the number of households. Second, one SEA was selected from each sample CSA, again with probability proportional to the number of households. Third, households lists were drawn up and used to select a systematic sample of households to be included in the survey.

Initially, the objective of the ZDHS sample design was to be able to produce demographic estimates at the national level, for urban and rural areas separately, and for larger provinces. Later it was decided that it would be desirable to produce separate estimates for all nine provinces. To do this, additional rural CSAs (and SEAs) were selected in Luapula, North Western and Western provinces and the number of sample households in each rural SEA in these provinces was reduced from 42 to 35 in order to minimize the increase in total sample size (20 households were selected in each urban SEA). As a result of this over-sampling in Luapula, North Western and Western provinces, the ZDHS sample is not self-weighting at the national level.

Source: Gaisie et al., 1993.

# Appendix B

# HOUSEHOLD AND RESPONDENT BACKGROUND CHARACTERISTICS

## 1.1 CHARACTERISTICS OF THE HOUSEHOLD POPULATION

Information on all usual residents and visitors who slept in the household the previous night was collected in the ZDHS. A household is defined as a person living alone or a group of people living together and sharing a common pot of food.

Overall, 84 percent of the households in the ZDHS survey are headed by men and the rest are headed by women. There is residential diversity; 19 percent of rural households are headed by women versus 13 percent of households in urban areas. There are more women-headed households in the Western (33 percent), North Western (22 percent) and Eastern (20 percent) provinces than in the other provinces (Gaise et al., 1993)

Overall average household size in the ZDHS is 5.6 people. Households are slightly larger in urban areas (6.3 people) than in rural areas (5.3 people), and in the Copperbelt (6.5 people) and Lusaka (5.7 people) provinces (Gaise et al., 1993) than in the other provinces.

## 1.2 CHARACTERISTICS OF HOUSEHOLDS WITH CHILDREN UNDER FIVE YEARS OF AGE

### Demographic Factors

A total of 3,551 mothers and 5,389 children under the age of five years are included in the analyses presented in this report. The distribution of the children and their mothers by province and type of area of residence (urban or rural) is shown in Table B.1. About 52 percent of respondents are from rural areas, an

Table B.1 Mothers and children weighed and measured in the Zambia DHS

Percentage of mothers of children under 5 years in the Zambia DHS nutrition sample, and among children the percentage that are male and the percentage that are female, by province and residence, Zambia 1992

| Province and residence | Mothers | | Children | | | |
|---|---|---|---|---|---|---|
| | Percent | Number | Boys | Girls | Total | Number |
| **Province** | | | | | | |
| Central | 9.5 | 337 | 46.8 | 53.2 | 100.0 | 541 |
| Copperbelt | 22.8 | 806 | 47.4 | 52.6 | 100.0 | 1256 |
| Eastern | 10.6 | 374 | 49.0 | 51.0 | 100.0 | 545 |
| Luapula | 6.1 | 217 | 48.7 | 51.3 | 100.0 | 345 |
| Lusaka | 16.4 | 581 | 51.9 | 48.1 | 100.0 | 846 |
| Northern | 9.8 | 346 | 48.9 | 51.1 | 100.0 | 533 |
| North Western | 2.7 | 97 | 49.2 | 50.8 | 100.0 | 149 |
| Southern | 16.6 | 588 | 52.6 | 47.4 | 100.0 | 889 |
| Western | 5.5 | 195 | 53.8 | 46.2 | 100.0 | 277 |
| **Residence** | | | | | | |
| Urban | 47.7 | 1693 | 49.3 | 50.7 | 100.0 | 2551 |
| Rural | 52.3 | 1854 | 50.0 | 50.0 | 100.0 | 2839 |
| Overall | 100.0 | 3551 | 47.3 | 52.7 | 100.0 | 5389 |

PREVIOUS PAGE BLANK

amount slightly higher than the official figure of 42 percent (Central Statistical Office, 1990). Migration is high in Zambia and this is reflected in Table B.2, which shows that 45 percent of the sample have lived in their current place of residence for less than 5 years. Recent migration is higher in the Copperbelt and Southern provinces and lower in the Luapula and North Western provinces than elsewhere.

Table B.2 Duration of residence

Percent distribution of children under 5 years by number of years the household has resided at the current location, according to province and residence, Zambia 1992

| Province and residence | Duration of residence | | | | | Number |
|---|---|---|---|---|---|---|
| | < 5 | 5-9 | 10+ | Always | Total | |
| **Province** | | | | | | |
| Central | 47.6 | 21.6 | 15.7 | 15.0 | 100.0 | 337 |
| Copperbelt | 51.2 | 15.7 | 16.7 | 16.4 | 100.0 | 806 |
| Eastern | 29.8 | 20.4 | 20.1 | 29.6 | 100.0 | 374 |
| Luapula | 34.3 | 12.9 | 8.3 | 44.5 | 100.0 | 217 |
| Lusaka | 43.6 | 16.5 | 23.9 | 16.1 | 100.0 | 581 |
| Northern | 48.7 | 20.5 | 10.6 | 20.2 | 100.0 | 346 |
| North Western | 33.3 | 16.7 | 6.2 | 43.8 | 100.0 | 97 |
| Southern | 52.1 | 20.5 | 18.4 | 9.0 | 100.0 | 588 |
| Western | 39.1 | 15.6 | 28.6 | 16.7 | 100.0 | 195 |
| | | p<0.001 | | | | |
| **Residence** | | | | | | |
| Urban | 49.8 | 15.6 | 19.2 | 15.5 | 100.0 | 1693 |
| Rural | 40.9 | 20.2 | 16.2 | 22.6 | 100.0 | 1854 |
| | | p<0.001 | | | | |
| Overall | 45.2 | 18.0 | 17.6 | 19.2 | 100.0 | 3547 |

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

There are provincial differences in the number of children living at home and the total number of children a mother has (Table B.3). Mothers in the Luapula, Copperbelt, North Western and Southern provinces tend to have more children. Furthermore, mothers in the Luapula and Copperbelt provinces also have more children currently living at home than mothers in the other provinces. Overall, there are no residential differences in the number of children living at home or the total number of children a mother has. (Table B.3). Mothers in the Luapula and Northern provinces have on average 0.8 deceased children, which is higher than that for the other provinces. Rural mothers are more likely to have more deceased children. The number of deceased children in a family is known to be associated with the nutritional risk of surviving siblings.

## Maternal, Social and Economic Factors

The age groups of mothers with children under the age of five years by province and residence is shown in Table B.4. There are no provincial differences in mother's age group but rural mothers tend to be older than urban mothers due to more childbearing at older ages.

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

Mean and standard deviation (SD) for number of children living at home, total number of children, and number of dead children per mother, among children under 5 years, by province and residence, Zambia 1992

| Province and residence | Number of children at home | Total number of children | Number of dead children | |
|---|---|---|---|---|
| | Mean (SD) | Mean (SD) | Mean (SD) | Number |
| **Province** | | | | |
| Central | 2.99 (1.98) | 3.44 (2.46) | 0.35 (0.69) | 210 |
| Copperbelt | 3.21 (2.26) | 3.57 (2.50) | 0.46 (0.79) | 503 |
| Eastern | 2.89 (2.09) | 3.18 (2.31) | 0.75 (1.09) | 223 |
| Luapula | 3.30 (2.0) | 3.72 (2.37) | 0.84 (1.12) | 217 |
| Lusaka | 2.79 (1.97) | 3.11 (2.24) | 0.40 (0.81) | 345 |
| Northern | 3.10 (2.08) | 3.46 (2.50) | 0.84 (1.18) | 198 |
| North Western | 2.80 (1.76) | 3.59 (2.40) | 0.71 (1.03) | 147 |
| Southern | 3.00 (1.96) | 3.55 (2.49) | 0.47 (0.92) | 339 |
| Western | 2.66 (1.62) | 3.29 (2.16) | 0.77 (1.24) | 172 |
| | p<0.01 | p<0.05 | p<0.001 | |
| **Residence** | | | | |
| Urban | 3.00 (2.14) | 3.34 (2.35) | 0.42 (0.78) | 1035 |
| Rural | 3.00 (1.94) | 3.51 (2.43) | 0.70 (1.09) | 1323 |
| | NS | NS | p<0.001 | |
| Overall | 3.00 (2.03) | 3.44 (2.40) | 0.58 (0.98) | 2359 |

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

Table B.4 Mother's age

Percent distribution of mothers of children under 5 years by age group, according to province and residence, Zambia 1992

| Province and residence | Mother's age group (years) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | Total | Number |
| **Province** | | | | | | | | | |
| Central | 12.4 | 28.0 | 24.1 | 17.9 | 9.5 | 5.9 | 2.3 | 100.0 | 338 |
| Copperbelt | 13.0 | 23.9 | 24.0 | 20.7 | 11.6 | 5.2 | 1.6 | 100.0 | 808 |
| Eastern | 15.3 | 26.3 | 19.4 | 18.0 | 9.1 | 9.2 | 2.7 | 100.0 | 376 |
| Luapula | 13.2 | 26.4 | 24.7 | 15.7 | 10.3 | 8.4 | 1.2 | 100.0 | 217 |
| Lusaka | 11.8 | 29.8 | 24.3 | 13.7 | 12.7 | 6.2 | 1.5 | 100.0 | 581 |
| Northern | 13.4 | 27.5 | 22.9 | 12.2 | 12.2 | 8.0 | 3.9 | 100.0 | 346 |
| North Western | 12.9 | 27.7 | 23.5 | 19.5 | 9.3 | 5.0 | 2.1 | 100.0 | 97 |
| Southern | 13.3 | 23.5 | 25.1 | 17.1 | 11.7 | 6.6 | 2.8 | 100.0 | 588 |
| Western | 9.2 | 26.1 | 21.3 | 20.4 | 11.2 | 8.0 | 3.7 | 100.0 | 195 |
| | | | | NS | | | | | |
| **Residence** | | | | | | | | | |
| Urban | 12.6 | 25.4 | 25.5 | 18.6 | 11.6 | 4.9 | 1.3 | 100.0 | 1694 |
| Rural | 13.2 | 26.9 | 21.6 | 15.9 | 10.9 | 8.4 | 3.2 | 100.0 | 1857 |
| | | | | p<0.001 | | | | | |
| Overall | 12.9 | 26.2 | 23.5 | 17.2 | 11.2 | 6.7 | 2.3 | 100.0 | 3545 |

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

Overall, 18 percent of mothers have never been to school, 62 percent have been to primary school and the remainder (21 percent) have attended at least secondary school (Table B.5). More than one in four mothers in the Eastern, Western, and Northern provinces have not been to school. In contrast, about one in three mothers in the Copperbelt and Lusaka provinces have been to at least secondary school. Rural mothers are less likely to have been to school than urban ones. These findings reflect the availability, access to, and use of educational institutions, as well as the cultural attitudes attached to the importance of educating daughters.

Table B.5 Mother's education

Percent distribution of mothers of children under 5 years by level of mother's education, according to province and residence, Zambia 1992

| Province and residence | Mother's education | | | | |
|---|---|---|---|---|---|
| | None | Primary+ | Secondary | Total | Number |
| **Province** | | | | | |
| Central | 15.1 | 64.2 | 20.7 | 100.0 | 338 |
| Copperbelt | 6.6 | 60.8 | 32.6 | 100.0 | 807 |
| Eastern | 36.1 | 57.8 | 6.1 | 100.0 | 376 |
| Luapula | 14.3 | 67.4 | 18.3 | 100.0 | 217 |
| Lusaka | 12.4 | 56.4 | 31.1 | 100.0 | 581 |
| Northern | 29.5 | 60.3 | 10.1 | 100.0 | 346 |
| North Western | 23.3 | 64.5 | 12.1 | 100.0 | 97 |
| Southern | 17.2 | 67.0 | 15.9 | 100.0 | 588 |
| Western | 26.3 | 63.7 | 10.1 | 100.0 | 195 |
| | | p<0.001 | | | |
| **Residence** | | | | | |
| Urban | 6.9 | 58.0 | 35.1 | 100.0 | 1693 |
| Rural | 27.2 | 65.2 | 7.7 | 100.0 | 1857 |
| | | p<0.001 | | | |
| Overall | 17.5 | 61.7 | 20.8 | 100.0 | 3550 |

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

Over one-half of Zambian mothers are engaged in employment in addition to that of being a wife and mother (Table B.6). A higher proportion of the working mothers live in the Northern and Western provinces where they are primarily engaged in agricultural work. Indeed, nearly three-quarters of mothers in the Northern province, and more than one-quarter of mothers in the Central, Eastern, North Western and Western provinces are engaged in agricultural activities, which accounts for the high proportion of working rural women.

Because women tend to work in the agricultural sector, they take their children to work with them. Indeed, according to the ZDHS results nearly two-thirds of the working mothers usually take their youngest child to work with them (Table B.7). This practice is less common in the Copperbelt and Lusaka provinces where mothers tend to have intermediate-type occupations. More rural than urban mothers take their youngest child with them to work. Overall, 48 percent of mothers depend on their older children or husbands for child care, 45 percent depend on relatives or friends and only 8 percent depend on other people (paid or institutional child care) to look after the youngest child (Table B.8). The latter is more common in the Lusaka and North Western provinces and in urban areas where people are better able to afford to pay for childcare.

Table B.6 Mother's occupation

Percent distribution of mothers of children under 5 years by occupation category, according to province and residence, Zambia 1992

| Province and residence | Mother's occupation: Profes-sional | Inter-mediate | Skilled/ unskilled | Agri-culture | House-wife | Total | Number |
|---|---|---|---|---|---|---|---|
| **Province** | | | | | | | |
| Central | 3.6 | 21.3 | 9.5 | 25.8 | 39.8 | 100.0 | 338 |
| Copperbelt | 4.0 | 34.1 | 8.1 | 2.8 | 51.0 | 100.0 | 808 |
| Eastern | 0.9 | 10.2 | 7.6 | 26.0 | 55.2 | 100.0 | 376 |
| Luapula | 3.7 | 23.6 | 10.2 | 3.7 | 58.7 | 100.0 | 217 |
| Lusaka | 3.9 | 36.0 | 7.8 | 0.6 | 51.7 | 100.0 | 581 |
| Northern | 0.9 | 12.3 | 3.8 | 72.5 | 10.4 | 100.0 | 346 |
| North Western | 2.2 | 13.1 | 17.7 | 27.1 | 39.9 | 100.0 | 97 |
| Southern | 2.0 | 23.9 | 7.4 | 9.4 | 57.2 | 100.0 | 588 |
| Western | 1.5 | 15.4 | 16.7 | 39.0 | 27.5 | 100.0 | 195 |
| | | | p<0.001 | | | | |
| **Residence** | | | | | | | |
| Urban | 4.9 | 38.6 | 9.1 | 1.6 | 45.9 | 100.0 | 1688 |
| Rural | 0.9 | 11.9 | 8.0 | 32.4 | 46.8 | 100.0 | 1845 |
| | | | p<0.001 | | | | |
| Overall | 2.8 | 24.6 | 8.5 | 17.7 | 46.4 | 100.0 | 3532 |

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

Table B.7 Presence of child at work

Percent distribution of children of working mothers who are usually, sometimes, or never with the mother at her place of work, by province and residence, Zambia 1992

| Province and residence | Child at mother's workplace: Usually | Some-times | Never | Total | Number |
|---|---|---|---|---|---|
| **Province** | | | | | |
| Central | 61.0 | 17.0 | 22.0 | 100.0 | 194 |
| Copperbelt | 48.2 | 15.7 | 36.0 | 100.0 | 385 |
| Eastern | 66.9 | 21.0 | 12.1 | 100.0 | 164 |
| Luapula | 54.5 | 20.4 | 25.1 | 100.0 | 83 |
| Lusaka | 45.1 | 10.7 | 44.2 | 100.0 | 272 |
| Northern | 56.5 | 30.3 | 13.2 | 100.0 | 308 |
| North Western | 77.0 | 11.0 | 12.0 | 100.0 | 57 |
| Southern | 62.0 | 11.1 | 26.9 | 100.0 | 245 |
| Western | 53.9 | 27.4 | 18.7 | 100.0 | 141 |
| | | p<0.001 | | | |
| **Residence** | | | | | |
| Urban | 47.2 | 13.4 | 39.4 | 100.0 | 885 |
| Rural | 63.0 | 22.9 | 14.1 | 100.0 | 959 |
| | | p<0.001 | | | |
| Overall | 55.4 | 18.3 | 26.2 | 100.0 | 1844 |

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

Table B.8 Usual caretaker of children of working mothers

Percent distribution of child caretakers who are siblings/husband, relative, or other person, by province and residence, Zambia 1992

| Province and residence | Child caretaker: Siblings/ husband | Relatives/ friends | Other | Total | Number |
|---|---|---|---|---|---|
| **Province** | | | | | |
| Central | 39.1 | 49.3 | 11.5 | 100.0 | 77 |
| Copperbelt | 41.2 | 50.3 | 8.6 | 100.0 | 203 |
| Eastern | 62.6 | 33.2 | 4.1 | 100.0 | 53 |
| Luapula | 34.5 | 54.3 | 11.2 | 100.0 | 37 |
| Lusaka | 43.8 | 40.8 | 15.3 | 100.0 | 148 |
| Northern | 52.5 | 47.5 | 0.0 | 100.0 | 135 |
| North Western | 58.0 | 25.6 | 16.4 | 100.0 | 13 |
| Southern | 59.9 | 36.6 | 3.5 | 100.0 | 93 |
| Western | 54.8 | 42.5 | 2.8 | 100.0 | 64 |
| | | p<0.001 | | | |
| **Residence** | | | | | |
| Urban | 41.6 | 46.9 | 11.5 | 100.0 | 470 |
| Rural | 56.2 | 41.5 | 2.3 | 100.0 | 354 |
| | | p<0.001 | | | |
| Overall | 47.9 | 44.6 | 7.6 | 100.0 | 825 |

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

About 90 percent of the mothers interviewed are currently married and 85 percent have a husband living at home (Table B.9). The husbands of the remaining mothers have migrated elsewhere. Mothers in the

Table B.9 Residence of mother's husband

Percent distribution of husbands of mothers of children under 5 years by whether husband resides at home or elsewhere, according to province and residence, Zambia 1992

| Province and residence | Husband's residence: At home | Elsewhere | Mother not married | Total | Number |
|---|---|---|---|---|---|
| **Province** | | | | | |
| Central | 86.1 | 5.5 | 8.4 | 100.0 | 312 |
| Copperbelt | 84.4 | 4.3 | 11.3 | 100.0 | 748 |
| Eastern | 85.3 | 5.5 | 9.2 | 100.0 | 362 |
| Luapula | 80.8 | 5.7 | 13.5 | 100.0 | 210 |
| Lusaka | 88.6 | 1.8 | 9.6 | 100.0 | 518 |
| Northern | 82.9 | 5.0 | 12.1 | 100.0 | 330 |
| North Western | 90.9 | 0.5 | 8.6 | 100.0 | 89 |
| Southern | 83.4 | 5.4 | 11.3 | 100.0 | 537 |
| Western | 75.3 | 2.6 | 22.1 | 100.0 | 173 |
| | | p<0.001 | | | |
| **Residence** | | | | | |
| Urban | 85.1 | 3.8 | 11.2 | 100.0 | 1523 |
| Rural | 83.9 | 4.8 | 11.3 | 100.0 | 1763 |
| | | NS | | | |
| Overall | 84.5 | 4.3 | 11.2 | 100.0 | 3280 |

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

Western province are less likely to be married than those in the other provinces. There is no residential difference in marital status. Fifteen percent of mothers are in a polygamous union (Table B.10). Polygamy is more common in the Southern province and in rural areas.

Table B.10 Mothers' marital union

Percent distribution of mothers of children under 5 years by type of marital union, according to province and residence, Zambia 1992

| Province and residence | Marital union | | | | |
|---|---|---|---|---|---|
| | Polyg-amous | Monog-amous | Mother not married | Total | Number |
| **Province** | | | | | |
| Central | 14.5 | 77.1 | 8.4 | 100.0 | 312 |
| Copperbelt | 5.8 | 82.9 | 11.3 | 100.0 | 747 |
| Eastern | 17.5 | 73.3 | 9.2 | 100.0 | 361 |
| Luapula | 15.2 | 71.3 | 13.5 | 100.0 | 210 |
| Lusaka | 6.7 | 83.7 | 9.6 | 100.0 | 520 |
| Northern | 19.8 | 68.1 | 12.1 | 100.0 | 330 |
| North Western | 13.4 | 77.8 | 8.9 | 100.0 | 86 |
| Southern | 28.5 | 60.2 | 11.3 | 100.0 | 537 |
| Western | 16.4 | 61.5 | 22.1 | 100.0 | 173 |
| | | p<0.001 | | | |
| **Residence** | | | | | |
| Urban | 6.3 | 82.6 | 11.2 | 100.0 | 1522 |
| Rural | 21.9 | 66.9 | 11.3 | 100.0 | 1762 |
| | | p<0.001 | | | |
| Overall | 14.6 | 74.2 | 11.3 | 100.0 | 3278 |

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

Among husbands, less than 10 percent have had no formal education (Table B.11). This is more noticeable in the Eastern and Western provinces and in rural areas, which again reflects the availability, access to, and use of educational institutions. Forty percent of husbands are farmers (Table B.12). Farming is common in all provinces except the Copperbelt and Lusaka. Ninety percent of farmers cultivate their own land rather than rented land (data not shown). Urban men mostly work as skilled and unskilled laborers.

Thirty percent of mothers live in houses where there are no toilet facilities, 44 percent live in houses that have a pit latrine, and 26 percent a flush toilet (Table B.13). Toilet facilities are more available in the Copperbelt, Lusaka, Northern, and North Western provinces than elsewhere. Flush toilets are found mainly in the Copperbelt province and in urban areas. Drinking water is obtained from a pipe by just under one-half of mothers while about 30 percent use well water and 20 percent use open-air sources (Table B.14). Piped water is more available in the Copperbelt and Lusaka provinces, while well water is more available in the Central, Luapula, North Western and Western provinces. Open-air water is an important source of drinking water in the Eastern, Northern and Southern provinces. The majority of women in rural areas are dependent upon wells and open-air sources of water. Despite the widespread use of wells and pipes, UNICEF (1993) estimates that only 60 percent of the population have access to safe water; 76 percent in urban areas and 43 percent in rural areas.

Table B.11 Husband's education

Percent distribution of husbands of mothers of children under 5 years by husband's education, according to province and residence, Zambia 1992

| Province and residence | Husband's education | | | | |
|---|---|---|---|---|---|
| | None | Primary | Second-ary+ | Total | Number |
| **Province** | | | | | |
| Central | 4.9 | 52.2 | 42.8 | 100.0 | 307 |
| Copperbelt | 2.2 | 29.1 | 68.6 | 100.0 | 743 |
| Eastern | 26.0 | 57.4 | 16.6 | 100.0 | 350 |
| Luapula | 7.3 | 50.2 | 42.5 | 100.0 | 205 |
| Lusaka | 4.0 | 38.5 | 57.4 | 100.0 | 515 |
| Northern | 10.1 | 66.3 | 23.6 | 100.0 | 329 |
| North Western | 17.8 | 56.4 | 25.8 | 100.0 | 88 |
| Southern | 9.5 | 56.2 | 34.3 | 100.0 | 535 |
| Western | 22.3 | 55.3 | 22.4 | 100.0 | 164 |
| | | p<0.001 | | | |
| **Residence** | | | | | |
| Urban | 1.7 | 30.8 | 67.4 | 100.0 | 1511 |
| Rural | 15.5 | 62.0 | 22.5 | 100.0 | 1733 |
| | | p<0.001 | | | |
| Overall | 9.1 | 47.5 | 43.4 | 100.0 | 3244 |

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

Table B.12 Husband's occupation

Percent distribution of husbands of mothers of children under 5 years by husband's occupation, according to province and residence, Zambia 1992

| Province and residence | Husband's occupation | | | | | | |
|---|---|---|---|---|---|---|---|
| | Profes-sional | Inter-mediate | Skilled/ unskilled | Agri-culture | Other | Total | Number |
| **Province** | | | | | | | |
| Central | 7.4 | 16.3 | 20.4 | 45.9 | 10.0 | 100.0 | 309 |
| Copperbelt | 10.9 | 27.5 | 42.3 | 4.3 | 15.0 | 100.0 | 745 |
| Eastern | 1.8 | 7.0 | 6.1 | 79.6 | 5.5 | 100.0 | 361 |
| Luapula | 8.3 | 13.4 | 10.6 | 60.3 | 7.4 | 100.0 | 211 |
| Lusaka | 13.2 | 27.8 | 39.0 | 9.4 | 10.7 | 100.0 | 518 |
| Northern | 5.6 | 7.3 | 9.6 | 73.8 | 3.6 | 100.0 | 330 |
| North Western | 9.6 | 14.5 | 13.1 | 46.1 | 16.6 | 100.0 | 88 |
| Southern | 5.3 | 13.1 | 17.6 | 57.0 | 6.9 | 100.0 | 537 |
| Western | 5.1 | 8.9 | 17.4 | 45.9 | 22.7 | 100.0 | 173 |
| | | | p<0.001 | | | | |
| **Residence** | | | | | | | |
| Urban | 13.2 | 28.3 | 40.0 | 4.4 | 14.0 | 100.0 | 1518 |
| Rural | 3.4 | 8.3 | 10.7 | 70.5 | 7.1 | 100.0 | 1761 |
| | | | p<0.001 | | | | |
| Overall | 8.0 | 17.6 | 24.2 | 39.9 | 10.3 | 100.0 | 3279 |

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

Table B.13 Toilet facilities

Percent distribution of households with children under 5 years by availability of toilet facilities, according to province and residence, Zambia 1992

| Province and residence | Type of toilet | | | | Number |
|---|---|---|---|---|---|
| | Flush | Pit | None | Total | |
| **Province** | | | | | |
| Central | 16.1 | 56.9 | 27.0 | 100.0 | 338 |
| Copperbelt | 65.8 | 32.6 | 1.6 | 100.0 | 807 |
| Eastern | 1.4 | 40.6 | 57.9 | 100.0 | 376 |
| Luapula | 13.4 | 59.4 | 27.2 | 100.0 | 217 |
| Lusaka | 35.4 | 57.7 | 6.9 | 100.0 | 580 |
| Northern | 5.3 | 63.8 | 30.8 | 100.0 | 346 |
| North Western | 5.6 | 80.2 | 14.2 | 100.0 | 97 |
| Southern | 12.2 | 23.7 | 64.1 | 100.0 | 583 |
| Western | 0.4 | 29.5 | 70.1 | 100.0 | 195 |
| | | p<0.001 | | | |
| **Residence** | | | | | |
| Urban | 52.5 | 44.5 | 3.0 | 100.0 | 1693 |
| Rural | 1.8 | 44.2 | 54.0 | 100.0 | 1850 |
| | | p<0.001 | | | |
| Overall | 26.0 | 44.3 | 29.7 | 100.0 | 3544 |

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

Table B.14 Source of drinking water

Percent distribution of households with children under 5 years by source of drinking water, according to province and residence, Zambia 1992

| Province and residence | Source of drinking water | | | | | | Number |
|---|---|---|---|---|---|---|---|
| | Private pipe | Public pipe | Well with pump | Well no pump | Open air | Total | |
| **Province** | | | | | | | |
| Central | 15.2 | 22.2 | 47.5 | 9.2 | 5.9 | 100.0 | 338 |
| Copperbelt | 71.1 | 18.4 | 7.3 | 0.3 | 2.9 | 100.0 | 807 |
| Eastern | 0.9 | 11.0 | 44.1 | 0.0 | 44.1 | 100.0 | 376 |
| Luapula | 11.9 | 2.5 | 27.6 | 34.9 | 23.1 | 100.0 | 217 |
| Lusaka | 54.7 | 34.7 | 5.9 | 0.2 | 4.6 | 100.0 | 580 |
| Northern | 7.2 | 4.4 | 13.9 | 31.5 | 43.0 | 100.0 | 346 |
| North Western | 6.7 | 9.0 | 63.9 | 0.8 | 19.6 | 100.0 | 97 |
| Southern | 13.6 | 20.1 | 23.4 | 1.7 | 41.2 | 100.0 | 583 |
| Western | 1.5 | 19.6 | 61.5 | 0.0 | 17.4 | 100.0 | 194 |
| | | | p<0.001 | | | | |
| **Residence** | | | | | | | |
| Urban | 60.5 | 30.4 | 8.3 | 0.5 | 0.3 | 100.0 | 1693 |
| Rural | 3.4 | 7.4 | 38.2 | 12.0 | 39.1 | 100.0 | 1850 |
| | | | p<0.001 | | | | |
| Overall | 30.7 | 18.4 | 23.9 | 6.6 | 20.6 | 100.0 | 3543 |

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

Nearly one-half of Zambian mothers live in a house with an earth/sand floor. Indeed, only mothers in the Copperbelt and Lusaka provinces and in urban areas are likely to have cement or tiled floors (Table B.15).

Table B.15 Type of floor

Percent distribution of households with children under 5 years by type of floor material, according to province and residence, Zambia 1992

| Province and residence | Floor material | | | | |
|---|---|---|---|---|---|
| | Earth/ Sand | Cement | Tiles | Total | Number |
| **Province** | | | | | |
| Central | 61.3 | 36.5 | 2.3 | 100.0 | 338 |
| Copperbelt | 7.5 | 87.3 | 5.3 | 100.0 | 805 |
| Eastern | 83.3 | 16.7 | 0.0 | 100.0 | 374 |
| Luapula | 72.6 | 26.4 | 1.0 | 100.0 | 217 |
| Lusaka | 10.8 | 80.6 | 8.6 | 100.0 | 580 |
| Northern | 83.2 | 16.5 | 0.3 | 100.0 | 346 |
| North Western | 78.4 | 21.6 | 0.0 | 100.0 | 97 |
| Southern | 61.6 | 37.9 | 0.6 | 100.0 | 583 |
| Western | 89.8 | 9.1 | 1.1 | 100.0 | 195 |
| | | p<0.001 | | | |
| **Residence** | | | | | |
| Urban | 9.9 | 84.2 | 5.9 | 100.0 | 1690 |
| Rural | 82.8 | 16.7 | 0.5 | 100.0 | 1850 |
| | | p<0.001 | | | |
| Overall | 48.0 | 48.9 | 3.1 | 100.0 | 3540 |

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

Fifty-five percent of Zambian mothers listen to a radio at least once a week but less than 20 percent watch TV weekly (Table B.16). Access to media, especially a radio, is widespread only in the Copperbelt and Lusaka provinces and in urban areas.

Table B.17 shows that about three-quarters of the mothers belong to households that do not own any means of transport. Bicycles are the most common means of transport. More households in the North Western, Central, Eastern, and Northern provinces and in rural areas own bicycles and more households in Lusaka province own cars/motorbikes than elsewhere.

A possession score was drawn up based upon the availability of electricity and ownership of a radio, TV, and/or refrigerator. This score is used as a scale for relative wealth, with zero being the poorest and four being the wealthiest. Table B.18 shows that one-half of mothers live in households which do not have access to any of these amenities and less than one-third have access to only one. Mothers in the Northern and Western provinces and in rural areas tend to have fewer amenities than mothers in the other provinces.

Table B.16 Exposure to radio and television

Percent distribution of mothers of children under 5 years who listen to the radio and watch television at least once a week, by province and residence, Zambia 1992

| Province and residence | Listen to radio weekly | Watch TV weekly | Number |
|---|---|---|---|
| **Province** | | | |
| Central | 55.2 | 11.6 | 338 |
| Copperbelt | 74.0 | 33.7 | 808 |
| Eastern | 36.5 | 4.1 | 376 |
| Luapula | 43.6 | 6.0 | 217 |
| Lusaka | 80.4 | 34.9 | 581 |
| Northern | 29.6 | 3.5 | 346 |
| North Western | 54.9 | 10.9 | 97 |
| Southern | 40.7 | 7.8 | 588 |
| Western | 39.2 | 4.8 | 195 |
| | p<0.001 | p<0.001 | |
| **Residence** | | | |
| Urban | 76.8 | 33.1 | 1694 |
| Rural | 35.4 | 3.2 | 1857 |
| | p<0.001 | p<0.001 | |
| Overall | 55.1 | 17.5 | 3545 |

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

Table B.17 Transport owned

Percent distribution of households with children under 5 years by type of transport owned, according to province and residence, Zambia 1992

| Province and residence | Type of transport owned | | | | |
|---|---|---|---|---|---|
| | None | Bicycle | Car/ motorbike | Total | Number |
| **Province** | | | | | |
| Central | 62.7 | 31.8 | 5.5 | 100.0 | 337 |
| Copperbelt | 78.2 | 14.5 | 7.3 | 100.0 | 806 |
| Eastern | 68.2 | 29.5 | 2.3 | 100.0 | 376 |
| Luapula | 82.5 | 14.7 | 2.8 | 100.0 | 217 |
| Lusaka | 76.8 | 12.6 | 10.7 | 100.0 | 581 |
| Northern | 70.3 | 27.5 | 2.2 | 100.0 | 346 |
| North Western | 60.1 | 37.7 | 2.2 | 100.0 | 97 |
| Southern | 74.8 | 22.2 | 3.0 | 100.0 | 583 |
| Western | 88.2 | 11.3 | 0.6 | 100.0 | 195 |
| | p<0.001 | | | | |
| **Residence** | | | | | |
| Urban | 76.3 | 15.0 | 8.7 | 100.0 | 1693 |
| Rural | 72.6 | 25.5 | 1.9 | 100.0 | 1849 |
| | p<0.001 | | | | |
| Overall | 74.4 | 20.5 | 5.1 | 100.0 | 3542 |

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

Table B.18 Possession score

Percent distribution of households with children under 5 years by possession score, according to province and residence, Zambia 1992

| Province and residence | Possession score[1] | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | Total | Number |
| **Province** | | | | | | | |
| Central | 48.3 | 35.5 | 9.7 | 4.2 | 2.3 | 100.0 | 338 |
| Copperbelt | 30.0 | 30.4 | 21.7 | 7.4 | 10.5 | 100.0 | 808 |
| Eastern | 67.7 | 30.0 | 1.2 | 0.9 | 0.3 | 100.0 | 376 |
| Luapula | 69.6 | 20.5 | 4.9 | 2.0 | 3.0 | 100.0 | 217 |
| Lusaka | 26.5 | 40.3 | 12.5 | 7.3 | 13.4 | 100.0 | 581 |
| Northern | 76.1 | 20.7 | 2.2 | 0.9 | 0.0 | 100.0 | 346 |
| North Western | 66.1 | 27.2 | 2.2 | 1.1 | 3.4 | 100.0 | 97 |
| Southern | 58.6 | 30.6 | 8.4 | 1.7 | 0.7 | 100.0 | 588 |
| Western | 77.1 | 21.7 | 1.1 | 0.0 | 0.0 | 100.0 | 195 |
| | | | p<0.001 | | | | |
| **Residence** | | | | | | | |
| Urban | 28.4 | 34.9 | 18.3 | 7.7 | 10.7 | 100.0 | 1694 |
| Rural | 70.5 | 26.3 | 2.5 | 0.4 | 0.2 | 100.0 | 1857 |
| | | | p<0.001 | | | | |
| Overall | 50.4 | 30.4 | 10.1 | 3.9 | 5.2 | 100.0 | 3551 |

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

[1] Possession score: Score 1 for availability and/or ownership of electricity or a radio, refrigerator, or television.

## Antenatal Care

About 90 percent of mothers with a child under the age of 5 years had consulted a nurse/midwife or doctor for antenatal care, and the remainder has either had no antenatal care or were seen by an untrained person, during the pregnancy of their youngest child (Table B.19). However, more than one out of five mothers in the Northern province and one out of ten mothers in rural areas did not go for antenatal care.

Table B.19 Antenatal care provider

Percent distribution of mothers of children under 5 years, by type of antenatal care provider, according to province and residence, Zambia 1992

| Province and residence | Antenatal care provider | | | | | | Number |
|---|---|---|---|---|---|---|---|
| | Doctor | Nurse/ midwife | Clinical officer | TBA/ other | No one | Total | |
| **Province** | | | | | | | |
| Central | 9.4 | 77.5 | 3.6 | 0.0 | 9.5 | 100.0 | 338 |
| Copperbelt | 8.6 | 89.9 | 0.0 | 0.0 | 1.5 | 100.0 | 808 |
| Eastern | 4.4 | 87.9 | 0.3 | 2.1 | 5.3 | 100.0 | 376 |
| Luapula | 1.6 | 78.6 | 9.4 | 3.0 | 7.3 | 100.0 | 217 |
| Lusaka | 6.0 | 92.9 | 0.2 | 0.0 | 0.9 | 100.0 | 581 |
| Northern | 1.9 | 56.7 | 16.4 | 2.2 | 22.8 | 100.0 | 346 |
| North Western | 4.6 | 72.2 | 12.9 | 0.8 | 9.5 | 100.0 | 97 |
| Southern | 2.2 | 92.1 | 2.1 | 0.4 | 3.2 | 100.0 | 587 |
| Western | 1.1 | 71.3 | 9.1 | 9.6 | 9.1 | 100.0 | 195 |
| | | | a | | | | |
| **Residence** | | | | | | | |
| Urban | 7.7 | 90.9 | 0.2 | 0.0 | 1.2 | 100.0 | 1694 |
| Rural | 2.8 | 77.5 | 7.1 | 2.4 | 10.3 | 100.0 | 1856 |
| | | | $p<0.001$ | | | | |
| Overall | 5.1 | 83.9 | 3.8 | 1.2 | 5.9 | 100.0 | 3544 |

Note: Levels of significance determined using Chi-square test.
a = Cells too small for valid Chi-square test.
TBA = trained birth attendant

# Appendix C

## ANTHROPOMETRIC DATA VERIFICATION

Of the 5,543 children under the age of five years who took part in the survey, 93.8 percent were weighed and measured. Among those for whom chronic and/or acute nutritional status could not be ascertained (518 children), 65.6 percent were not weighed and measured, 29.8 percent did not have the month of birth, and a further 4.6 percent had invalid measurements, i.e., data were classified as invalid, where at least one of the anthropometric measurements (age, weight or height) was highly unlikely given the other two measurements. The invalid measurements were defined as Z-scores for height-for-age and weight-for-age below -6 standard deviations and weight-for-height below -4 standard deviations or any of the indices above 6 standard deviations.

The most frequently cited reason for not weighing and measuring a child included: the child was away at the time of the interview (69.7 percent), missing information (10.7 percent), the child refused (6.7 percent), other reasons (6.4 percent), the child was sick (3.4 percent), and the mother refused (3.1 percent).

Children for whom there were no weight and/or height data tended to be over 30 months of age, with most over 48 months of age, and live in the Eastern and Central provinces and, to a lesser extent, the Southern province. Invalid data tended to be for infants under 6 months; taking accurate anthropometric measurements on this age group is much more difficult than for older infants and children. Few children had incomplete ages.

Z-scores were imputed for the children with invalid or missing Z-scores in order to determine whether the missing and outlying data in any way biased the nutrition results. This was done by assigning the Z-scores for the previous child in the data set who was born in the same year and whose mother had attended the same level of school. The distribution of the imputed Z-scores, compared with the valid Z-scores, show that 56 versus 57, 72 versus 70, and 82 versus 83 percent of the imputed Z-scores for ht/age, wt/age and wt/ht, respectively, fell in the normal and mildly undernourished categories and among children born in 1988 or earlier, i.e., older children (Table C.1). In other words it would appear that the children for whom no data were available tended to be the older, chronically undernourished children. There was no evidence of bias by sex in the missing or invalid data.

A comparison was made between the data set used to calculate the prevalences of undernutrition and the data set with the imputed Z-scores for weight-for age, height-for-age, and weight-for-height. The results showed that the data set used in the analyses presented are probably a true reflection of nutritional status (Table C.2). However, it should be borne in mind that more data were missing (for undernourished children) in the Eastern province where more chronic undernutrition is found.

There was evidence of digit preference in the height and weight measurements but not for the aging of children (Table C.3). Digit preference was more prominent with height than with weight measurements. Preferences were for terminal digits ending in 0, 5 and 2. It is not possible to comment on whether the tendency was to round upwards or to round downwards. These findings of digit preference should not affect the calculated prevalences of undernutrition. They will, however, reduce the probability of finding significant associations between undernutrition and explanatory variables.

Table C.1 Imputed and valid Z-scores

Percent distribution of children age 1 to 59 months 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, Zambia 1992

| | Height-for-age | | Weight-for-age | | Weight-for-height | |
|---|---|---|---|---|---|---|
| Characteristic | Imputed | Valid | Imputed | Valid | Imputed | Valid |
| **Nutritional status** | | | | | | |
| Low outlier | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Severe undernutrition | 14.8 | 15.9 | 3.5 | 6.3 | 1.0 | 1.1 |
| Moderate undernutrition | 26.3 | 24.9 | 18.1 | 19.7 | 1.6 | 4.0 |
| Mild undernutrition | 28.6 | 31.2 | 33.5 | 33.8 | 17.9 | 17.2 |
| Normal nutrition | 26.9 | 25.3 | 38.7 | 35.9 | 64.2 | 65.5 |
| Mild overnutrition | 1.9 | 1.8 | 3.8 | 3.1 | 10.1 | 9.5 |
| Moderate overnutrition | 0.0 | 0.5 | 0.2 | 0.7 | 2.6 | 1.8 |
| Severe overnutrition | 0.4 | 0.5 | 1.2 | 0.5 | 1.8 | 1.0 |
| High outlier | 0.4 | 0.0 | 0.4 | 0.0 | 0.2 | 0.0 |
| Missing data | 0.8 | - | 0.8 | - | 0.6 | - |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| **Year of birth** | | | | | | |
| 1987 | 21.9 | 12.2 | 21.9 | 12.2 | 22.9 | 12.2 |
| 1988 | 21.5 | 16.5 | 21.5 | 16.5 | 21.5 | 16.5 |
| 1989 | 19.4 | 20.0 | 19.4 | 20.0 | 18.9 | 20.0 |
| 1990 | 14.0 | 21.2 | 13.8 | 21.2 | 12.9 | 21.3 |
| 1991 | 11.9 | 25.3 | 11.9 | 25.3 | 12.3 | 25.2 |
| 1992 | 11.1 | 4.8 | 11.2 | 4.8 | 11.5 | 4.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| **Sex of child** | | | | | | |
| Male | 50.9 | 49.5 | 51.0 | 49.5 | 49.2 | 49.5 |
| Female | 49.1 | 50.5 | 49.0 | 50.5 | 50.8 | 50.5 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Number | 517 | 5022 | 516 | 5023 | 494 | 5046 |

Table C.2 Verification of anthropometric data

Percentage of children under 5 years by nutritional status, according to imputed and non-imputed anthropometric data and the difference between imputed and non-imputed values, Zambia 1992

| Nutritional status | Imputed values | | Difference |
|---|---|---|---|
| | Yes | No | |
| **Stunted** | 40.8 | 40.8 | 0.0 |
| Number | 5539 | 5022 | |
| **Underweight** | 25.6 | 26.0 | -0.4 |
| Number | 5539 | 5023 | |
| **Wasted** | 4.9 | 5.1 | -0.2 |
| Number | 5540 | 5046 | |

Table C.3 Digit preference in anthropometric data

Percentage of height, weight, and age data falling as specific integers, Zambia 1992

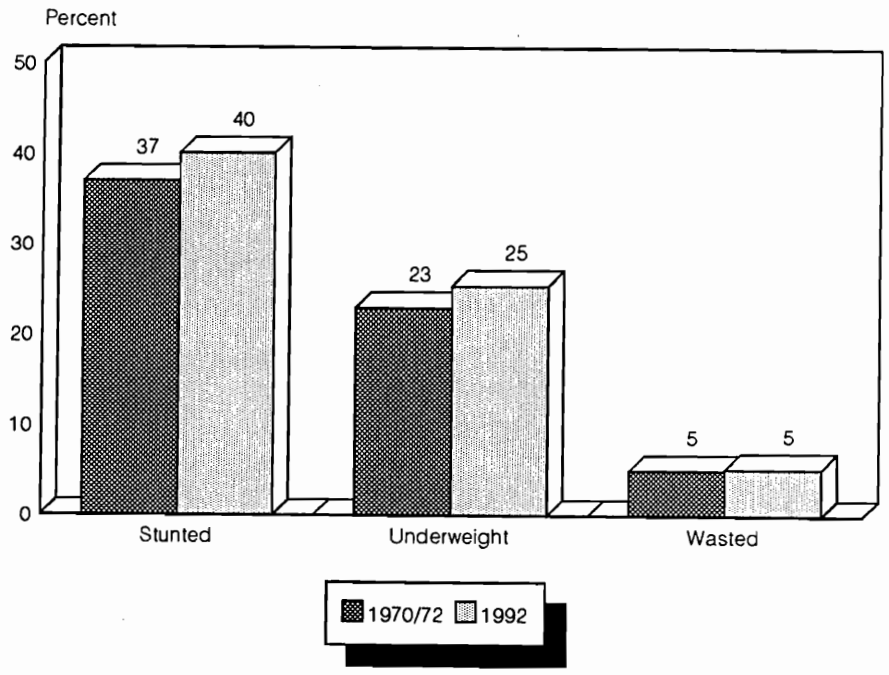
| Integers/age | Height | Weight |
|---|---|---|
| **Decimal integer**[1] | | |
| 0 | 22.6 | 13.6 |
| 1 | 7.1 | 8.9 |
| 2 | 11.0 | 11.1 |
| 3 | 9.0 | 9.4 |
| 4 | 8.0 | 9.8 |
| 5 | 17.5 | 11.0 |
| 6 | 7.0 | 10.8 |
| 7 | 6.6 | 8.8 |
| 8 | 6.3 | 9.9 |
| 9 | 4.8 | 6.7 |
| Total | 100.0 | 100.0 |
| Number | 5216 | 5413 |
| | Observed | Expected |
| **Age** | | |
| Complete years | 7.4 | 8.3 |
| Half years | 8.6 | 8.3 |
| Quarter years | 8.2 | 8.3 |
| Three-quarter years | 8.0 | 8.3 |
| Others | 67.9 | 66.7 |
| Total | 100.0 | 100.0 |
| Number | 5519 | |

[1]Expect 10 percent in each category.

# Appendix D

## DIFFERENCES IN PREVALENCE OF UNDERNUTRITION 1970/72 AND 1992

Figure D
Undernutrition among Zambian children: 1970/72 and 1992




PREVIOUS PAGE BLANK

# Appendix E

# FEEDING PRACTISES BY CHILD'S AGE

Table E.1 Undernutrition by region and age group

Percentage of children age 1 to 59 months who are undernourished, by gender, residence, and age group, Zambia 1992

| Age group (months) | Undernutrition | | |
|---|---|---|---|
| | Stunted | Underweight | Wasted |
| **Zambia** | | | |
| 1-5 | 9.8 | 3.8 | 2.0 |
| 6-11 | 22.1 | 18.5 | 5.7 |
| 12-17 | 40.6 | 37.7 | 10.4 |
| 18-23 | 55.9 | 34.0 | 9.5 |
| 24-35 | 49.4 | 34.4 | 4.8 |
| 36-47 | 49.7 | 24.7 | 2.4 |
| 48-59 | 42.7 | 20.8 | 4.0 |
| Number | 4865 | 4866 | 4886 |
| **Boys** | | | |
| 1-5 | 9.5 | 4.3 | 1.2 |
| 6-11 | 25.1 | 18.6 | 5.3 |
| 12-17 | 43.0 | 40.1 | 11.3 |
| 18-23 | 54.2 | 35.5 | 10.0 |
| 24-35 | 50.5 | 34.8 | 4.4 |
| 36-47 | 50.3 | 22.3 | 1.8 |
| 48-59 | 46.8 | 22.1 | 3.7 |
| Number | 2409 | 2409 | 2422 |
| **Girls** | | | |
| 1-5 | 10.2 | 3.4 | 2.7 |
| 6-11 | 18.9 | 18.4 | 6.1 |
| 12-17 | 38.1 | 35.2 | 9.4 |
| 18-23 | 57.7 | 32.5 | 9.1 |
| 24-35 | 48.4 | 34.0 | 5.3 |
| 36-47 | 49.2 | 27.0 | 2.9 |
| 48-59 | 38.8 | 19.7 | 4.2 |
| Number | 2455 | 2457 | 2464 |
| **Urban** | | | |
| 1-5 | 4.7 | 2.0 | 2.0 |
| 6-11 | 15.5 | 14.4 | 5.9 |
| 12-17 | 32.6 | 31.6 | 10.6 |
| 18-23 | 47.7 | 26.3 | 8.8 |
| 24-35 | 43.7 | 29.9 | 5.5 |
| 36-47 | 43.1 | 21.3 | 2.4 |
| 48-59 | 35.3 | 18.1 | 4.1 |
| Number | 2305 | 2305 | 2313 |
| **Rural** | | | |
| 1-5 | 14.9 | 5.7 | 2.0 |
| 6-11 | 28.0 | 22.3 | 5.5 |
| 12-17 | 47.6 | 43.0 | 10.1 |
| 18-23 | 63.0 | 40.5 | 10.2 |
| 24-35 | 54.8 | 38.5 | 4.3 |
| 36-47 | 54.7 | 27.4 | 2.3 |
| 48-59 | 50.3 | 23.7 | 3.8 |
| Number | 2556 | 2557 | 2570 |



Previous Page Blank

Table E.2 Undernutrition by province and age group

Percentage of children age 1 to 59 months who are undernourished, by province and age group, Zambia 1992

| Age group (months) | Undernutrition | | |
|---|---|---|---|
| | Stunted | Underweight | Wasted |
| **Central** | | | |
| 1-5 | 12.8 | 4.3 | 2.1 |
| 6-11 | 23.4 | 13.3 | 3.3 |
| 12-17 | 28.3 | 26.9 | 4.5 |
| 18-23 | 55.6 | 22.3 | 8.9 |
| 24-35 | 54.8 | 33.4 | 3.6 |
| 36-47 | 45.7 | 24.2 | 2.5 |
| 48-59 | 39.7 | 19.2 | 1.4 |
| Number | 477 | 477 | 477 |
| **Copperbelt** | | | |
| 1-5 | 5.2 | 1.7 | 4.4 |
| 6-11 | 16.3 | 11.6 | 3.9 |
| 12-17 | 35.6 | 34.0 | 7.8 |
| 18-23 | 53.7 | 40.3 | 13.4 |
| 24-35 | 45.2 | 31.7 | 5.0 |
| 36-47 | 39.7 | 22.6 | 3.8 |
| 48-59 | 32.3 | 14.8 | 2.2 |
| Number | 1143 | 1144 | 1150 |
| **Eastern** | | | |
| 1-5 | 17.4 | 1.9 | 0.0 |
| 6-11 | 32.3 | 17.8 | 4.8 |
| 12-17 | 48.0 | 49.9 | 10.3 |
| 18-23 | 59.1 | 35.9 | 12.5 |
| 24-35 | 58.6 | 35.1 | 1.1 |
| 36-47 | 58.3 | 19.0 | 0.0 |
| 48-59 | 53.5 | 15.5 | 0.0 |
| Number | 479 | 479 | 481 |
| **Luapula** | | | |
| 1-5 | 9.4 | 3.1 | 0.0 |
| 6-11 | 31.8 | 35.9 | 9.5 |
| 12-17 | 59.7 | 47.3 | 11.2 |
| 18-23 | 77.0 | 59.9 | 10.7 |
| 24-35 | 61.9 | 48.7 | 4.7 |
| 36-47 | 73.8 | 39.7 | 5.4 |
| 48-59 | 64.4 | 43.3 | 1.6 |
| Number | 310 | 310 | 311 |
| **Lusaka** | | | |
| 1-5 | 5.0 | 6.3 | 3.8 |
| 6-11 | 11.9 | 17.5 | 12.0 |
| 12-17 | 32.9 | 30.2 | 17.6 |
| 18-23 | 44.2 | 16.3 | 4.4 |
| 24-35 | 41.2 | 35.5 | 9.5 |
| 36-47 | 44.0 | 21.0 | 0.9 |
| 48-59 | 40.7 | 24.2 | 11.5 |
| Number | 765 | 765 | 767 |

Table E.2 Undernutrition by province and age group—*Continued*

| Age group (months) | Undernutrition | | |
|---|---|---|---|
| | Stunted | Underweight | Wasted |
| **Northern** | | | |
| 1-5 | 16.4 | 9.1 | 1.8 |
| 6-11 | 38.1 | 32.4 | 5.7 |
| 12-17 | 64.0 | 51.1 | 18.7 |
| 18-23 | 67.6 | 42.0 | 13.7 |
| 24-35 | 70.6 | 48.8 | 6.4 |
| 36-47 | 67.7 | 35.4 | 3.1 |
| 48-59 | 62.1 | 31.1 | 5.7 |
| Number | 490 | 490 | 492 |
| **North Western** | | | |
| 1-5 | 10.2 | 2.2 | 0.0 |
| 6-11 | 21.8 | 27.3 | 2.7 |
| 12-17 | 48.1 | 48.8 | 6.8 |
| 18-23 | 52.2 | 28.8 | 17.4 |
| 24-35 | 49.7 | 26.2 | 1.6 |
| 36-47 | 59.6 | 30.7 | 0.0 |
| 48-59 | 48.4 | 21.5 | 1.8 |
| Number | 131 | 131 | 132 |
| **Southern** | | | |
| 1-5 | 9.4 | 2.7 | 0.0 |
| 6-11 | 23.4 | 15.6 | 1.3 |
| 12-17 | 35.1 | 32.5 | 8.8 |
| 18-23 | 55.2 | 32.1 | 5.4 |
| 24-35 | 43.3 | 26.6 | 1.8 |
| 36-47 | 35.8 | 20.0 | 2.5 |
| 48-59 | 33.0 | 18.2 | 4.1 |
| Number | 806 | 806 | 812 |
| **Western** | | | |
| 1-5 | 12.0 | 2.4 | 0.0 |
| 6-11 | 19.9 | 26.6 | 6.6 |
| 12-17 | 39.8 | 44.9 | 2.6 |
| 18-23 | 47.3 | 31.2 | 5.4 |
| 24-35 | 44.2 | 35.2 | 6.2 |
| 36-47 | 57.8 | 22.2 | 0.0 |
| 48-59 | 55.0 | 18.4 | 3.0 |
| Number | 253 | 253 | 254 |

# Appendix F

## LOGISTIC REGRESSION MODELS

Logistic regression analysis, as opposed to multiple regression analysis, is used when the dependent (or outcome variable) has only two values, in other words an event can either occur or not occur. In this document, logistic regression models have been developed to explain (or predict) two outcomes, namely diarrhoea and nutritional status among Zambian children. These models estimate the probability that an event occurs; in this case having a recent history of diarrhoea and being stunted, underweight, or wasted.

In each model the value of one of the categories listed under the variable heading is a reference category against which all other values are compared. For each variable, the category in the bivariate analysis most positively associated with the "outcome variable" has generally been used as the reference category. By default, values for these reference categories are given a regression estimate of 1.00. Regression estimates greater than 1 indicate that the odds for the "outcome variable" for the category in question are greater than for the reference category. Conversely, regression estimates of less than 1 indicate that the odds for the "outcome variable" for the category in question is less than that for the reference category. In the results of the logistic regressions, the ratio of the odds have been transformed into the ratios of probabilities (relative risks) for ease of understanding.

In Table 4.7, for example, the age group 1 to 10 months is the reference category for the variable "age of infant" and has a numerical value of 1.00. The relative risk for infants age 11 to 18 months of having diarrhoea is 64 percent greater, which is significantly different from that of infants age 1 to 10 months. At the same time, the relative risk for infants age 19 to 24 months of having diarrhoea is 34 percent greater, which, in turn, is significantly different from that of infants age 1 to 10 months. Similarly, children who receive liquids in addition to breast milk are 44 percent more likely to have diarrhoea than infants who are exclusively/fully breastfed but this difference is not statistically significant. On the other hand, children who receive complementary solids and children who are fully weaned are 70 and 75 percent, respectively, more likely to have diarrhoea, and these values are significantly higher than the risk of having diarrhoea if the child is exclusively/fully breastfed.

Table F.1 Feeding practices by age

Percent distribution of children under 24 months by feeding practices, according to age group, Zambia 1992

| | Breastfed and: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Age (months) | Nothing | Water | Other liquids | Milk | Solids | Milk and solids | Fully weaned | Total | Number |
| 0-1 | 15.3 | 69.1 | 6.8 | 2.3 | 4.7 | 0.0 | 1.7 | 100.0 | 186 |
| 2-3 | 11.3 | 39.3 | 7.6 | 2.3 | 33.9 | 2.2 | 3.4 | 100.0 | 245 |
| 4-5 | 2.9 | 13.1 | 7.3 | 4.2 | 64.6 | 6.9 | 1.1 | 100.0 | 231 |
| 6-7 | 0.7 | 7.0 | 3.6 | 1.1 | 74.3 | 9.6 | 3.7 | 100.0 | 253 |
| 8-9 | 0.0 | 6.2 | 2.7 | 0.9 | 76.1 | 12.5 | 1.6 | 100.0 | 204 |
| 10-11 | 0.0 | 3.7 | 3.2 | 0.0 | 79.8 | 10.8 | 2.5 | 100.0 | 194 |
| 12-13 | 0.0 | 4.5 | 2.5 | 0.0 | 77.9 | 12.5 | 2.7 | 100.0 | 190 |
| 14-15 | 0.0 | 2.9 | 2.7 | 0.5 | 65.5 | 11.1 | 17.4 | 100.0 | 206 |
| 16-17 | 0.0 | 3.8 | 2.0 | 0.0 | 67.2 | 7.7 | 19.3 | 100.0 | 174 |
| 18-19 | 0.0 | 0.4 | 0.4 | 1.3 | 47.1 | 6.0 | 44.8 | 100.0 | 187 |
| 20-21 | 0.0 | 0.8 | 1.3 | 0.0 | 35.4 | 3.2 | 59.3 | 100.0 | 194 |
| 22-23 | 0.0 | 0.6 | 0.6 | 0.0 | 21.1 | 3.4 | 74.2 | 100.0 | 171 |