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

Findings from the 1994 Zimbabwe Demographic and Health Survey

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CONTENTS

		Page
Tables		v
Figures		iv
Contributors		xi
Executive Summary		xiii
Map of Zimbabwe		xvi
Chapter 1	Introduction	1
1.1	Geography and Population	1
1.2	Climate and Economy	1
1.3	Food Production	3
1.4	Production of Staple	4
1.5	Livestock Preparation	4
1.6	Food Imports	4
1.7	Food Marketing	4
1.8	Diet	5
1.9	National Food and Nutrition Policy	6
1.10	Data Source and Type of Information Collected	9
Chapter 2	Nutritional Status of Infants and Children	11
2.1	Effects of Malnutrition	11
2.2	Basic Indicators of Nutritional Status	13
2.3	Characteristics of Delivery	14
2.4	Prevalence of Malnutrition	15
2.5	Geographic Variations	15
2.6	Changes in Malnutrition since 1988	18
2.7	Age-specific Patterns of Malnutrition	19
2.8	Malnutrition among Children Age 3 to 35 Months in Zimbabwe	20
Chapter 3	Infant and Child Feeding Practices	23
3.1	Optimal Infant and Child Feeding Practices	23
3.2	Initiation of Breastfeeding	24
3.3	Frequent, On-demand Feeding	26
3.4	Exclusive Breastfeeding	26
3.5	Introduction of Complementary Foods	27
3.6	Types of Supplemental Foods	30
3.7	Bottle Use	31
3.8	Breastfeeding during Illness and Recovery	33
3.9	Duration of Breastfeeding	33
3.10	Reasons for Weaning	33
3.11	Summary and Recommendations	35

Chapter 4 Morbidity and Mortality 37

4.1 Infant and Under-five Mortality 37
4.2 Changes in Mortality 38
4.3 Contribution of Malnutrition to Under-five Mortality 39
4.4 Child Mortality Compared with Other Sub-Saharan Countries 39
4.5 Age Specific Patterns of Morbidity 41
4.6 Morbidity and Treatment 44
4.7 Factors Associated with Diarrhoea 47
4.8 Summary and Recommendations 48

Chapter 5 Factors Associated with Malnutrition 51

5.1 Biological and Health Characteristics of Stunting 51
5.2 Biological and Health Characteristics of Wasting 52
5.3 Socio-economic and Demographic Characteristics of Stunting 52
5.4 Socio-economic and Demographic Characteristics of Wasting 55
5.5 Multivariate Regression Analysis 55
5.6 Risk Factors for Stunting 56
5.7 Risk Factors for Wasting 57
5.8 Summary and Recommendations 58

Chapter 6 Nutritional Status of Women 59

6.1 Background 59
6.2 Data Collected 60
6.3 Indicators of Maternal Nutritional Status 60
6.4 Height and Weight 61
6.5 Body Mass Index 62
6.6 Maternal Chronic Energy Deficiency 62
6.7 High Body Mass 64
6.8 Summary and Recommendations 65

References 67

Appendix A Sample Design 71
Appendix B Household and Respondent Background Characteristics 73
Appendix C Anthropometric Data Verification 93
Appendix D Undernutrition Among Children 6 to 35 Months by Province and Residence, 1988/89 and 1994 97
Appendix E Provincial, Residential, and Gender Differences in Prevalence of Undernutrition by Child's Age 101
Appendix F Feeding Practices by Age 105
Appendix G Logistic Regression Models 107
Appendix H List of Country Nutrition Reports and Nutrition Chartbooks Produced under the Africa Regional DHS Nutrition and Family Health Analytical Initiative 109

3

TABLES

		Page
Table 1.1	Total Value of Crop Production	3
Table 1.2	Livestock Number by Sector	5
Table 1.3	Maize Production and Sales	6
Table 1.4	Wheat Purchases and Sales	6
Table 1.5	Most Frequently Consumed Food Items	7
Table 2.1	Birth Weight and Size at Birth for Children under Three Years	14
Table 2.2	Prevalence of Caesarean Section	15
Table 2.3	Moderate and Sever Stunting and Wasting, by Province and Residence	16
Table 3.1	Initial Breastfeeding	25
Table 3.2	Breastfeeding Status	27
Table 3.3	Types of Foods Received by Children in Preceding 24 Hours	30
Table 3.4	Prevalence and Estimates of Net Relative Risk for Bottle Use	31
Table 3.5	Median Duration of Breastfeeding	33
Table 3.6	Reason for Weaning Last-born Child	34
Table 4.1	Infant and Under-five Mortality Rates	38
Table 4.2	Prevalence and Treatment of Diarrhoea, Fever and Cough	41
Table 4.3	Source for Treatment of Diarrhoea	44
Table 4.4	Source for Treatment of Fever and Cough	45
Table 4.5	Use of Oral Rehydration Therapy for Treatment of Diarrhoea	46
Table 4.6	Knowledge of Diarrhoea Care	47
Table 4.7	Changes in Feeding Practice among Children with Diarrhoea	48
Table 4.8	Prevalence and Estimates of Net Relative Risk of Diarrhoea among Children under Three Years	49
Table 5.1	Stunting and Wasting by Biological Characteristics	52

4

Table 5.2 Stunting and Wasting by Socio-economic Characteristics 53

Table 5.3 Estimated Net Relative Risk of Stunting and Wasting 56

Table 6.1 Recommended Weight Gain Ranges for Pregnant Women 59

Table 6.2 Distribution of Mother's Ages 60

Table 6.3 Nutritional Status of Mothers 60

Table 6.4 Distribution of Mother's Height, Weight and BMI 61

Table 6.5 Prevalence and Estimated Net Relative Risk of Low Body Mass and High Body Mass among Nonpregnant Mothers 63

Table B.1 Anthropometric Measurment of Children 76

Table B.2 Mean Number of Living and Dead Children 77

Table B.3 Mother's Age 78

Table B.4 Mother's Education 79

Table B.5 Mother's Occupation 80

Table B.6 Usual Caretaker of Children of Working Mothers 81

Table B.7 Residence of Mother's Husband 82

Table B.8 Mother's Marital Status 83

Table B.9 Husband's Education 84

Table B.10 Husband's Occupation 85

Table B.11 Toilet Facilities 86

Table B.12 Source of Drinking Water 87

Table B.13 Type of Floor 88

Table B.14 Exposure to Radio and Television 89

Table B.15 Transport Owned 90

Table B.16 Possession Score 91

Table B.17 Antenatal Care 92

Table C.1 Imputed and Valid Z-Scores 94

Table C.2 Verification of Anthropometric Data 95

Table C.3 Digit Preference in Anthropometric Data 95

Table E.1 Malnutrition by Province and Age 101

Table E.2 Malnutrition by Gender, Urban/Rural Residence, and Age 103

Table F.1 Feeding Practices by Age 105

6

FIGURES

		Page
Figure 1.1	Natural Regions and Farming Areas of Zimbabwe	2
Figure 2.1	Conceptual Framework: Determinants of Nutritional Status and Child Survival	12
Figure 2.2	Malnutrition among Children under 3 Years by Residence, Zimbabwe	16
Figure 2.3	Stunting among Children under 3 Years by Province, Zimbabwe	17
Figure 2.4	Malnutrition among Children under 3 Years by Residence, Zimbabwe	17
Figure 2.5	Malnutrition among Children 3 to 35 Months, Zimbabwe 1988 and 1994	18
Figure 2.6	Departure from Normal Seasonal Rainfall, 1979/80-1991/92, Zimbabwe	19
Figure 2.7	Stunting, underweight and Wasting among Children under 3 Years, Zimbabwe	20
Figure 2.8	Malnutrition among Children Age 3 to 35 Months in Zimbabwe Compared with Other Sub-Saharan Countries	21
Figure 3.1	Feeding Practices for Infants under 4 Months, Zimbabwe	26
Figure 3.2	Exclusive Breastfeeding among Infants under 4 Months by Residence and Province, Zimbabwe	28
Figure 3.3	Infants under 4 Months Who Are Exclusively Breastfed in Zimbabwe Compared with Other Sub-Saharan Countries	28
Figure 3.4	Breastfeeding with Complementary Foods among Infants Age 6 to 9 Months by Residence and Province, Zimbabwe	29
Figure 3.5	Infants Age 6 to 9 Months Not Receiving Solid Food in Addition to Breast milk in Zimbabwe Compared with Other Sub-Saharan Countries	29
Figure 3.6	Infants under 4 Months Who Receive a Supplemental Bottle in Zimbabwe Compared with Other Sub-Saharan Countries	32
Figure 4.1	Under-five Mortality by Selected Background Characteristics, Zimbabwe	39
Figure 4.2	Contribution of Malnutrition to Under-five Mortality, Zimbabwe	40
Figure 4.3	Child Mortality in Zimbabwe Compared with Other Sub-Saharan Countries	40
Figure 4.4	Diarrhoea by Age, Zimbabwe	42
Figure 4.5	Diarrhoea and Wasting by Age, Zimbabwe	43
Figure 4.6	Fever and Cough by Age, Zimbabwe	43
Figure D.1	Malnutrition among Children 3 to 35 Months by Residence, Zimbabwe 1988/89 and 1994	99

7

CONTRIBUTORS

The completion of this report was made possible through the involvement and participation of a number of institutions and people.

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From Zimbabwe, Mrs. Joyce Chanetsa, Senior Nutritionist from the Ministry of Health and Child Welfare, and Mrs. Jerida Nyatsanza, Professor of Nutrition at the University of Zimbabwe, participated in the writing of the final version of the report during a mini-workshop at Macro International headquarters, together with Patricia Haggerty and René Berger. Mrs. Chanetsa and Nyatsanza provided expert insight into the interpretation of the findings, formulation of recommendations, and background information on Zimbabwe. They also proposed several important follow-up activities.

Other individuals from Macro International who participated in production of the report include Celia Siebenmann (secretarial services), Catherine Sansone (document production) and Sidney Moore (editing).

8

EXECUTIVE SUMMARY

Malnutrition is an important health and welfare problem among infants and young children in Zimbabwe, resulting in serious health and economic consequences for both the individual and nation. There is a clear age-specific pattern for the risk of stunting, which represents chronic malnutrition, and wasting, which represents acute malnutrition. The proportion of children who are stunted starts to rise at about 3 months of age and increases precipitously at 9 months before peaking between 18 and 21 months. Wasting follows a slightly different pattern; increasing gradually from birth until 9 months and remaining at this level—about 10 percent—until 16 months. Both indicators show infants and toddlers—or the period from birth through most of the second year of life—to be a critical period for interventions to improve nutritional status.

The key infant feeding behaviour revealed by the survey that poses the greatest threat to child nutritional status and health is the short duration of exclusive breastfeeding. Although a culture of breastfeeding exists in Zimbabwe, in that breastfeeding is nearly universal and of long duration, this culture does not include the practice of exclusive breastfeeding. The early introduction of water, other liquids, and complementary foods is likely related to the age-specific patterns of diarrhoeal disease which start to climb shortly after birth.

As with malnutrition, significant age-related patterns were found in the prevalences of diarrhoea, fever, and cough. The proportion of children with diarrhoea climbs rapidly during infancy, peaking at about 8 months of age and remaining high until about 15 months before beginning to decline. Not surprisingly, the age-related pattern for diarrhoea is identical to that for wasting, illustrating the direct relationship between diarrhoea and malnutrition. Although both WHO and UNICEF call for an increase in liquids during a diarrhoeal episode to prevent dehydration, more than 1 in five children actually received less liquids.

Illness during infancy and the second year of life, and their negative interaction, clearly results in long-term growth failure of Zimbabwean children. This is manifested by the sustained high prevalences of stunting in the third year of life. Malnutrition is an important factor in the death of many young children. Indeed, a total of 28 percent of all deaths among children under five years of age are related to malnutrition. Because of its high prevalence, moderate rather than severe malnutrition contributes to the majority of these deaths. This suggests that nutrition programs to prevent and treat moderate malnutrition, as well as severe malnutrition, will have an important impact on child mortality.

In Zimbabwe, 53 infants out of every 1,000 born die before their first birthday. Another 24 die before their fifth birthday. Thus, over two-thirds of all under five child deaths occur during the first year of life. Of these, one-third occur during the first month of life. Although Zimbabwe has one of the lowest infant and child mortality rates in sub-Saharan Africa, no decrease in infant or child mortality has been observed since 1988.

Women's nutritional status prior to conception and during pregnancy is important, both as an indicator of the woman's overall health and a predictor of pregnancy outcome for the mother and infant. In Zimbabwe, 3 percent of nonpregnant, nonlactating women, and nearly 7 percent of lactating women meet the criteria for chronic energy deficiency. This level of underweight is indicative of poor maternal nutritional status, which puts women and their present and future pregnancies at risk. At the other end of the extreme, 20 percent of the nonpregnant, nonlactating women are overweight, which may put them at risk for diabetes and cardiovascular disease.

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

9

- Focus on the first 4 to 6 months of life. Specifically, focus on encouraging more women to extend the duration of exclusive breastfeeding to about 4 months of age.

- Improve child feeding behaviours in and around the diarrhoeal episode. Specifically, for those children who are still breastfed, focus on increasing the frequency of breastfeeding during and after the episode to reduce dehydration and allow for catch up growth. For children who are weaned, focus on increasing the feeding of foods and fluids and on recognizing the signs of dehydration when the amounts and frequency of oral rehydration fluids should be increased.

- Improve the energy balance of women, and in particular pregnant and/or lactating women, by improving their dietary quality and reducing their energy expenditure.

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

Long-term strategies include, the following:

- To improve the nutritional status of women, improve the nutritional status of female infants and children, focusing on the first 24 months of life. Such a strategy overlaps entirely with the approach required to improve child nutritional status.

- Improve access to educational opportunities for female children. Maternal education is strongly associated with both child and maternal nutritional status. Although the effect of maternal education, independent of its association with wealth, could not be disentangled in this study, a large body of literature shows that independent of household wealth, maternal education has a powerful positive effect on child nutritional status.

- Improve access to water and sanitation, and overall environmental and household hygiene. This will reduce exposure to diarrhoea, a direct cause of child malnutrition.

Improvements in both maternal and child nutritional status are possible and within reach of the Zimbabwean government and international donors. Among sub-Saharan countries, Zimbabwe has some of the best indicators related to child nutritional status, child mortality, and fertility. New and expanded efforts to target those behaviours most associated with child malnutrition, morbidity, and mortality are needed and can be effective in ensuring the health and future of Zimbabwean children.

10

ZIMBABWE

Zambezi River
ZAMBIA
NAMIBIA
MASHONALAND WEST
MASHONALAND CENTRAL
HARARE
MASHONALAND EAST
MATABELELAND NORTH
MIDLANDS
MANICALAND
MOZAMBIQUE
BULAWAYO
BOTSWANA
MASVINGO
MATABELELAND SOUTH
Limpopo River
SOUTH AFRICA

CHAPTER 1

INTRODUCTION

1.1 Geography and Population

Zimbabwe is situated in the southern part of Africa between latitude 13° 20" and 22° 30" south and longitude 25° and 33° 10" east. It is bordered by Zambia in the North, Mozambique in the East, South Africa in the south and Botswana in the west. The total area is 390,757 square kilometres (Statistical Year Book, 1989).

Administratively the country is divided into 8 administrative Provinces further divided into 52 districts. At the base of the political structure is the village development committee. However, districts are becoming the focal points for government ministry planning during the process of decentralization.

The most principal physical structure is the high plateau which runs from South-West to North-East across the whole country. The east side of this central plane spine slopes north towards Zambezi River and south towards the Limpopo River. A map of the natural regions and farming areas is shown in Figure 1.1.

In 1992 the Zimbabwean population was 10.4 million, an increase of 6.4 million (1961/62 Census). If the growth rate of 3.1 is maintained, the population will double in about 23 years. The population density is 27 per square kilometre with the eastern province being the most densely populated province. The male ratio per female is 95 to 100. Population breakdown by age group of under 15 years 45 percent, 15-64 years 51 percent and above 65 years 3 percent. Population by settlement is 69 percent rural (Zimbabwe Population Census, 1992).

1.2 Climate and Economy

Zimbabwe lies within the tropics with the climate falling roughly into three seasons:

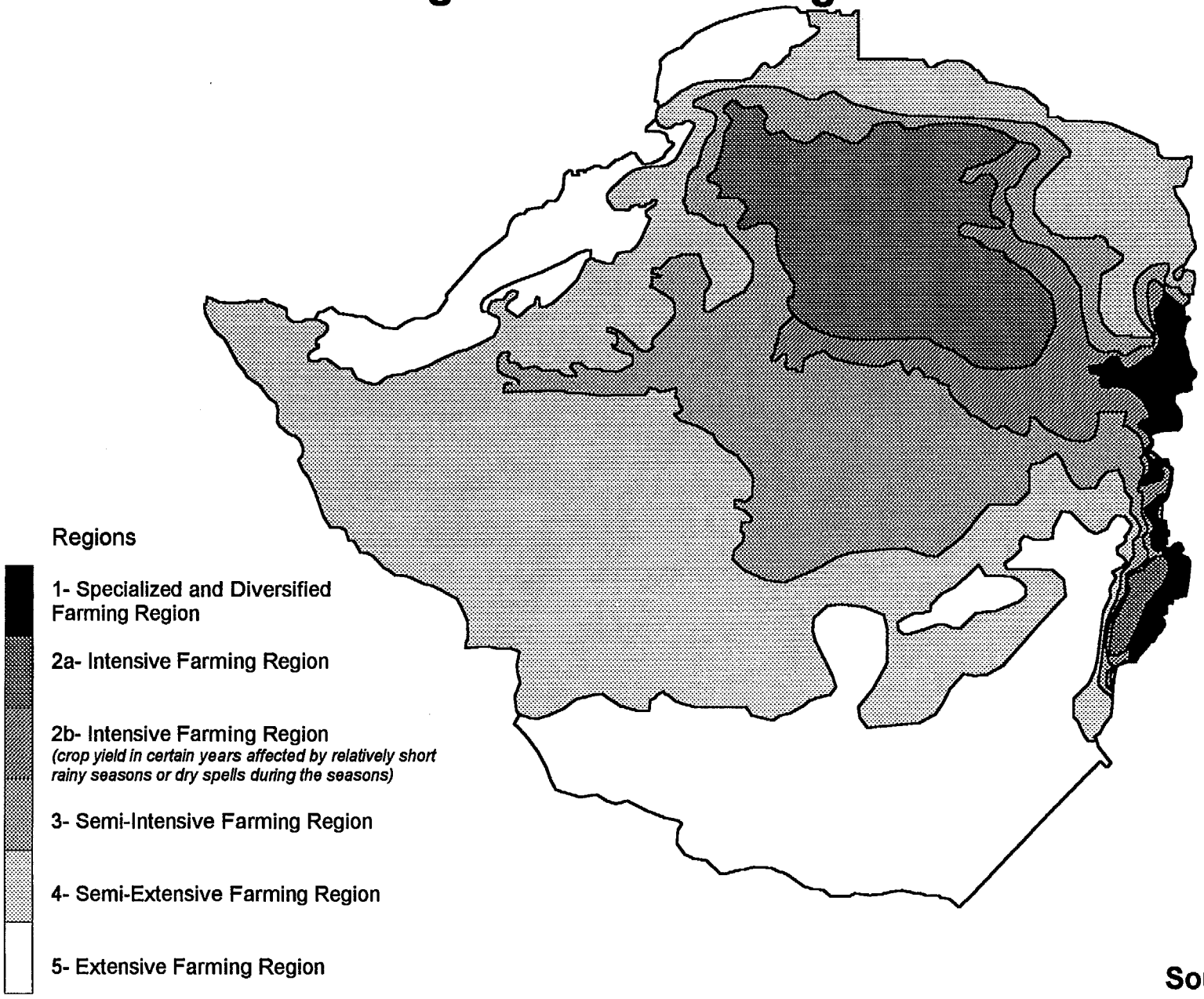
a) a dry winter, covering the months from April to August, with cool temperatures especially at night when frost is experienced.
b) a hot season with temperatures building up to a maximum in October or early November and
c) a wet season in which the main rains usually arrive in mid November and continue until March.

The country has a broad based economy in which industry accounts for 35 percent of output and about 16 percent for agriculture. In spite of this diversity, economic growth in the period 1980-1993 saw a decline in GDP between 2.3 and -6.2 percent per annum. This downward trend was very significant in the drought years of 1983, 1987 and 1992. The severe drought of 1992 which led to -6.8 percent growth in the GDP. The period of 1986-1993 also saw real wages for those in formal employment reduced by 25 percent. This effectively led to a reduction of their purchasing power.

The agricultural sector also experienced stagnant growth with a decline in output and productivity in the smallholder subsector during this period. While the drought offered one explanation, the main reasons were the declining (real) producer prices, inadequate formal sector credit, reduced funding for research, and extension service and reduced marketing services. However, recent changes in agriculture marketing and pricing policy allowed producers to obtain better prices for maize, cotton oil seeds, beef and dairy products. But those participating in smallholder agriculture only received limited benefits because their lands were marginal.

In contrast to a decline in small holder agriculture, the large scale commercial farming subsector expanded its output in export-oriented crops such as tobacco, horticulture and other produce whose prices were not subject to government price and marketing controls.

Figure 1.1
Natural Regions and Farming Areas of Zimbabwe



Source: CSO, 1989

In the early 1990's the government introduced the Economic Structural Adjustment Programme (ESAP) in order to boost the economy. The main strategy of the reform programme was to liberalize trade, deregulate the domestic market and reduce the budget deficit. While in the long term, these changes may raise the country's rate of economic growth and the living standards of its people, but since the 1990's the population has been experiencing extreme hardship due to rising inflation, currency depreciation, lower real wages and rising unemployment. A recent Poverty Assessment Study Survey Preliminary Report (PASS, 1995) showed that poverty is very high with about 62 percent of all Zimbabweans living in households with income per person at a rate insufficient to provide basic needs, and about 46 percent living below the Food Poverty Line where they are not able to meet basic nutrition requirements. However, it should be noted that this survey was conducted during a drought year (1994-1995) so the figures above represent the worst scenario.

1.3 Food Production

In normal rainfall years, Zimbabwe can produce sufficient food to meet its national food security, although most of the contribution to this national food security is from a small number of commercial farmers. A report from the Agriculture Economics Department of the Ministry of Land and Agriculture in 1994 show the total value of crop production from communal farmers' contributions was a quarter of the commercial farmers' production. Various reasons explaining this scenario were discussed under the causes of malnutrition by Tagwireyi and Gremer 1994 (see Table 1.1). Some 60 percent of communal people live in national regions (NR) IV and V which is overcrowded resulting in advanced environmental degradation making the agriculture progress more difficult. A report by UNICEF quoting the same authors in 1990 showed 57 percent of households in NR V reported they experience food scarcity in most years compared with 14 percent in NR V. This further confirms poor land as a reason for lack of food and nutrition security. Redistribution of the best agricultural land to a large number of rural people with no land, or with poor quality land has progressed slowly since Zimbabwe's independence. To ensure success in the land redistribution programme, there requires proper guidelines in choosing candidates for resettlement on the basis of need and a demonstrated experience in those farming.

Table 1.1 Total value of crop production

Percent distribution of communal and commercial sectors (in Z$ thousand) according to year, Zimbabwe 1983-1993

	Commercial Sector		Communal Sector		Total	
Year	Percent	Value	Percent	Value	Percent	Value
1983	81.8	527,083	18.2	117,409	100.0	644,492
1984	80.1	721,053	19.9	178,595	100.0	899,648
1985	67.5	994,567	32.5	479,441	100.0	1,474,008
1986	72.8	1,093,656	27.2	408,865	100.0	1,502,521
1987	81.5	1,050,119	18.5	238,317	100.0	1,288,436
1988	67.8	1,219,358	32.2	579,210	100.0	1,798,568
1989	74.1	1,435,583	25.9	502,036	100.0	1,937,619
1990	75.4	1,851,352	24.6	603,037	100.0	2,454,389
1991	82.7	3,073,780	17.3	643,233	100.0	3,717,013
1992	90.1	2,253,556	9.9	246,386	100.0	2,499,942
1993	68.8	4,014,003	31.2	1,823,755	100.0	5,837,758

Source: Central Statistical Office - Production Account of Agriculture: Commercial and Communal Sectors.

14

1.4 Production of Staples

The choice of crops is depended on those which are less labour intensive in terms of production, processing and preparation. Household food security might improve if more of the small grain, such as sorghum and millet, were grown. These grains can be grown in poor soils and are more drought resistant. Traditionally these grains could be stored for two to three years compared with six to twelve months for maize. Maize has increased in popularity for several reasons. In nondrought years its yield is higher than that of small grains. Maize can be processed at a local hammer mill while the small grains require labour intensive processing before being milled at a local hammer mill. A report from the Agriculture Statistical Bulletin shows that maize, which is the staple food crop, topped the list as the cash crop followed by cotton and sunflower from 1988 and 1993 (Economics Division, MOA, 1996). On production for own consumption, maize still was the number one crop followed by meat and other grains in 1988, while in 1993 maize was followed by meat, beans, then fruits and vegetables as the third commodity produced. These commodities (meat, beans and vegetables) are side dishes for the staple diet (sadza).

1.5 Livestock Production

Recent data on livestock numbers by sector show that from 1983 to 1993, communal farms' total herd was more than the commercial herd for all livestock breeds, yet the commercial farmers had more dairy cattle than the communal farms (Table 1.2). An analysis of the contribution of livestock sales to total national income livestock production show that cattle were the major contributor followed by dairy products, pigs and poultry in 1983. In 1993 the sales from pigs exceeded those from poultry.

1.6 Food Imports

Zimbabwe is a net exporter of food to neighbouring states, but due to the persistent drought between the two DHSs, there has been some importation of maize. Maize purchases and sales shows that maize was imported in the years 1984/85, 1991/92, 1992/93 and 1993/94 (Table 1.3). The highest maize import was in 1992/93, the year after the country experienced the worst drought during the planting season in living memory. This meant the country had no reserve because the imported maize was to cater for immediate as well as future year needs. The second major crop, also considered to be a staple, is wheat. For the period under review, the country has not been self sufficient in wheat production due to persistent droughts and that wheat is a winter crop. Table 1.4 shows importation was low every year but short in 1992/93 and 1994/95. Lastly, soya bean an oil seed has been produced adequately during the review period, except for 1992/93 when 158,869 metric tons were imported.

1.7 Food Marketing

Agriculture produce in Zimbabwe has always been sold almost exclusively through a marketing board or commissions, a system that was mainly concerned with moving rural surplus effectively to regional storage and then to urban areas for sale or export. For maize this had some advantages as low storage losses were experienced. Grain could legally be sold only by GMB or its agent, and movement of maize was restricted. This meant the surplus rural areas could not sell grain to the deficit rural neighbours. This inhibited the development of rural food markets, resulting in few selling locations and inadequate transportation. GMB collection centres were allowed to buy grain and ferry it to Harare and other urban areas for processing but were not allowed to sell locally. From the lesson learned during the drought periods when a lot of public funds were spent on transporting food back to deficit rural areas, there is now some flexibility in grain marketing. The Government announced the change in April 1992 allowing maize to be bought and sold freely in NRs IV and V. with the GMB providing a floor price. This has some nutritional benefits as rural households would make use of local hammer mills to immediately process the maize than to buy urban milled mealie meal with high extraction rate and low on nutrition.

15

Table 1.2 Livestock number by sector

Numbers of given in the thousands by commercial sector and communal and resettlement according to year, Zimbabwe 1975-1995

	Commercial sector				Communal and resettlement			
	Cattle[1]	Sheep	Pigs	Goats	Cattle	Sheep	Pigs	Goats
1975	3,099	264	113	81	3,123	494	96	1,872
1976	3,133	249	116	80	3,183	440	85	1,694
1977	3,226	237	127	80	3,388	451	99	1,748
1978	3,077	211	113	72	2,950	494	96	1,872
1979	2,709	187	90	48	2,860	400		1,300
1980	2,410	173	93	47	2,869	214	39	935
1981	2,391	172	99	40	2,895	297	84	1,203
1982	2,400	152	106	58	3,262	248	77	862
1983	2,358	154	107	57	3,189	245	76	1,024
1984	2,231	164	81	62	3,234	267	97	1,445
1985	2,090	147	79	60	3,409	422	92	1,564
1986	2,126			70	3,657	343	121	1,916
1987	2,013	120	96	72	3,905	447	120	2,090
1988	2,005	126	95	83	3,815	545	143	2,234
1989	1,990	129	107	78	3,856	410	197	2,290
1990	1,831	116	105	35	4,576	483	198	2,505
1991	1,840	112	106	33	3,509	381	174	2,512
1992	1,765	113	110	34	4,259	381	175	2,506
1993	1,566	105	95	35				
1994	1,488	91	100	32				
1995								

Note: 1990-1994 are provisional (figures exclude small scale farmers).
[1] Includes beef and dairy products for commercial sector.
Source: Central Statistical Office (1) Quarterly Digest of Statistics, 1994 and Livestock on Large Scale Commercial Farms for Commercial Sector; (2) Veterinary Services, MLAWD for Communal Sector.

1.8 Diet

The local diet is based mainly on cereals particularly white maize from which sadza (a thick porridge) is prepared. This is consumed with leafy vegetables. Meat is seldom eaten and even less often by the rural population. Other foods eaten include dairy, animal products, legumes and edible insects. The use of insects depends on the season. Food consumption data is very scanty; however, a study conducted from December 28, 1987, to January 5, 1988 (Benhura and Chitsiku, 1988, quoted in Tagwireyi and Greiner, 1994) on 172 households selected randomly from eleven villages in the rural district of Mutambara confirmed that on average, three meals (including causal meals) were eaten each day. Twenty of the most frequently consumed food items are listed in Table 1.5 below, and this shows a substantial amount of food is bought rather than grown, except pumpkin leaves, beans and mangoes which are grown more often than purchased.

A variety of wild vegetables and fruits are also consumed when they are in season and it is believed that they may protect against nutrient deficiencies (Benhura and Chitsiku, 1988, quoted in Tagwireyi and Greiner, 1994). However, the changing environment may gradually limit their availability in the same way wild animals once formed a part of the diet in the 1950's, which were seldomly consumed.

Table 1.3 Maize purchases and sales

Maize purchases and sales in metric tonnes, Zimbabwe 1981-1995

Marketing Year	Purchases				Sales		
	L.S.C.	S.S.C. & C.	Imports	Total	Local	Exports	Total
81-82	1,650,574	363,269	-	2,013,843	664,912	305,053	969,965
82-83	1,021,892	369,374	-	1,391,266	1,041,639	491,982	1,533,621
83-84	464,486	152,414	-	616,900	1,273,240	2,525,545	3,798,785
84-85	464,486	390,001	268,935	1,123,422	859,701	-	859,701
85-86	1,008,971	819,140	-	1,828,111	560,631	284,817	845,448
86-87	911,945	682,429	-	1,594,374	713,314	494,525	1,207,839
87-88	246,735	155,802	-	402,537	1,087,123	393,270	1,480,393
88-89	440,733	755,802	-	1,196,535	676,600	313,727	990,327
89-90	510,686	654,841	-	1,165,527	758,829	174,244	933,073
90-91	357,414	423,594	-	781,008	903,685	414,381	1,318,066
91-92	233,731	371,764	83,171	688,666	1,048,207	230,219	1,278,426
92-93	11,904	716	1,845,000	1,857,620	1,654,354	1,000	1,655,354
93-94	620,000	718,000	204,970	1,542,970	527,555	396,119	923,674
94-95	546,718	536,028	-	1,082,746	718,000	597,000	1,315,000

Source: Grain and Marketing Board annual reports, various years

Table 1.4 Wheat purchases and sales

Wheat purchases and sales in metric tonnes, Zimbabwe 1981-1995

Marketing Year	Purchases				Sales		
	L.S.C.	S.S.C. & C.	Imports	Total	Local	Exports	Total
81-82	191,444	9,468	16,534	217,446	222,990	-	222,990
82-83	200,734	12,210	31,403	244,347	233,790	-	233,790
83-84	117,414	6,836	54,759	179,009	277,418	-	277,418
84-85	87,754	10,741	104,184	202,679	219,994	-	219,994
85-86	193,207	12,299	86,248	291,754	247,555	-	247,555
86-87	231,961	15,441	55,910	303,312	250,892	-	250,892
87-88	196,291	16,345	91,356	303,992	270,992	-	270,992
88-89	241,519	15,319	64,032	320,870	287,841	-	287,841
89-90	252,458	31,998	37,757	322,213	334,127	-	334,127
90-91	320,054	6,714	60,246	387,014	309,794	2,960	312,754
91-92	232,253	27,067	-	259,320	349,263	948	350,211
92-93	53,498	3,427	200,819	257,744	343,662	-	343,662
93-94	226,168	17,832	40,985	284,985	281,892	-	281,892
94-95	182,875	20,033	118,000	320,908	206,000	15,000	221,000

Source: Grain and Marketing Board, Report and Accounts, various years

1.9 National Food and Nutrition Policy

Zimbabwe does not have a food and nutrition policy, however, a policy framework which provides parameters for action in nutrition for all relevant sectors has now been defined.

17

Table 1.5 Most Frequently Consumed Food Items

Most frequently consumed food items, selected rural households in Mutambara District

Food item, ranked by frequency of consumption	Number of households[a]			Percentage of meals in which food item is present[b]
	Consuming	Growing	Buying	
White flour	162	0	172	23
Tomatoes	161	22	150	40
Roller meal	158	0	172	75
Tea	156	0	172	26
Cooking oil	153	0	172	44
Sterilized milk	145	0	172	23
Covo	135	22	150	8
Beef	112	0	172	10
Cabbage	109	16	156	5
Margarine	102	0	172	9
Pumpkin leaves	100	172	0	5
Onions	93	22	150	13
Fish (dried)	87	0	172	5
Derere[c]	59	Wild	0	5
Soured milk	56	0	172	3
Runi[c]	51	Wild	0	3
Eggs	50	69	103	3
Mangoes	47	157	15	2
Ndakupuka[c]	32	Wild	0	1
Dried beans	31	161	11	1

[a] Total number of households, 172
[b] Total number of meals, 3,582
[c] Wild food
Source: Benhura and Chitsiku, 1988

In September 1995, the government set up a Task Force on Food and Nutrition to recommend a sustainable inter-sectoral and inter-agency mechanism to tackle the problems of hunger and malnutrition. This assignment has been finalized and is ready for submission to the government for consideration and adoption.

The major nutritional problem in Zimbabwe is protein energy malnutrition (PEM) in young children. This results directly from an inadequate intake of food and the burden of repeated infections and diseases, particularly diarrhoea and acute respiratory infections. The underlying causes of malnutrition are related to inadequate access to food due to insufficient household food insecurity, inadequate health care services, and inadequate young child care and feeding. The droughts which the country has experienced since 1982 have only served to worsen the situation. The country's vulnerability has furthermore been increased by the absence of a coherent drought preparedness strategy.

Micronutrient deficiencies are also significant public health problems in Zimbabwe, especially iodine, iron, vitamin A and B-vitamins, particularly niacin, whose incidence has tripled in the last two years because of the consumption to a predominantly maize diet. The World Bank has estimated the deficiency of Vitamin A, iodine and iron could waste as much as 50 percent of GDP and yet a programme to combat them would cost as little as 0.3 percent of GDP.

Zimbabwe is also burdened with the HIV/AIDS epidemic. Current estimates indicate that about 10 percent of the total population is HIV positive and this will undoubtedly have a major impact on household food and economic security as those affected are mainly the economically active individuals.

There is in addition a growing problem of noncommunicable diseases such as obesity, hypertension, diabetes and cardiovascular diseases. They are related to unhealthy lifestyles and changes in eating habits which are characteristic by a move away from the consumption of the less refined traditional African diet, coupled with a high fat and salt intake. The department needs to have a foresight and plan ahead for these anticipated future Public Health problems.

Several programmes and initiatives are currently being implemented to reduce household food insecurity and malnutrition. The Ministry of Health and Child Welfare - Nutrition Unit Spearheads, a Child Supplementary Feeding Programme for under fives during periods of drought, and a Community Food Production Programme as a drought recovery strategy involving other sectors. Other activities arrived at improving the nutrition and health status of mothers and children are also underway. Such activities include salt iodation, distribution of iron sulfate tablets and vitamin A capsules to children during drought.

The Ministry of Public Service, Labour and Social Welfare administers a Drought Relief Programme which involves food distribution and a Food for Work Programme during drought periods as well as a Public Assistance Programme which addresses the needs of those who suffer the effects of the economic reforms.

Many other sectors in government as well as nongovernment organisations are involved in nutrition relevant programmes; however, these are mostly being implemented in a fragmented and uncoordinated manner. It is for this reason that there has been an overwhelming need for a national food and nutrition policy including an appropriate mechanism to manage that policy.

If adopted, the Food and Nutrition Policy will seek to:

1. Contribute to the maintenance of national food security

2. Promote the reduction of poverty, hunger and malnutrition through sustainable short- and long-term efforts of government, private sector and NGO's

3. Improve the nutrition and health status of individuals in the country

4. Strengthen the national early warning system with timely response

5. Ensure that food and nutrition programmes take into account the need to promote environmentally sustainable development.

6. Coordinate policies aimed at sustained agricultural production, diversification, marketing, and rural industrialisation so that higher incomes and better access to food to be attained at the household level.

7. Rationalize responsibilities and functions between all agencies whose work impacts on food and nutrition so that they can attain better inter-sectoral linkages and increase efficiency.

9. Promote consumer rights and education for good nutrition, and advocate for a constitutional guarantee that every citizen has a right to food security and that famine should not occur even in the event of severe droughts.

10. Establish a food and Nutrition Council as a permanent and self-financing institution with statutory, advisory, technical programming and advocacy responsibilities.

1.10 Data Source and Type of Information Collected

Data for this report is drawn from the second Zimbabwe Demographic and Health Survey (ZDHS) which was conducted from July to November in 1994 by the Central Statistical Office (CSO) with technical assistance from Macro International Inc. (Maryland, USA). The first ZDHS was collected in 1984. The Ministry of Health and Child Welfare (MOHCW) and the Zimbabwe National Family Planning Council (ZNFPC) also provided significant technical inputs. Funding was provided by the United States Agency for International Development (USAID).

The 1994 ZDHS collected information on fertility, nuptuality, fertility preferences, family planning, infant, child and maternal mortality, maternal and child health practices, breast feeding practices, nutritional status of mothers and young children and awareness and behaviour regarding sexually transmitted diseases including Acquired Immune Deficiency Syndrome (AIDS).

The area sampling frame used was based on the 1992 Zimbabwe Master Sample (ZMS92) which was developed by the Central Statistical Office following the 1992 Population Census. This included 395 enumeration areas (EA's) stratified by province and land use sector. Eighteen sampling strata were identified i.e. urban and rural strata for each of the eight provinces plus Harare (including Chitungwiza) and Bulawayo which are exclusively urban strata. Sample selection was carried out in two stages. First, 230 EA's were collected and in the second stage, a complete household listing and mapping was carried out for each enumeration area. Detailed sampling information is in Appendix A. A nationally representative total of 6,128 women aged 15-49 and 2,141 men aged 15-54 were interviewed.

Data were collected at both the household and individual level. Household level data included background information characteristics on all of household members. Also collected were data on the housing characteristics as well as ownership of specific durable goods. At the individual level, detailed information was sought on women's reproductive history, contraceptive knowledge and use, pregnancy, breast feeding, fertility preferences, maternal mortality husbands background, women's work and knowledge of sexually transmitted diseases. Appendix B represents background characteristics of the households and respondents.

Data were also collected on all living children born since January 1991 aged 0-35 months to the women interviewed. Nutritional and health status data was collected from a total of 2,014 children. This information also included breastfeeding history and feeding patterns as well as the occurrence of diarrhoea, fever cough and the immunization status.

CHAPTER 2

NUTRITIONAL STATUS OF INFANTS AND CHILDREN

Malnutrition is an important health and welfare problem among infants and young children in Zimbabwe, resulting in profound health and economic consequences for both the individual and the nation. The prevalence and severity of malnutrition among Zimbabwean infants and children from birth to three years of age, provincial differences in malnutrition, and the age-specific nature of the patterns of malnutrition, are described in this chapter. Comparisons are also made with the 1988 ZDHS, and with Demographic and Health Surveys in other sub-Saharan countries.

2.1 Effects of Malnutrition

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

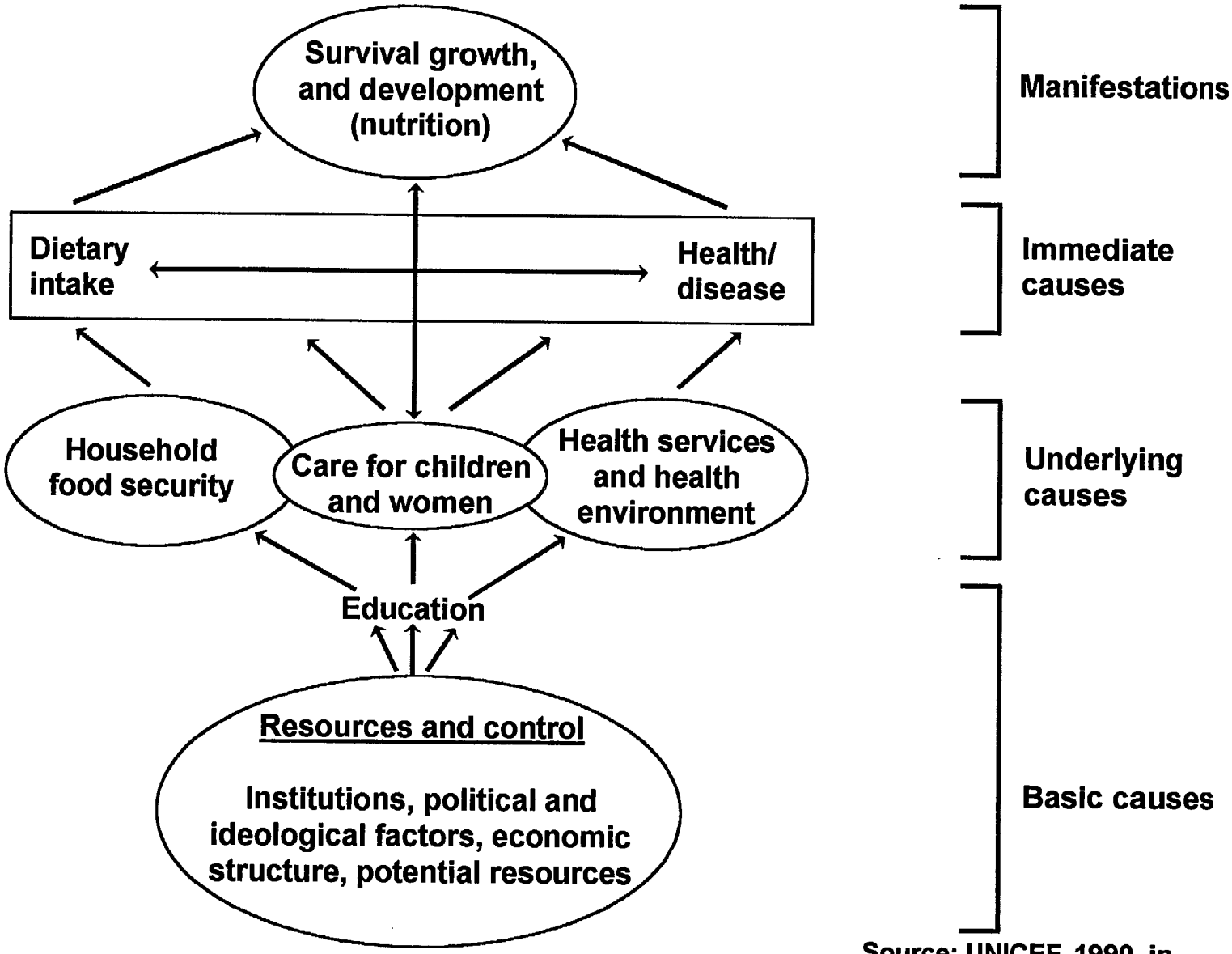
Malnutrition is a direct result of both inadequate intake of food and poor environmental sanitation. Inadequate food intake is a consequence of improper feeding practices and/or insufficient availability of food at the household level. Poor sanitation puts infants and young children at risk of increased incidence and duration of illness (Haggerty et al., 1994, Clemens and Stanton, 1987). Diarrhoeal disease is particularly important and compromises nutritional status through reduced dietary intake, poor absorption, and increased nutrient loss (Brown et al., 1990; Rosenberg et al., 1977; Rahaman and Wahed, 1983). In environments where infectious diseases are common, children typically suffer recurrent infections and are unable to recover fully from each bout of illness. The result is weakened immunity and increased susceptibility to malnutrition. As stated by Scrimshaw et al., (1968) "The simultaneous presence of malnutrition and infection results in an interaction that is more serious for the host than would be expected from the combined effect of the two working independently."

Although children living in poverty are at risk of malnutrition because of both inadequate food intake and infectious disease, of which diarrhoea is particularly important, their interaction is also important in understanding the direct causes of child malnutrition (Lutter et al., 1989). Several studies have pointed to the fact that child nutritional status depends on both the prevalence of diarrhoea and energy intake. The relationship between inadequate energy intake and diarrhoea is thus interactive, or synergistic, and affects nutritional status in a manner far greater than the simple additive effects of diarrhoea or inadequate intake alone would predict. These interactive effects are of particular importance in Zimbabwe where the high prevalence of diarrhoeal disease increases precipitously starting at birth and remaining high through 15 months of age result in dramatic increases in the prevalence of malnutrition.

Both inadequate intake of food and poor environmental sanitation reflect underlying social and economic conditions at the household, community and national level. Figure 2.1 derived from the UNICEF conceptual framework (UNICEF, 1990; Jonsson, 1995) and adapted to reflect the relationships among variables measured in the ZDHS survey, illustrates the context in which malnutrition develops and the mechanisms that lead to inadequate food intake and disease. Political and economic structures at the national and community levels ultimately affect the nutritional status of children by determining the availability of educational opportunities,

22

Figure 2.1
Conceptual Framework: Determinants of Nutritional Status and Child Survival



Source: UNICEF, 1990, in Tagwireyi and Greiner, 1994

employment, health services, and quality of sanitation. Maternal education, in particular, is a powerful predictor of child nutritional status and fertility (Moore, 1990) through its association with the biological and behavioural causes of malnutrition, such as inter-household food distribution, child care practices, feeding behaviours and patterns, and food handling procedures. Employment, by providing a source of income, is an important determinant of household food availability. In particular, female employment has been shown to result in increased food availability and improved child nutritional status. In communities that have little access to health care, children are more vulnerable to malnutrition as a consequence of low immunization rates, poor antenatal care and inadequate treatment of common illnesses. Poor sanitation also puts children at increased risk of infection from the ingestion of fecal matter and contaminated food and water (Esrey et al., 1985).

2.2 Basic Indicators of Nutritional Status

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

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

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

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

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

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

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

2.3 Characteristics of Delivery

Mothers were able to report birth weights for nearly 70 percent of children (Table 2.1), which corresponds to the proportion of deliveries that occur in a health facility. The mean birth weight for those

Table 2.1 Birth weight and size at birth for children under three years

Among children under three years, the percentage weighed at birth, mean birth weight, the percentage of low[1] birth weight (LBW) births, and the percent distribution of births that were small at birth or of average size or larger, by province, residence, and sex of the child, Zimbabwe 1994

Province, residence, and sex of child	Weighed at birth	Mean weight (kg) and (SD)	LBW[2] births	Size at birth: Small	Size at birth: Average+	Total	Number of children
Province							
Manicaland	51.6	3.0 (0.7)	12.5	17.3	82.7	100.0	248
Mashonaland C.	63.1	3.1 (0.7)	11.5	15.1	84.9	100.0	179
Mashonaland E.	73.1	3.2 (0.6)	8.4	17.0	83.0	100.0	212
Mashonaland W.	66.1	3.1 (0.7)	11.4	17.9	82.1	100.0	240
Matabeleland N.	51.0	3.1 (0.6)	13.8	18.6	81.4	100.0	156
Matabeleland S.	66.1	3.2 (0.6)	7.7	19.3	80.7	100.0	119
Midlands	67.3	3.1 (0.6)	17.3	20.0	80.0	100.0	275
Masvingo	69.2	3.2 (0.6)	7.6	23.4	76.6	100.0	209
Harare/Chitungwiza	89.7	3.1 (0.6)	12.7	13.2	86.8	100.0	272
Bulawayo	91.3	3.0 (0.6)	11.7	20.4	79.6	100.0	103
	p<0.0001		NS	NS			
Residence							
Urban	88.4	3.1 (0.6)	11.8	15.6	84.4	100.0	519
Rural	61.7	3.1 (0.7)	11.8	18.9	81.1	100.0	1,495
	p<0.0001		NS	NS			
Sex of child							
Male	68.3	3.1 (0.6)	9.3	15.1	84.9	100.0	991
Female	68.8	3.1 (0.6)	14.3	20.8	79.2	100.0	1,023
	NS		p<0.004	p<0.001			
Total	68.6	3.1 (0.6)	11.8	18.0	82.0	100.0	
Number	2,014	1,381	1,380		363	1,651	2,014

Note: Level of significance determined using Chi-square test.
NS = Not significant
[1] Only living children with complete height, weight and age data were included in this analysis. As a result, some values may differ from those in the Zimbabwe DHS 1994 report (CSO, 1995).
[2] Low birth weight (less than 2.5 kg)

children is 3.1±0.6 kg, which is similar to the NCHS median of 3.3 kg (WHO, 1979). Among those children weighed at birth, the incidence of low birth weight was 12 percent. This is higher than the incidence of low birth weight in the U.S. of 7 percent (IOM, 1985), though less than in many developing countries. However, since this incidence is based on only 70 percent of all births, it must be interpreted with caution, particularly since poor and uneducated women who may be at greatest risk for delivering a low birth weight infant may also be the least likely to deliver in a health facility. In contrast to the relatively low incidence of low birth weight, nearly 20 percent of all infants were perceived by their mothers to be small at birth. Because maternal perception of having a small infant may influence feeding and care behaviours, maternal perceptions of small size as well as actual size are important to consider in examining the factors associated with malnutrition.

Significant provincial and urban/rural differences in the proportion of newborns who were weighed at birth were reported (Table 2.1). The highest proportion was in Bulawayo and the Harare/Chitungwiza provinces and in the urban areas, where nearly 90 percent of mothers could report birth weights. In contrast, in Manicaland and Matabeleland North provinces only 50 percent of mothers could report birth weights. Although there were no provincial or urban/rural differences in the incidence of low birth weight, female newborns were significantly more likely to be low birth weight (14 percent) compared with male newborns (9 percent). Likewise, there were no provincial or urban/rural differences in maternal perceptions of size at birth. However, mothers were significantly more likely to report that female infants were born "small" compared with male infants.

According to maternal reports, 6 percent of infants were delivered by cesarean section Significant provincial differences were found in the incidence of cesarean section, with the highest incidence (11 percent) found in Matabeleland South and the lowest (1 to 2 percent) found in Mashonaland West and Matabeleland North (Table 2.2). There were no significant urban/rural differences reported.

Table 2.2 Prevalence of caesarean section

Percentage of children under 3 years delivered by caesarean section, by province and residence, Zimbabwe 1994

Province and residence	Caesarean section
Province	
Manicaland	4.3
Mashonaland C.	7.4
Mashonaland E.	4.7
Mashonaland W.	1.4
Matabeleland N.	2.4
Matabeleland S.	10.8
Midlands	7.4
Masvingo	7.8
Harare/Chitungwiza	7.7
Bulawayo	6.5
Residence	
Urban	6.8
Rural	5.6
	NS
Total	5.9
Number	2,014

Note: Only living children with complete height, weight and age data were included in this analysis. As a result, some values may differ from those in the Zimbabwe DHS 1994 report (CSO, 1995).
NS = Not significant

2.4 Prevalence of Malnutrition

The prevalence of malnutrition in Zimbabwe is high; 22 percent of children less than 3 years of age are stunted, and 6 percent are wasted (Figure 2.2). These are 11 and 3 times, respectively, the levels that would be expected in a healthy, well-nourished population. The level of underweight is 16 percent.

Of the children who are stunted, 28 percent are severely stunted (i.e., below -3 SD from the reference median) (Table 2.3). Thus, severe stunting affects 6 percent of all Zimbabwean children. Likewise, of the children who are wasted, 13 percent are severely wasted. Thus, severe wasting affects nearly 1 percent of all Zimbabwean children. In a healthy, well nourished population only one in 1,000 children is expected to be severely wasted. Thus, severe wasting affects 10 times the number that wouldbe expected in a healthy, well nourished population.

2.5 Geographic Variations

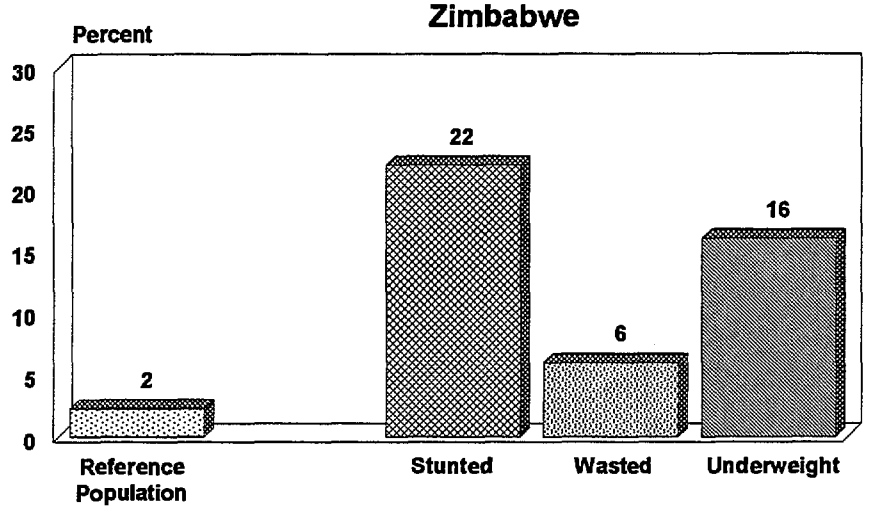
Significant provincial differences in the proportion of children suffering from malnutrition exist in Zimbabwe (Figure 2.3 and Table 2.3). Four provinces (Mashonaland Central, Matabeleland North, Matabeleland South, and Masvingo) have prevalences of stunting in excess of 25 percent, indicating that in these provinces one in four children suffers from stunting. Another four provinces (Manicaland, Mashonaland East, Mashonaland West and Harare/Chitungwiza) have prevalences of stunting of about 20 percent, indicating that one in five children suffers from stunting. The lowest prevalences of stunting (13 percent) are in the provinces of Midlands and Bulawayo. Provincial differences in wasting are also significant, ranging from a low of 2 percent in Masvingo and Mashonaland East to a high of 10 percent in Manicaland and Matabeleland North. Severe wasting is particularly a problem in Matabeleland North where 2.5 percent of children are classified as severely wasted.

Urban versus rural residence of a child is also significantly associated with malnutrition (Figure 2.4). Stunting is higher among rural children compared with urban children (23 versus 18 percent). In contrast, the proportion of children who are wasted is similar at about 5 percent.

2.6 Changes in Malnutrition since 1988

The 1994 ZDHS collected data on children less than 3 years of age whereas the 1988 ZDHS collected data on children aged 3 months to 5 years. To allow for comparison of trends using these two surveys, results from both surveys were reanalyzed using the common age range of 3 to 35 months.

Figure 2.2
Malnutrition among Children under 3 Years by Residence, Zimbabwe



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

ZDHS 1994

Table 2.3 Moderate and severe stunting and wasting, by province and residence

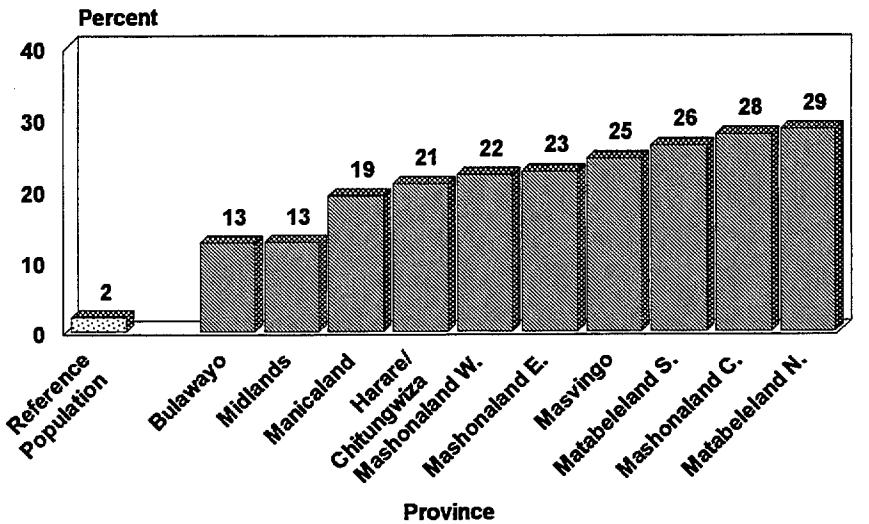
Among children less than 3 years, the percentage moderately malnourished and the percentage severely malnourished, by province and residence, Zimbabwe 1994

Province and residence	Stunted			Wasted		
	Moderate[1]	Severe[2]	Number	Moderate[1]	Severe[2]	Number
Province						
Manicaland	13.3	6.0	249	5.6	0.4	248
Mashonaland C.	19.0	8.4	179	3.9	1.7	180
Mashonaland E.	18.0	4.7	211	1.9	0.0	212
Mashonaland W.	13.4	8.8	239	5.9	0.8	239
Matabeleland N.	20.3	8.2	158	7.6	2.5	158
Matabeleland S.	20.3	5.9	118	4.2	0.8	118
Midlands	10.5	2.2	275	6.9	0.4	275
Masvingo	18.8	5.8	208	1.4	0.5	208
Harare/Chitungwi	14.0	7.0	272	5.1	0.7	273
Bulawayo	8.7	3.9	103	2.9	1.0	104
		$p<0.004$			NS	
Residence						
Urban	12.0	5.6	518	5.6	0.4	518
Rural	16.5	6.3	1,496	4.4	0.9	1,496
		$p<0.04$			NS	
Total	15.3	6.1	2,014	4.7	0.7	2,014

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

26

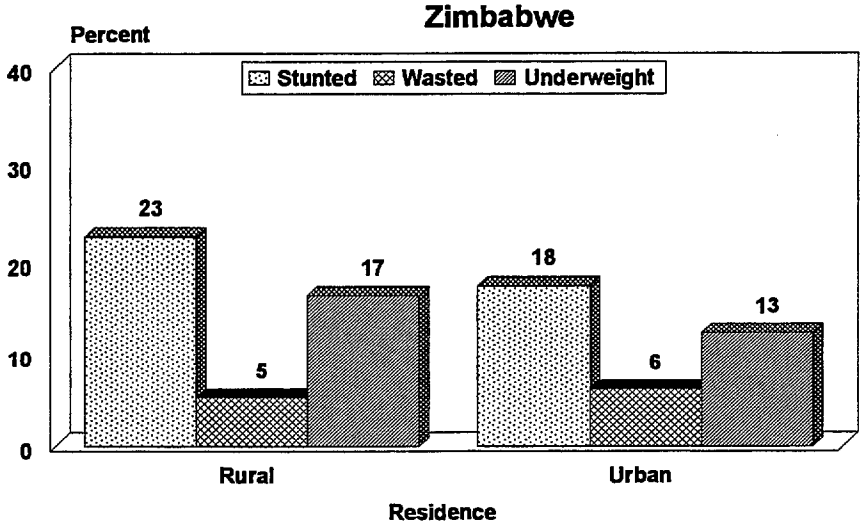
Figure 2.3
Stunting among Children under 3 Years by Province, Zimbabwe



Note: *Stunted* reflects chronic malnutrition.

ZDHS 1994

Figure 2.4
Malnutrition among Children under 3 Years by Residence, Zimbabwe



ZDHS 1994

27

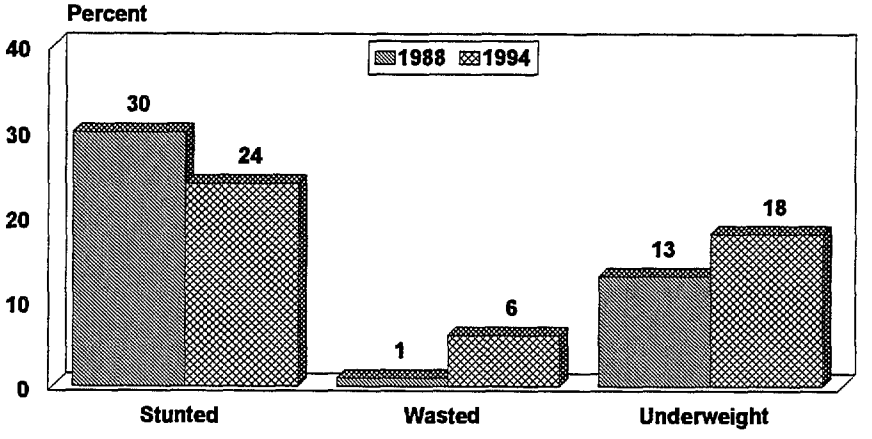
Urban versus rural residence of a child is also significantly associated with malnutrition (Figure 2.4). Stunting is higher among rural children compared with urban children (23 versus 18 percent). In contrast, the proportion of children who are wasted is similar at about 5 percent.

2.6 Changes in Malnutrition since 1988

The 1994 ZDHS collected data on children less than 3 years of age whereas the 1988 ZDHS collected data on children aged 3 months to 5 years. To allow for comparison of trends using these two surveys, results from both surveys were reanalyzed using the common age range of 3 to 35 months.

This comparison shows a decline in the prevalence of stunting during the 6 year period from 30 to 24 percent. In contrast, the prevalence of wasting increased from 1 to 6 percent over the same time period (Figure 2.5). Low weight-for-height, or wasting, reflects conditions immediately preceding the two surveys and could be influenced by season of data collection, rainfall patterns, and/or differences in the prevalence of diarrhoea immediately prior to data collection. Both season and drought conditions have been documented to significantly affect food availability in Zimbabwe (Tagwireyi and Greiner, 1994)[1]. The years between the surveys were characterized by considerable drought and poor harvests, particularly in 1991, 1992 and 1994 (Figure 2.6). Other possible reasons for the increase in wasting are failure to receive adequate nutrition and/or reduced utilization due to diseases including ARI and AIDS, and increased food insecurity because of eroded household income due to economic structural adjustment measures.

Figure 2.5
Malnutrition among Children 3 to 35 Months, Zimbabwe 1988 and 1994

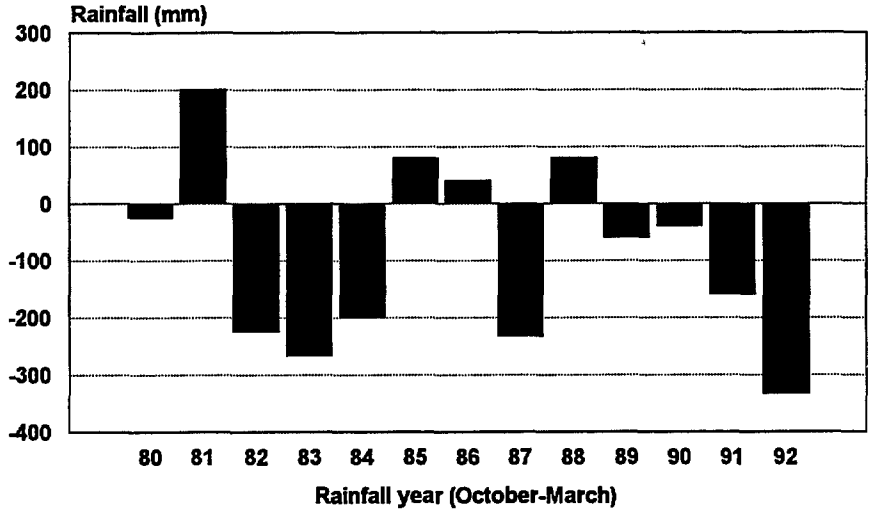


Note: Data for 1994 represents children 3 to 35 months of age.

ZDHS 1988 and 1994

[1] The 1988 survey was conducted between started during the hot, dry season (September 1988) and ended in the rainy season (January 1989), whereas the 1994 survey started during the cold season (July 1994) and ended at the beginning of the rainy season.

Figure 2.6
Departure from Normal Seasonal Rainfall, 1979/80-1991/92, Zimbabwe



Source: Marume and Uganai, 1992, in Kinsey, 1995

There are several possible reasons for the decline in the prevalence of stunting between the surveys. In response to the droughts the Government and NGO community implemented timely responses to the rural communities most affected. Among the interventions were a Child Supplementary Feeding Programme (CSFP); a programme whereby free tillage units and seed packs were given by the Government to farmers in rural areas; and a grain loan scheme whereby grain was given to farmers in rural areas as a loan and repaid back after they harvested their own grain. Other nondrought interventions during this period included food subsidies, free education, legislation of minimum wage, implementation of health care in commercial farms, rural development, water and sanitation programmes, and land redistribution/resettlement programmes. Together, these programmes contributed toward the overall improvements in child health and nutrition.

2.7 Age-specific Patterns of Malnutrition

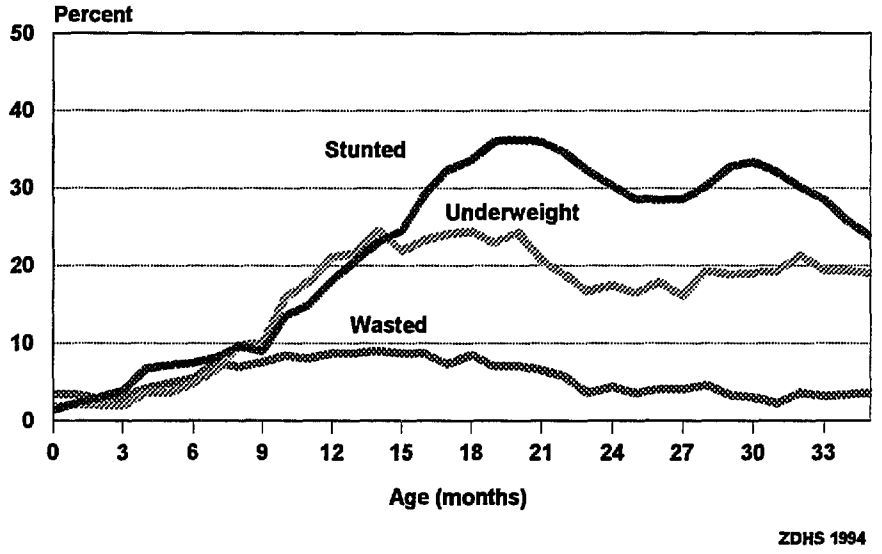
There is a clear age-specific pattern in the proportion of children suffering from stunting and wasting (Figure 2.7). The prevalence of stunting starts to rise at about 3 months of age and increases precipitously at 9 months before peaking between 18 and 21 months at nearly 40 percent. Wasting follows a different pattern, increasing gradually from birth until 9 months and remaining at this level, nearly 10 percent, until 16 months. A gradual decline then begins and continues until about 23 months when the level stabilizes at about 5 percent. Both the stunting and wasting indicators show infants and toddlers to be most vulnerable to malnutrition, and the first 24 months of life to be a critical period for interventions to improve nutritional status.

Nutritional deprivation and illness experienced during infancy and the second year of life clearly results in long-term growth failure, manifested by the sustained high level in the third year of life. Because these are cross-sectional data, it cannot be determined if the prevalence of stunting continues to increase or merely reflects the deficits acquired during the first two years of life. Longitudinal data from other studies, however, would

suggest that the proportion of children aged 3 to 5 years who are stunted reflects deficits acquired during their first two years (Lutter et al., 1989). A longitudinal study of growth patterns in Shamva District, Zimbabwe between 1987 and 1989 also showed that after the first 20 months all three indicators of nutritional status were static (Moy et al., 1991; Tagwireyi and Greiner, 1994). These data again confirm the period of vulnerability to be during the first two years of life.

Although chronic malnutrition, as reflected by the prevalence of stunting, is a greater nutritional problem in Zimbabwe than acute malnutrition, the prevalence of acute malnutrition is also high (Figure 2.7). Nearly 5 percent of all children less than 3 years of age and 10 percent of children age 9 to 16 months are wasted. As with the data on stunting, these data indicate that the most critical period of nutritional vulnerability for Zimbabwean children is during the first 24 months of life.

Figure 2.7
Stunting, Underweight and Wasting among Children under 3 Years, Zimbabwe

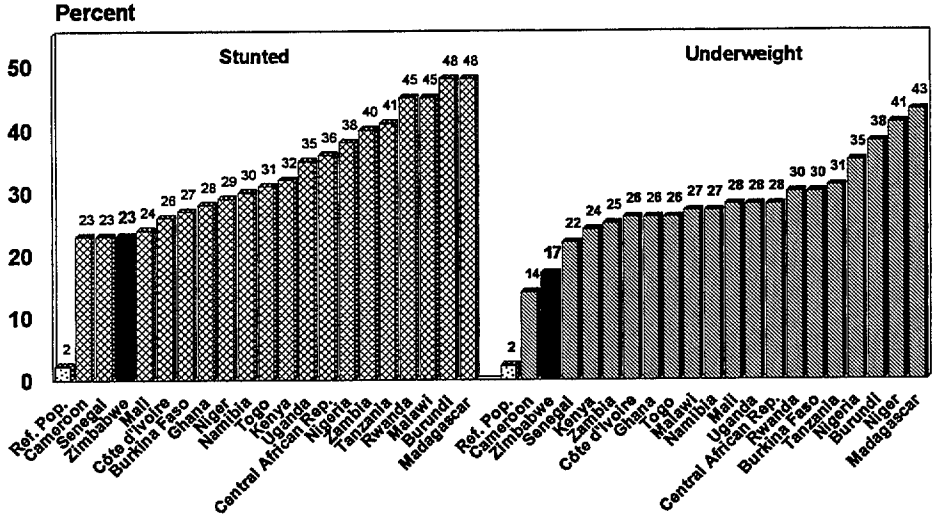


2.8 Malnutrition among Children Age 3 to 35 Months in Zimbabwe Compared with Other Sub-Saharan Countries

Comparison of nutritional status among sub-Saharan countries must be done with caution as the season in which anthropometric data are collected can greatly affect the proportion of children categorized as stunted, wasted, or underweight. Underweight and wasting would be especially vulnerable to this limitation. Among the sub-Saharan countries surveyed, the percentage of children age 3 to 35 months who are underweight ranges from 14 percent in Cameroon to 43 percent in Madagascar and stunting ranges from 23 percent in Cameroon, Zimbabwe and Senegal to 48 percent in Madagascar (Figure 2.8). Zimbabwe, with prevalence rates of 17 percent underweight and 23 percent stunting, has among the lowest rates of malnutrition in sub-Saharan Africa.

30

Figure 2.8
Malnutrition among Children Age 3 to 35 Months in Zimbabwe Compared with Other Sub-Saharan Countries



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

UDHS 1995

31

CHAPTER 3

INFANT AND CHILD FEEDING PRACTICES

3.1 Optimal Infant and Child Feeding Practices

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

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

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

In Zimbabwe, the recommendations for the length of exclusive breastfeeding and the introduction of complementary foods vary slightly from the above formulations. The Government's recommendation is that exclusive breastfeeding be practised through the first 4 to 6 months of life and, accordingly, that mothers begin feeding complementary foods at 4 to 6 months of age.

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

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

Exclusive breastfeeding, defined as breast milk as the only source of infant food or liquid, meets nutritional requirements (Cohen et al., 1994), satisfies fluid needs even in hot and humid climates (Sachdev et

al., 1991), and protects against illness (Huffman and Combest, 1990) for about the first six months of life. Exclusively breastfed infants are 14 times less likely to die from diarrhoea compared with formula fed infants and 4 times less likely to die compared with partially breastfed infants (Victora et al., 1987). Thus, exclusive breastfeeding is the infant feeding behaviour most predictive of infant survival.

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

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

The recommended duration of breastfeeding has recently received considerable attention due to several studies which show that children who are breastfed beyond the second year of life are more likely to suffer from malnutrition. A review of these studies, however, shows most to have serious methodological flaws (Grummer-Strawm, 1993). Both WHO and UNICEF recommend that because of its many nutritional and immunological benefits breastfeeding should continue into the second year of life and beyond. Breastfeeding beyond 4 to 6 months of age should be complemented with energy and other nutrient dense weaning foods.

3.2 Initiation of Breastfeeding

In Zimbabwe, virtually all women (99 percent) initiate breastfeeding (Table 3.1). No differences in breastfeeding initiation were found by province, maternal age, education, kind of health provider assisting with the delivery, or source of antenatal care the mother received.

Although virtually all women initiate breastfeeding, the recommended practice of initiating breastfeeding within the first hour after giving birth occurs in only 38 percent of all births (Table 3.1). In contrast to the data on breastfeeding initiation, significant differences were found in the timing of initiation by province, maternal age, education, kind of health provider assisting with the delivery, and source of antenatal care the mother received. In three provinces (Matabeleland North, Matabeleland South, and Masvingo), about half of all women initiated breastfeeding within the first hour after giving birth. In contrast, in the province of Midlands only 20 percent of women initiated breastfeeding within the first hour. Delayed initiation of greater than 24 hours occurred among more than 10 percent of all women in four provinces (Mashonaland Central, Matabeleland North, Harare/Chitungwiza, and Bulawayo).

Maternal age was also significantly associated with timing of initiation, with mothers in the 20 to 24 year old age group more likely to delay initiation more than 24 hours compared with the other age groups (Table 3.1). This finding may be due to the fact that mothers between 20 and 24 years of age are more likely to be primiparous and therefore unfamiliar with breastfeeding initiation techniques than multiparous, older mothers.

Maternal education was also significantly associated with breastfeeding initiation. Mothers with secondary education were least likely to initiate breastfeeding within the first hour of birth and most likely to initiate breastfeeding after the first 24 hours compared with mothers with primary level or no education.

Table 3.1 Initial breastfeeding

Percentage of children under three years who were ever breastfed and the percentage who started breastfeeding within one hour, within 24 hours, and after 24 hours or more, by distribution background characteristics, Zimbabwe 1994

Background characteristic	Ever breastfed	Started breastfeeding: First 1 hour	Started breastfeeding: First 24 hours	Started breastfeeding: After 24 hours	Total	Number of children
Province						
Manicaland	100.0	32.6	61.2	6.2	100.0	242
Mashonaland C.	100.0	38.4	46.9	14.7	100.0	177
Mashonaland E.	99.1	27.5	65.0	7.5	100.0	200
Mashonaland W.	100.0	40.2	52.7	7.1	100.0	239
Matabeleland N.	98.7	50.3	33.6	16.1	100.0	149
Matabeleland S.	100.0	50.0	41.2	8.8	100.0	102
Midlands	99.6	19.6	73.6	6.8	100.0	250
Masvingo	100.0	49.0	45.7	5.3	100.0	208
Harare/Chitungwiza	100.0	43.5	46.2	10.3	100.0	253
Bulawayo	99.0	38.8	48.5	12.6	100.0	103
	NS		p<0.0001			
Mother's age						
15-19	100.0	37.7	53.7	8.6	100.0	175
20-24	99.5	37.0	49.6	13.5	100.0	587
25-29	99.8	40.3	54.4	5.3	100.0	419
30-34	99.5	38.0	54.9	7.1	100.0	395
35-49	100.0	35.3	56.9	7.8	100.0	348
	NS		P<0.001			
Mother's education						
No education	100.0	41.1	52.8	6.1	100.0	246
Primary	99.8	38.1	53.4	8.5	100.0	981
Secondary+	99.5	36.0	53.5	10.5	100.0	697
	NS		p<0.04			
Source of antenatal care						
Doctor	99.5	34.9	54.8	10.2	100.0	392
Nurse/midwife/aux.	99.8	39.7	52.5	7.8	100.0	1,402
Other/none	100.0	24.8	58.1	17.1	100.0	129
	NS		p<0.0003			
Assistance at delivery						
Doctor	98.6	32.6	48.7	18.6	100.0	236
Nurse/midwife/aux.	99.8	40.0	53.9	6.2	100.0	1,121
TBA[1]	100.0	33.3	54.5	12.2	100.0	336
Relative/friend	100.0	43.3	48.3	8.4	100.0	178
None	100.0	24.5	76.7	3.8	100.0	53
	NS		p<0.0001			
Total	99.8	37.8	53.4	8.9		1,924

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

At birth, women attended by a doctor or traditional birth attendant were significantly more likely to delay initiation of breastfeeding than women attended by someone else. Women who received antenatal care by a doctor or who did not receive antenatal care were also significantly more likely to delay initiation by more than 24 hours. There is a need to establish to what extent the traditional birth attendant is trained in lactation management. The delay of initiation among women attended at birth by doctors may be because doctors customarily want women to rest immediately after birth, although the Baby Friendly Hospital Initiative is designed to address this problem. It is also possible that many of the deliveries by doctors are the referral cases, i.e. cases where the mother and/or baby may be sick and breastfeeding initiation is delayed.

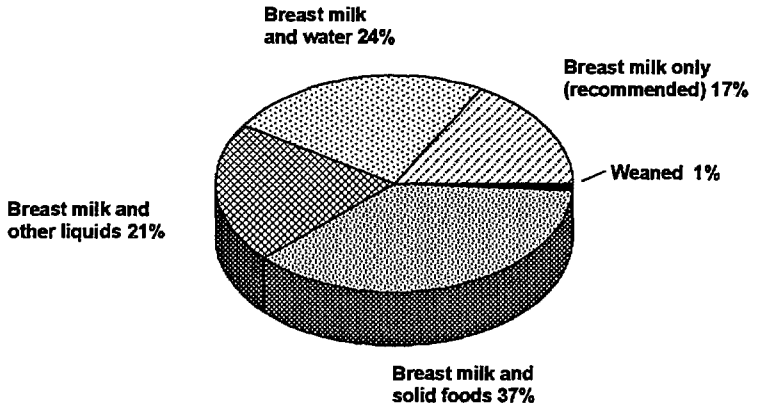
3.3 Frequent, On-demand Feeding

Among infants less than 6 months of age, the mean breastfeeding frequency is 6 times or more during the preceding 24 hours. This is less than the recommended frequency for this age group. However, as discussed in the next section, exclusive breastfeeding is rarely practised and complementary foods and liquids begin early in life. Such early feeding reduces infant demand for breast milk, reduces breast milk production and ultimately results in reduced breastfeeding frequency.

3.4 Exclusive Breastfeeding

Exclusive breastfeeding, the behaviour most important to infant health and survival, is extremely rare; only 17 percent of all infants less than 4 months of age are exclusively breastfed (Figure 3.1). The most common feeding patten of infants in this age group is breast milk and solid foods, with 37 percent of infants in this category. Breastfeeding with the addition of water (full breastfeeding) or other liquids is also common with 24 and 21 percent falling into these categories, respectively. Less than 1 percent of infants are weaned at this age.

Figure 3.1
Feeding Practices for Infants under 4 Months, Zimbabwe



Note: WHO recommends that all infants be breastfed exclusively until they are about 6 months old.

ZDHS 1994

Age-specific patterns of infant feeding practices show that the introduction of plain water and other foods occurs early (Table 3.2). For example, 29 percent of mothers with infants less than 2 months of age report giving water and 52 percent report giving other foods. By two to three months of age, two-thirds of infants are given other foods, and by four to five months, nearly 90 percent are. By the fourth month of life less than 1 percent of infants continue to be exclusively breastfed.

Significant provincial and urban/rural differences in the proportion of infants exclusively breastfed were found (Figure 3.2). Infants in the provinces of Manicaland, Matabeleland North, Matebeleland South, Midlands,

35

Masvingo, and Harare/Chitungwiza were more likely to be fully breastfed compared with infants in the other provinces. Also, infants in rural areas were more likely to be fully breastfed compared with infants in urban areas.

At 17 percent, the proportion of Zimbabwean infants less than 4 months of age who are exclusively breastfed is in the middle range of sub-Saharan countries (Figure 3.3).

Table 3.2 Breastfeeding status

Percent distribution of living children by current breastfeeding status, according to chid's current age in months, Zimbabwe 1994

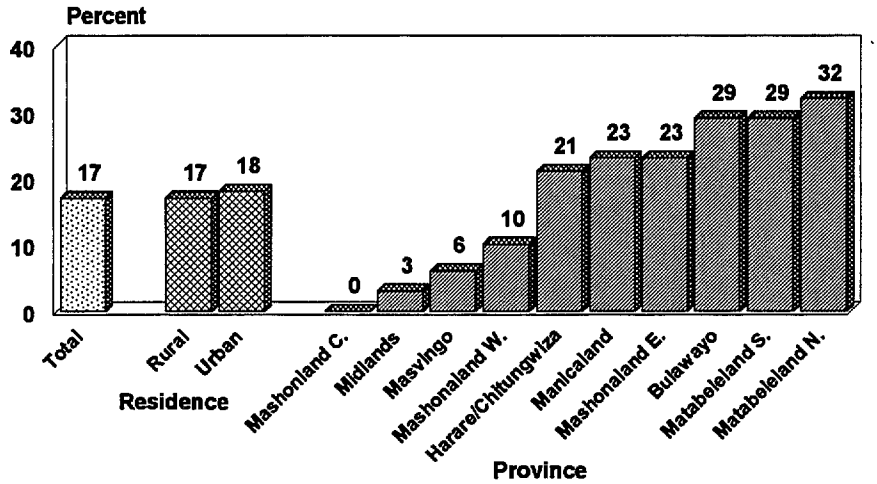
	Percentage of living children who are:					
			Breastfeeding and:			
Age in months	Not breast-feeding	Exclusive breast-fed	Plain water only	Supple-ments	Total	Number of living children
<2	0.0	20.0	29.5	50.5	100.0	105
2-3	1.6	14.1	18.8	65.7	100.0	128
4-5	0.8	0.8	8.5	89.8	100.0	118
6-7	0.8	0.8	3.9	94.5	100.0	128
8-9	1.5	0.0	2.2	96.3	100.0	134
10-11	4.8	1.6	0.0	93.5	100.0	124
12-13	10.0	1.8	0.9	87.3	100.0	110
14-15	7.1	0.0	0.0	92.9	100.0	99
16-17	22.0	2.2	0.0	75.8	100.0	91
18-19	35.9	0.8	0.0	63.3	100.0	128
20-21	61.0	0.0	2.0	37.0	100.0	100
22-23	76.2	0.0	1.9	21.9	100.0	105
24-25	83.0	1.9	1.9	13.2	100.0	106
26-27	81.1	2.7	0.9	15.3	100.0	111
28-29	84.3	1.1	3.4	11.2	100.0	89
30-31	84.7	1.0	2.0	12.2	100.0	98
32-33	78.0	0.0	3.3	18.7	100.0	123
34-35	73.7	1.8	2.6	21.9	100.0	114
0-3 months	0.8	16.9	23.7	58.5	100.0	236
4-6 months	1.1	1.1	7.4	90.6	100.0	190
7-9 months	1.0	0.0	2.1	96.8	100.0	191

Note: Breastfeeding status refers to preceding 24 hours. Children classified as *breastfeeding and plain water only* receive no supplements.

3.5 Introduction of Complementary Foods

Optimal infant feeding practices include the introduction of complementary foods at about 6 months of age. Therefore, all infants between 6 and 9 months of age should be receiving complementary foods in addition to breast milk. In Zimbabwe, the vast majority, or 93 percent of infants in this age group, are receiving both breast milk and complementary foods (Figure 3.4). Another 6 percent receive only breast milk and water or other liquids, and only 1 percent are weaned. There were no significant provincial or urban/rural differences in the proportion of infants 6 to 9 months who received breast milk with complementary solids in comparison to any other form of feeding at this time period.

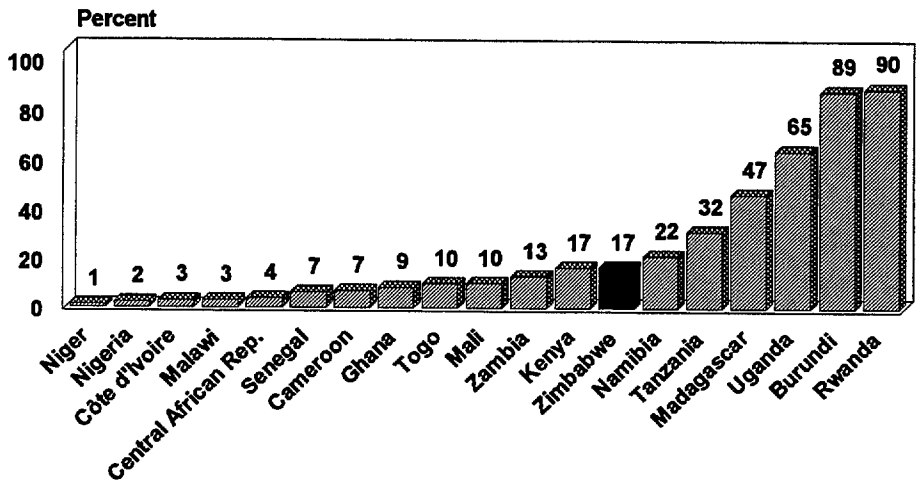
Figure 3.2
Exclusive Breastfeeding among Infants under 4 Month by Residence and Province, Zimbabwe



Note: Information on feeding practices is based on the 24 hours preceding the survey. WHO recommends that all infants should receive nothing but breast milk until about 6 months of age.

ZDHS 1994

Figure 3.3
Infants under 4 Months Who Are Exclusively Breastfed in Zimbabwe Compared with Other Sub-Saharan Countries

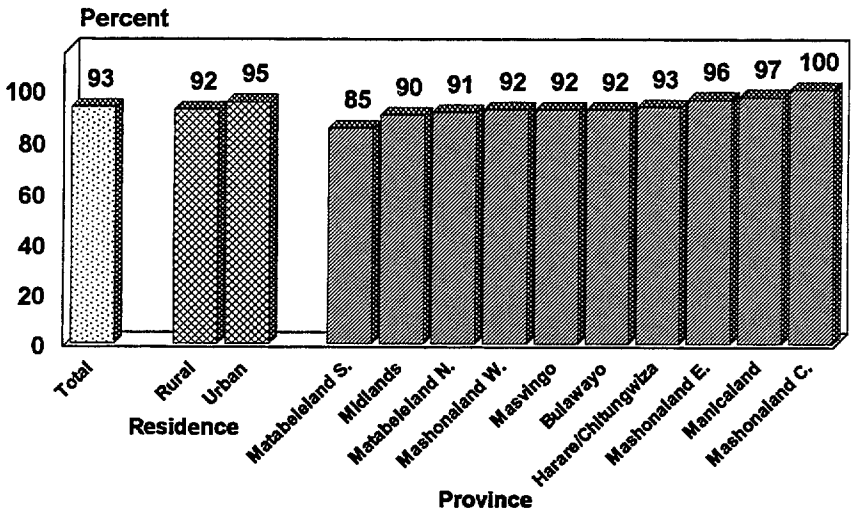


Note: Information on feeding practices is based on the 24 hours preceding the survey. WHO recommends that all infants should receive nothing but breast milk until about 6 months of age.

DHS Surveys 1986-1995

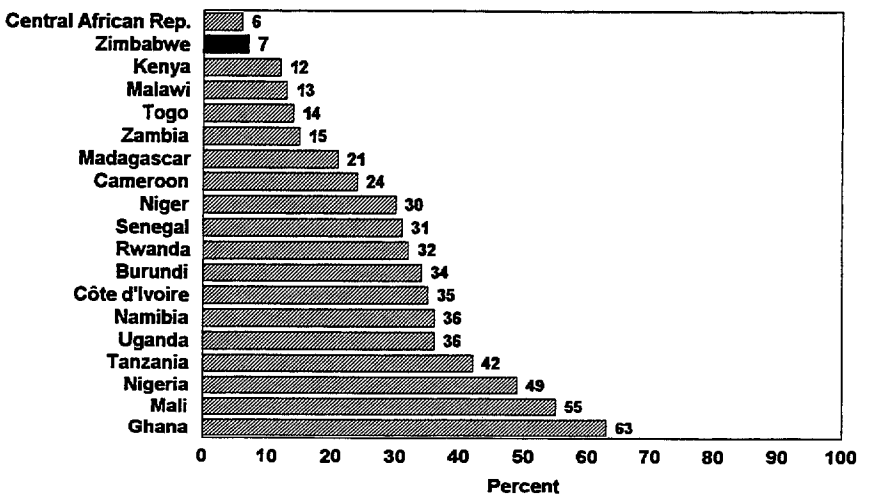
37

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



ZDHS 1994

Figure 3.5
Infants Age 6 to 9 Months Not Receiving Food in Addition to Breast Milk in Zimbabwe Compared with Other Sub-Saharan Countries



Note: WHO recommends that by the age of 6 months all infants should receive solid foods and liquids in addition to breast milk.

DHS Surveys 1986-1995

38

The high proportion of infants age 6 to 9 months that receive both solid food and breast milk makes Zimbabwe, along with the Central African Republic, one of the top two countries surveyed that best complies with this WHO indicator (Figure 3.5). Despite this positive finding, the rate of malnutrition among children in the second half of infancy is still of great concern. Attention must, therefore, be paid to the consistency, frequency and hygienic preparation of weaning foods which play a role in this problem.

3.6 Types of Supplemental Foods

Porridge is a common weaning food in Zimbabwe. By two to three months of age, more than half of all children are receiving porridge and by four to five months, 85 percent are receiving porridge (Table 3.3). Use of infant formula is not common, about 4 percent of mothers report infant formula use, and correlates highly with bottle use. However, use of other milks, typically cow's milk is common, reported by nearly 25 percent of mother of infants less than 1 year of age. The proportion of infants receiving foods high in protein and other nutrients (meats, poultry, fish, and eggs), rises from 12 percent at age four to five months to 50 percent by 12 to 13 months.

Table 3.3 Types of foods received by children in preceding 24 hours

Percentage of children under three years who received specific types of food in the 24 hours before the interview, and the percentage using a bottle with a nipple, by breastfeeding status and child's age in months, Zimbabwe 1994

Age (in months)	Breast milk only	Infant formula	Other milk	Other liquid[1]	Meat poultry/ fish/ eggs	Porridge	Fruits/ vege-tables	Other	Using bottle with a nipple	Number of children
Breastfeeding children										
0-1	20.0	5.7	3.8	7.5	0.0	19.8	0.0	0.9	4.7	106
2-3	14.1	3.2	8.7	13.5	0.8	50.4	2.4	0.8	6.4	125
4-5	0.8	5.2	16.2	25.6	11.2	83.8	17.9	19.8	5.9	118
6-7	0.8	3.9	15.0	25.0	18.1	84.4	33.1	49.2	6.3	128
8-9	0.0	5.3	20.5	25.2	35.6	86.3	51.5	78.8	9.1	132
10-11	1.6	9.5	25.9	32.8	37.9	88.1	72.3	86.2	5.9	118
12-13	1.8	1.0	21.6	22.9	47.9	80.0	82.3	89.6	1.0	98
14-15	0.0	4.3	25.0	24.2	52.7	83.5	91.3	91.2	5.4	92
16-17	2.2	2.9	26.1	35.7	54.3	78.5	85.7	92.9	4.3	70
18-23	0.3	1.5	26.5	25.2	57.0	75.7	85.2	92.6	5.9	136
24-35	(1.4)	(4.2)	(8.3)	(41.7)	(58.3)	(83.3)	(83.3)	(87.5)	(4.2)	24
0-3 months	16.9	4.3	6.1	10.8	0.4	36.2	1.3	0.9	5.6	231
4-6 months	1.1	4.8	15.6	24.6	12.8	83.4	20.4	25.7	6.9	188
7-9 months	0.0	4.7	18.5	25.9	31.7	86.2	49.2	75.1	6.9	189
Total	2.8	4.3	18.4	23.8	30.8	73.5	50.3	58.7	5.7	1,147
Non-breastfeeding children										
12-17	NA	15.4	43.6	33.3	66.7	89.7	87.2	92.1	28.2	39
18-23	NA	4.3	46.5	44.9	68.8	88.1	85.5	96.2	7.6	185
24-29	NA	3.2	40.6	33.1	58.6	75.7	90.0	95.2	4.3	253
30-35	NA	3.4	34.7	38.2	59.2	74.6	90.5	93.1	3.8	262
Total	NA	4.2	40.2	37.9	61.8	79.2	88.9	94.6	6.2	739

Note: Figures in parentheses are based on 24 cases.
NA = Not applicable
[1] Included sugar water and juice.

39

It is not possible to determine from the data available in the ZDHS whether complementary feeding practices provide adequate energy and protein to infants and young children. Adequate energy and protein is a function of both feeding frequency and the energy and protein content of the foods provided, and the nutrient demands imposed by illness, particularly diarrhoeal disease. Feeding practices, particularly during and immediately after a diarrhoeal episode, are important determinants of child nutritional status.

3.7 Bottle Use

Relatively few children are bottle fed during infancy with only 6 percent of mothers reporting this practice (Table 3.4). However, significant differences in bottle feeding based on province, urban/rural residence, and demographic and socio-economic characteristics were found. In the provinces of Bulawayo and Harare/Chitungwiza over 15 percent of infants received bottles in contrast to five provinces (Manicaland, Infants

Table 3.4 Prevalence and estimates of net relative risk of bottle use

Percentage of children under one year using a bottle and the estimate of net relative risk for using a bottle, by background characteristics, Zimbabwe 1994

Background characteristic	Bottle use	Net relative risk
Province		
Manicaland	1.0	
Mashonaland C.	8.5	
Mashonaland E.	5.1	
Mashonaland W.	8.8	
Matabeleland N.	6.1	
Matabeleland S.	5.1	
Midlands	3.4	
Masvingo	4.3	
Harare/Chitungwiza	15.9	
Bulawayo	20.7	
	p<0.006	
Residence		
Urban	13.3	
Rural	5.4	
	p<0.0009	
Mother's education		
No education	2.3	
Primary	5.0	
Secondary+	11.1	
	p<0.002	
Mother's occupation		
Not working	6.2	1.0 [a]
Professional[1]	31.0	4.3 [b]
Agriculture/self-employed	3.4	0.7
Service	6.7	1.1
Un/Skilled manual	7.9	1.2
	p<0.0001	
Husband's education		
No education	2.0	
Primary	5.0	
Secondary+	9.9	
	p<0.02	
Type of toilet		
None	6.0	
Traditional pit	2.0	
Blair	4.5	
Shared flush	8.2	
Own flush	17.6	
	p<0.0001	

Table 3.4 — *Continued*

Background characteristic	Bottle use	Net relative risk
Watches television weekly		
Yes	13.8	
No	5.5	
	p<0.0007	
Possession score[2]		
0	3.4	1.0 [a]
1	8.8	2.4 [b]
2+	13.6	2.7 [b]
	p<0.0001	
Source of antenatal care		
Doctor	12.6	
Nurse/midwife/aux.	6.5	
Other/none	0.0	
	p<0.01	
No. of antenatal care visits		
0	0.0	
1-3	4.4	
4-6	6.6	
7+	12.6	
	p<0.001	
Assistance at delivery		
Doctor	20.8	
Nurse/midwife/aux.	6.9	
TBA[3]	3.0	
Relative/friend	4.2	
None	0.0	
	p<0.0001	
Place of delivery		
At home	2.9	
Public facility	9.0	
Private facility	9.3	
	p<0.01	

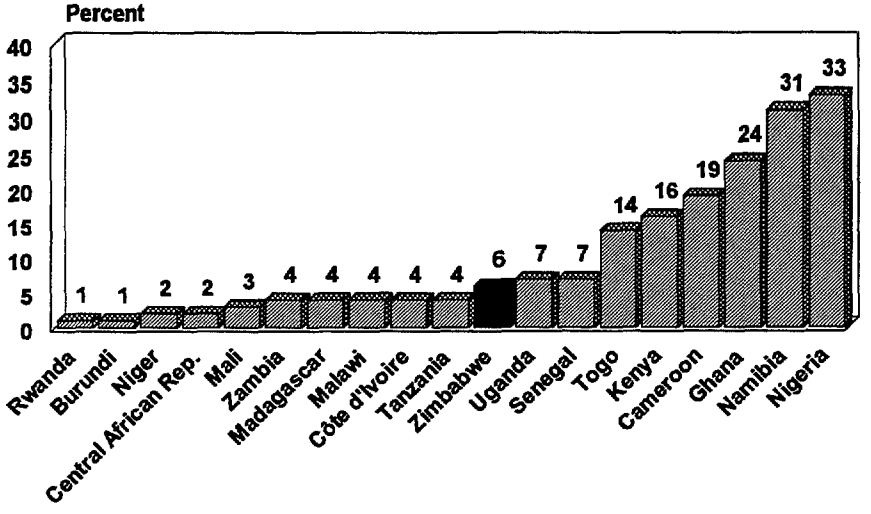
Note: Analysis based on 739 children. Level of significance determined using Chi-square test. Relative risk estimates based on odds ratios.
[1] Includes professional, clerical, and sales occupations
[2] Score of one for availability/ownership of electricity, radio, television, or refrigerator. Maximum score of 4.
[3] Traditional birth attendant
[a] Overall p<0.05
[b] p<0.05 compared with reference category

living in urban areas were also far more likely to receive bottles (13 percent) compared with infants living in rural Mashonaland East, Matabeleland South, Midlands, and Masvingo) where less than 5 percent received bottles. areas (5 percent). In general, infants of women of higher socio-economic status (based on education, occupation, and amenities found in the home) are more likely to bottle feed their infants than women of lower socio-economic status. For example, 31 percent of women in professional occupations reported giving their infants a bottle compared with 3 percent of women in agricultural occupations or self employed.

Receipt of antenatal care by a physician and attendance at delivery by a physician are also strongly associated with bottle use: 13 percent of women receiving antenatal care by a physician report bottle use compared with 7 percent receiving care by a nurse, midwife, or auxiliary health worker and 0 percent receiving no antenatal care or care from another source. Also, 21 percent of women attended during delivery by a physician report bottle use compared with 3 percent among women attended by a traditional birth attendant and 0 percent among women who were not attended at birth. Significant differences were also found by place of delivery. Women who delivered at home were least likely to report using a bottle (3 percent). In contrast, 9 percent of women who delivered at a public or private facility reported using a bottle. In Zimbabwe, it is still common among some private maternities to ask women to bring their own bottles for use after birth. Because receipt of antenatal care by a physician, assistance by a physician during delivery, and delivery at a private facility are also strongly associated with socio-economic status it cannot be determined from these bivariate correlations if physicians or private facilities are encouraging the use of bottles. Also, because wealthier women are more likely to use bottles, the risk they present for infants cannot be determined because wealthy women are more likely to have access to the resources needed to use bottles hygienically. However, in Zimbabwe the recent Baby Friendly Initiative has been undertaken at hospitals and clinics in an effort to further reduce bottle use.

At 6 percent the proportion of Zimbabwean infants less than 4 months of age who receive a bottle is in the middle range of sub-Saharan countries (Figure 3.6).

Figure 3.6
Infants under 4 Months Who Receive a Supplemental Bottle in Zimbabwe Compared With Other Sub-Saharan Countries



Note: Information on feeding practices is based on the 24 hours preceding the survey. WHO recommends that all infants should receive nothing but breast milk until about 6 months of age.

DHS Surveys 1986-1995

3.8 Breastfeeding during Illness and Recovery

Current recommendations for optimal infant feeding practices include increasing the frequency of breastfeeding during illness. Although data on changes during feeding practices during diarrhoea were collected (see Chapter 5), specific data on breastfeeding practices during diarrhoea were not collected and hence cannot be compared with recommended practices.

3.9 Duration of Breastfeeding

The median duration of breastfeeding among last born children, or the time when 50 percent of infants are no longer breastfed is nearly 19 months (Table 3.5). Durations are longer in rural areas where the median duration is over 19 months compared with nearly 18 months in urban areas. Provincial differences are also apparent; the longest duration is found in Masvingo province (20 months) and the shortest in the province of Bulawayo (17 months). Both male and female children are breastfed equally long.

3.10 Reasons for Weaning

Information on the reasons for weaning was obtained from mothers for their last-born child (n=1,861). Overall, among last born children less than 3 years of age, the most common reason for weaning was another pregnancy (23 percent), maternal factors such as nipple or breast problem, lack of breast milk, employment, husband disapproval or other (8 percent), child illness (5 percent), maternal illness (2 percent) and time to wean (2 percent) (Table 3.6). The majority (61 percent) were still being breastfed. However, reasons for weaning differed significantly by province, urban/rural residence, child age, maternal education, possession score, and child nutritional status.

In general, women from the provinces of Harare/Chitungwiza and Bulawayo and in urban areas were more likely to report weaning for maternal factors compared with women in other provinces or in rural areas. Weaning because of child illness or maternal factors (i.e. nipple/breast problems, no milk, working, husband disapproval or other) was also more common among children 18 months of age or older. Weaning because of pregnancy increased from 2 percent among age 12 to 17 months to 23 percent among age 18 to 24 months to more than 60 percent among age 24 months. Women with a level of education of secondary school or greater and those with a high household possession score were more likely to report maternal factors as reasons for weaning

Table 3.5 Median duration of breastfeeding

Median duration of breastfeeding among children under three years, by selected background characteristics, Zimbabwe 1994

Background characteristic	Median duration of breastfeeding (months)			Number of children[2]
	Any	Exclusive	Full[1]	
Province				
Manicaland	18.1	0.5	2.0	311
Mashonaland C.	18.6	0.4	0.4	203
Mashonaland E.	18.1	0.5	0.7	244
Mashonaland W.	18.7	0.4	0.5	279
Matabeleland N.	19.3	0.6	2.6	184
Matabeleland S.	17.5	1.0	2.4	135
Midlands	18.2	0.4	0.7	331
Masvingo	20.1	0.4	0.6	245
Harare/Chitungwiza	19.0	0.5	1.8	314
Bulawayo	16.8	0.6	0.7	118
Residence				
Urban	17.6	0.5	1.3	617
Rural	19.2	0.5	0.7	1,747
Mother's education				
No education	20.1	0.5	1.7	297
Primary	19.0	0.5	0.6	1,183
Secondary+	17.8	0.4	0.9	884
Assistance at delivery				
Health professional	18.4	0.5	0.8	1,640
Trad. birth attendant	18.5	0.4	0.6	406
Other/none	19.6	0.4	0.6	316
Sex of child				
Male	18.5	0.4	0.6	1,159
Female	18.6	0.5	1.0	1,205
Total	18.5	0.5	0.7	2,364

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

42

compared with women with less education. It is also interesting to note that mothers of stunted or wasted children were significantly more likely to report child illness as reasons for weaning compared with mothers of normal weight children.

Table 3.6 Reason for weaning last-born child

Among last-born children under three years, the percentage fully weaned because; the mother or child was ill, maternal/child characteristics, subsequent pregnancy, mother considered it time to wean, or still breastfeeding by selected background characteristics, Zimbabwe 1994

Background characteristic	Mother ill	Child ill	Maternal factors[1]	Pregnancy	Time to wean	Still breast-feeding	Total	Number of children
Child's age (months)								
0-5	0.0	0.0	0.6	0.3	0.0	99.1	100.0	348
6-11	0.0	0.8	0.8	0.3	0.3	97.9	100.0	380
12-17	1.4	1.7	7.1	2.4	0.7	86.8	100.0	295
18-23	4.7	11.9	14.1	22.5	5.0	41.9	100.0	320
24-29	3.8	7.6	14.8	62.9	3.8	7.2	100.0	264
30-35	3.5	13.0	13.4	67.7	1.2	1.2	100.0	254
				p<0.0001				
Province								
Manicaland	2.2	4.8	6.1	21.7	0.4	64.8	100.0	230
Mashonaland C.	2.4	7.3	5.5	25.6	1.8	57.3	100.0	164
Mashonaland E.	2.6	6.2	5.7	25.4	1.0	59.1	100.0	193
Mashonaland W.	0.9	4.1	6.4	22.8	1.4	64.4	100.0	219
Matabeleland N.	1.4	5.6	4.9	16.0	2.8	69.4	100.0	144
Matabeleland S.	0.9	3.6	4.5	24.5	3.6	62.7	100.0	110
Midlands	2.0	4.4	7.3	19.4	1.2	65.7	100.0	248
Masvingo	2.1	3.6	4.1	26.9	2.1	61.1	100.0	193
Harare/Chitungwiza	3.4	9.2	15.3	19.1	1.9	51.1	100.0	262
Bulawayo	1.0	1.0	19.6	27.8	1.0	49.5	100.0	97
				p<0.0001				
Residence								
Urban	2.9	6.3	15.3	22.4	1.6	51.4	100.0	490
Rural	1.8	4.9	5.0	22.6	1.8	64.1	100.0	1,370
				p<0.0001				
Mother's education								
No education	0.9	3.8	2.6	22.6	3.8	66.2	100.0	234
Primary	2.5	5.0	5.4	25.1	1.8	60.2	100.0	947
Secondary +	1.8	6.3	12.8	18.8	0.9	59.4	100.0	680
				p<0.0001				
Possession score[2]								
0	1.7	5.7	4.3	22.8	1.8	63.8	100.0	949
1	2.8	5.0	8.0	23.1	2.4	58.7	100.0	537
2 +	1.9	4.7	16.4	21.4	0.8	54.8	100.0	365
				p<0.0001				
Stunted								
Yes	3.3	11.2	6.9	29.8	4.3	44.4	100.0	392
No	1.7	3.7	7.9	20.6	1.0	65.1	100.0	1,468
				p<0.0001				
Underweight								
Yes	2.7	14.0	5.8	20.5	4.5	52.4	100.0	292
No	1.9	3.6	8.1	22.9	1.2	62.3	100.0	1,569
				p<0.0001				
Total	2.0	5.3	7.7	22.5	1.7	60.7	100.0	1,861

Note: Analysis is based on 1,861 last-born children. Level of significance determined using Chi-square test.
[1] Nipple/breast problem, no milk, working, husband disapproved, other
[2] Score of one for availability/ownership of electricity, radio, television, or refrigerator. Maximum score of 4.

3.11 Summary and Recommendations

The infant feeding behaviour that threatens child nutritional status and health is the lack of a cultural norm of exclusive breastfeeding. The early introduction of water, liquids, and complementary foods is not only not necessary to infant nutrition but puts infants at risk of diarrhoea because of contamination during a period in life when their own immune systems are immature. Early introduction of other liquids and foods also reduces the time the infant suckles at the breast, which in turn reduces maternal breast milk supply. Lastly, reduced infant suckling also shortens the length of postpartum amenorrhoea, which puts a woman at risk of pregnancy in the absence of other methods of contraception. Delayed introduction of complementary foods is not a problem in Zimbabwe as in many other sub-Saharan countries.

Thus, the key recommendations to improve infant and child feeding practices are as follows:

- Qualitative research to understand the reasons behind the early introduction of water, liquids, and complementary foods should be reinforced and public health messages to promote the practice of exclusive breastfeeding as the safest and most nutritious infant feeding method for infants less than about 4 to 6 months of age should be identified.

- Public health education efforts should be made to increase awareness of the importance of initiating breastfeeding immediately after birth and exclusive breastfeeding for the first 4 to 6 months of life. These efforts should be targeted to medical practitioners and other health service providers.

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

- Operations research is needed to test the effectiveness of the messages identified by the qualitative research in extending the duration of exclusive breastfeeding.

- The Baby Friendly Hospital Initiative, currently underway in Zimbabwe, should continue to be supported and strengthened.

CHAPTER 4

MORBIDITY AND MORTALITY

Illness and inadequate food intake are direct causes of malnutrition (Jamison, 1993). In turn, malnutrition also results in increased risk of death. Although diarrhoeal diseases pose a greater risk for malnutrition, acute respiratory infection (ARI) is the most common childhood illness in the developing world and accounts for the greatest proportion of infant and under-five mortality in these countries (Jamison et al., 1993) In Zimbabwe, pneumonia is the leading cause of death (Central Statistics Office, 1995). In this chapter, the rates of mortality are described and compared with data from the 1988 ZDHS. The prevalence and age-specific patterns of three common childhood illnesses, acute respiratory infection, fever, and diarrhoea, are also described and related to care-seeking behaviours.

4.1 Infant and Under-five Mortality

Infant and under-five mortality rates were calculated for the five and ten year periods preceding the 1994 ZDHS. The infant mortality rate (IMR) is the probability of death in the first year of life and is calculated per 1,000 live births. Similarly, the under-five mortality rate (U5MR) is the probability of dying before the child's fifth birthday and is calculated per 1,000 live births. The IMR is thus embedded in the U5MR.

In Zimbabwe, the IMR for the five years preceding the 1994 ZDHS is 53. For the ten years preceding the survey, the IMR is 51, with about half of these deaths occurring in the first month of life. The IMR differs significantly by province, urban/rural residence, maternal education, maternal age at birth, previous birth interval, and sex of child (Table 4.1).[1] The provinces of Harare/Chitungwiza and Bulawayo have the lowest IMR at 30 and the province of Mashonaland West has the highest at 86. Mashonaland West may have the highest IMR because it has the best data gathering system. Infants in rural areas have an IMR of 54 compared with 44 for infants in urban areas.

Maternal education is a powerful predictor of IMR. Infants of mothers with no education, primary education, and secondary education have an IMR of 62, 54, and 39, respectively. Maternal education is associated with household wealth and hence access to resources. Educated women are more likely to use available health services and have greater knowledge of nutrition, hygiene, and other behaviours related to child care. Maternal age of greater than 40 years at the time of birth is also associated with increased IMR, however, because this rate is based on less than 250 births it should be interpreted with caution. A previous birth interval of less than 2 years is also strongly associated with the IMR. Infants born less than 2 years after a previous sibling have an IMR of 87 compared with 42 for infants born 2 to 3 years after a previous sibling. Male infants are also more likely to die in the first year of life compared with female infants: the IMR for male and female infants is 57 and 46, respectively.

The U5MR is 76 (or 77, using the preceding 5 years only), indicating that two-thirds of all deaths before age 5 years occur during the first year of life with only one-third occurring during the subsequent 4 years. As with the IMR, the U5MR differs similarly by province, urban/rural residence, maternal education, maternal age at birth, previous birth interval, and sex of child (Table 4.1). Particularly striking is the effect of birth interval on the U5MR. Children with a previous birth interval of less than two-years have an U5MR of 130, indicating that

[1] In Table 4.1 differential mortality rates by background characteristics are based on the ten-year period preceding the 1994 ZDHS. Five year rates are shown, but these are not used in the analysis of differentials. Ten-year rates have been found to give stranger statistical validity to these analyses.

Table 4.1 Infant and under-five mortality rates

Infant and under-five mortality rates for the ten-year period preceding the survey, by selected background characteristics, Zimbabwe 1994

Background characteristic	Mortality rates (per 1,000) Infant	Under-five
Province		
Manicaland	55.8	86.9
Mashonaland C.	60.4	88.5
Mashonaland E.	43.3	68.2
Mashonaland W.	86.0	116.4
Matabeleland N.	42.9	69.7
Matabeleland S.	53.1	72.8
Midlands	43.4	71.9
Masvingo	58.2	78.0
Harare/Chitungwiza	30.2	49.4
Bulawayo	30.4	36.2
Residence		
Urban	44.3	63.0
Rural	53.6	80.3
Mother's education		
None	61.6	93.1
Primary	53.9	78.7
Secondary+	38.6	56.6
Mother's age at birth		
<20	54.7	85.3
20-29	53.5	77.1
30-39	42.3	63.5
40-49	*	*
Birth order		
1	53.2	79.0
2-3	51.4	73.8
4-6	50.1	74.0
7+	49.9	80.2
Previous birth interval		
<2 years	87.4	129.5
2-3 years	42.4	63.4
4 years+	44.4	60.5
Sex of child		
Male	56.9	81.8
Female	45.5	69.9
Total	51.2	75.9
Five-year rate	52.8	77.1

Note: *Infant mortality rate:* the probability of dying before the first birthday; *under-five mortality rate:* the probability of dying before the fifth birthday.
* Rate suppressed because based on less than 250 births

half of all under five deaths occur between years 1 and 4 rather than the one-third that is characteristic for the other indicators (Figure 4.1). As illustrated by Figure 4.1 children aged one to four years born after a short birth interval (defined as less than two years) are three times more likely to die compared with children of the same age range born after a longer interval.

Because the relationships reported in this section between mortality and various background characteristics are bivariate associations and may themselves be correlated, they do not imply causality. Differences based on province and urban/rural residence are likely to be related to characteristics of the population (e.g. maternal education) in these provinces and/or access to medical care. However, the associations between length of preceding birth interval and sex of child are likely to be causal.

Shorter birth intervals result in vulnerable infants and young children having to compete for parental time and resources when they are least able to do so. Shorter birth intervals also stress women's nutritional status and hence potentially compromise birth weight and lactational ability. The finding that short birth intervals are strongly associated with child mortality, in particular, demonstrates the potential impact on mortality reduction that successful efforts to promote birth spacing could achieve.

The excess mortality among male infants diminishes after infancy, which suggests a biological cause rather one related to different child feeding and/or care practices compared with female infants. Another reason to suspect biological vulnerability is the finding that sex-specific differences in the duration of breastfeeding were not detected. Male children were more likely to suffer from stunting, however, which suggests that they may be more vulnerable to the effects of disease.

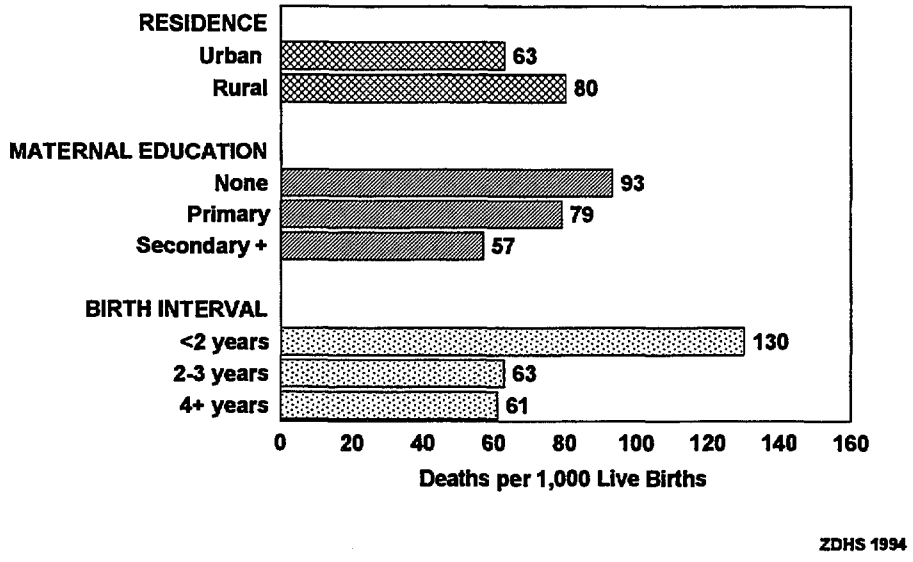
4.2 Changes in Mortality

The IMR and U5MR in the 1994 ZDHS are similar to the rates calculated from the 1988 ZDHS, indicating that there has been no change over the past 6 years in either infant or child mortality. The 1994 Zimbabwe DHS report suggests three reasons for these mortality trends: 1) a recent worsening of the economic situation in Zimbabwean households and subsequent effects on child health and nutrition; 2) the direct and indirect impact of the AIDS epidemic on child health and survival; and, 3) diminishing returns from the simple, targeted health and nutrition interventions responsible for earlier improvements in child survival that will persist

46

until background causes of infant and child mortality, e.g. poverty, are addressed. The trends may also be related to the reduced Government expenditure in social services, health and education, due to the pressure of structural readjustment reforms. As the report suggests, the stagnation in mortality declines is likely to be due to a combination of these and perhaps other factors.

Figure 4.1
Under-five Mortality by Selected Background Characteristics, Zimbabwe



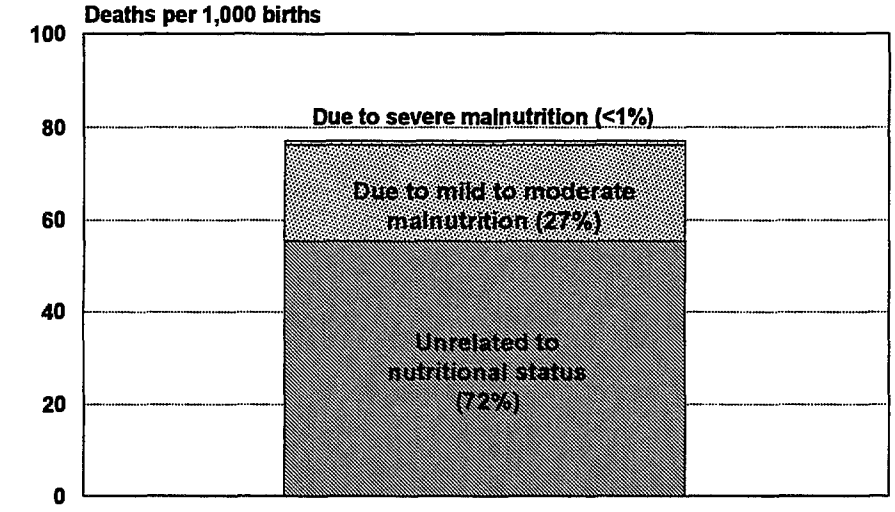
4.3 Contribution of Undernutrition to Under-five Mortality

Malnutrition is an important factor in the death of many young children. Malnutrition has a synergistic relationship with disease that causes an increase in the risk of mortality. The contributions of moderate and severe malnutrition to child mortality in Zimbabwe are presented in Figure 4.2. A total of 28 percent of all deaths that occur before age five are related to malnutrition. Because of its high prevalence, moderate rather than severe malnutrition contributes to the majority of these deaths. This suggests that nutrition programmes established to prevent and treat moderate malnutrition, as well as severe malnutrition, will have an important impact on child mortality. Moreover, great care should be taken before withdrawing feeding programmes in certain areas of the country, as these programmes provide a safety net against a worsening of the nutrition situation.

4.4 Child Mortality Compared with other Sub-Saharan Countries

Under-five mortality is low in Zimbabwe in comparison with other sub-Saharan countries. At current mortality rates, less than 8 percent of children will die before their fifth birthday. This mortality rate is the second lowest among all sub-Saharan countries surveyed (Figure 4.3). However, the relatively low mortality rates should not lead to complacency in this area, as it is still a troubling fact that mortality rates have not improved in Zimbabwe in nearly a decade.

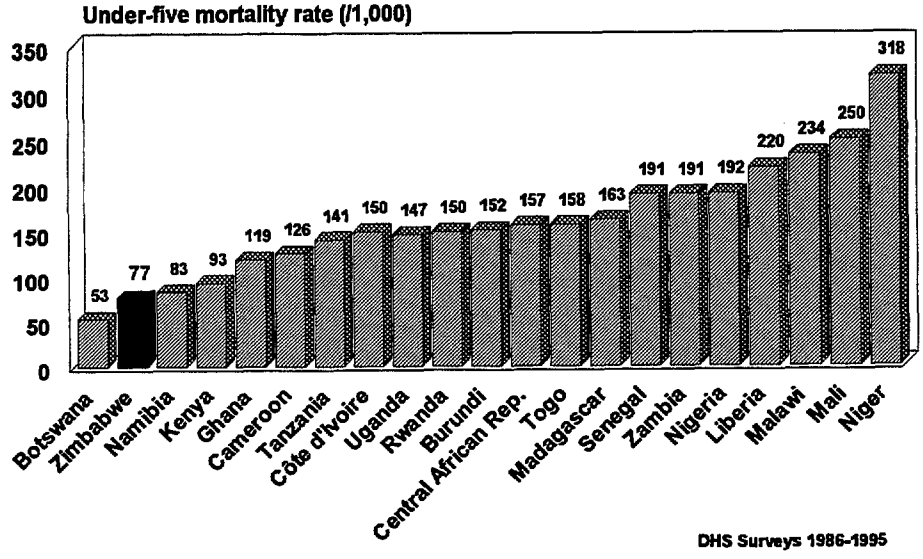
Figure 4.2
Contribution of Malnutrition to Under-five Mortality, Zimbabwe



Note: Calculation based on Pelletier et al., 1993

ZDHS 1994

Figure 4.3
Child Mortality in Zimbabwe Compared with Other Sub-Saharan Countries



DHS Surveys 1986-1995

48

4.5 Age-Specific Patterns of Morbidity

Because pneumonia—a leading cause of childhood mortality in Zimbabwe—can be treated with antibiotics, a programme to control acute respiratory infections (ARI) has been initiated. Emphasis has been placed on educating both mothers and health workers to recognize the signs of impending severity of ARI so that appropriate treatment can be sought. These efforts have been strained, however, by Government budget cuts in health, rendering many institutions unable to cope with the demand for services. In the ZDHS, the prevalence of ARI was estimated by asking mothers if their children under age three had been ill with cough accompanied by short, rapid breathing in the two weeks preceding the survey. More than half (51 percent) of all children were reported by their mothers to have ARI (Table 4.2). This high rate is in part due to the fact that the survey began during the coldest time in Zimbabwe when respiratory infections are more prevalent.

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

Percentage of children under three years with diarrhoea, fever, and cough in the two weeks preceding the survey and whether treatment was sought, by province and residence, Zimbabwe 1994

	Percentage of children with:					Advice/treatment sought for:			
Province and residence	Diarrhoea	Fever	Cough	Cough with rapid breathing[1]	Number of children	Diar-rhoea	Number of children	Fever/ Cough	Number of children
Province									
Manicaland	25.7	44.0	46.8	62.1	248	22.6	62	79.3	116
Mashonaland C.	28.3	46.1	56.1	50.5	180	36.0	50	69.3	101
Mashonaland E.	19.3	36.0	41.0	54.0	212	45.0	40	77.0	87
Mashonaland W.	28.5	54.0	65.8	66.5	240	33.8	68	77.8	158
Matabeleland N.	26.6	22.2	51.3	46.3	158	34.1	41	60.5	81
Matabeleland S.	12.7	13.6	39.8	27.7	118	46.7	15	66.0	47
Midlands	29.5	56.3	62.4	56.7	274	47.4	78	73.5	170
Masvingo	31.9	55.3	51.7	65.4	207	41.0	61	63.9	108
Harare/ Chitungwiza	19.5	40.2	42.5	28.4	273	32.1	53	70.4	115
Bulawayo	15.5	10.7	40.4	31.7	104	37.5	16	65.9	41
	p<0.0001	p<0.0001	p<0.0001	p<0.0001		NS		p<0.04	
Residence									
Urban	18.7	36.0	45.2	35.9	518	32.0	97	72.4	232
Rural	26.8	43.5	53.0	57.4	1,493	38.3	389	71.6	791
	p<0.0003	p<0.004	p<0.003	p<0.0001		NS		NS	
Total	24.7	41.6	51.0	52.5		37.0		71.7	

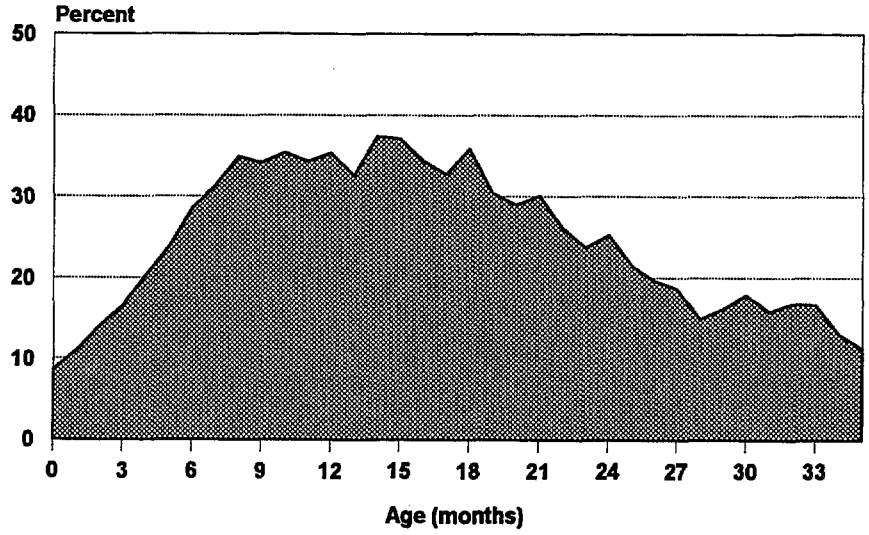
Note: Level of significance determined using Chi-square test.
NS = Not significant
[1] Based on a total of 1,024 children with cough

The prevalence of other common child illnesses was also ascertained. Because malaria is endemic throughout some parts of Zimbabwe and is manifested by fever, mothers were asked whether their children under the age of three had a fever in the two weeks preceding the survey. To estimate the prevalence of diarrhoea, mothers were also asked whether their children had diarrhoea in the preceding two weeks. Based on these reports, 42 percent of the children had a fever, and 25 percent had diarrhoea (Table 4.2). These data should be interpreted with caution due to the methodological problems often associated with maternal recall (Haggerty et al., 1994; Martorell et al., 1976).

Significant differences for these three illnesses were found by province and urban/rural residence. For example, the prevalence of diarrhoea ranged from 13 percent in the province of Matabeleland South to 32 percent in the province of Masvingo. The prevalence of fever ranged from 14 percent in the province of Matabeleland to 56 percent in Midlands. The prevalence of cough ranged form 40 percent in the province of Matabeleland South and Mashonaland East to 66 percent in Mashonaland West. In general, prevalence rates for all three illnesses were lowest in the provinces of Mashonaland East, Matabeleland South, and Harare/Chitungwiza compared with other provinces, and lower in urban are compared with rural areas. Because these rates are based on maternal reports, the extent to which the wide range of prevalence rates reflect genuine differences, or are due to differences in perceptions of disease, cannot be determined.

As with malnutrition, significant age-related patterns were found in the prevalence of diarrhoea, fever, and cough. The prevalence of diarrhoea starts to climb precipitously at birth, peaking at about 8 months of age, and remaining high until about 15 months before beginning to decline (Figure 4.4). At the peak, about 40 percent of all mothers reported that their child had experienced diarrhoea in the preceding two weeks. The rapid rise in the prevalence of diarrhoea during infancy may reflect the increased risk of pathogen contamination associated with the early introduction of water, other liquids, and solid foods. In addition, once infants begin to crawl and move around, they tend to put objects in their mouths, again increasing the risk of pathogen contamination. This further emphasizes the need to vigorously promote exclusive breastfeeding in the first 4 to 6 months of life.

Figure 4.4
Diarrhoea by Age of Child, Zimbabwe

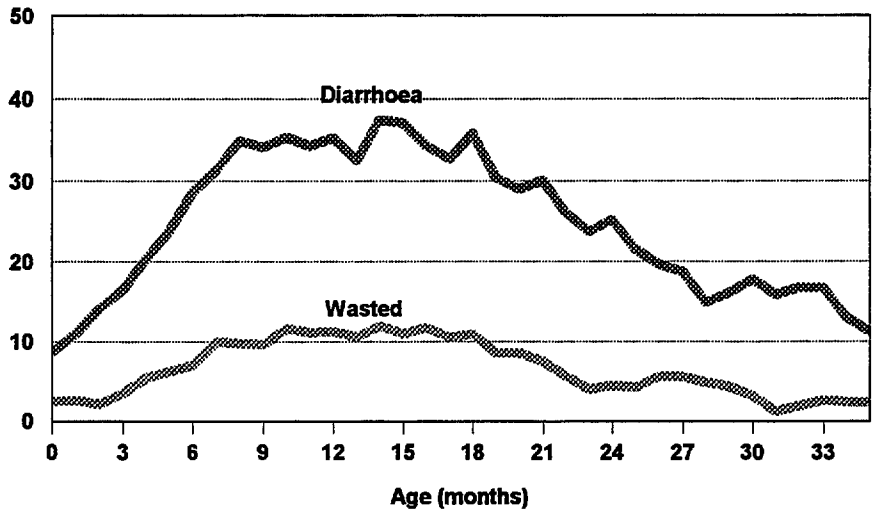


ZDHS 1994

Diarrhoea frequently causes fluid loss and dehydration, decreased food intake because of anorexia, malabsorption and increased nutrient loss (Molla et al., 1976). Both dehydration and decreased food intake can lead directly to wasting. Not surprisingly, the age-specific pattern of diarrhoea is similar to that for wasting, illustrating the direct relationship between diarrhoea and malnutrition (Figure 4.5).

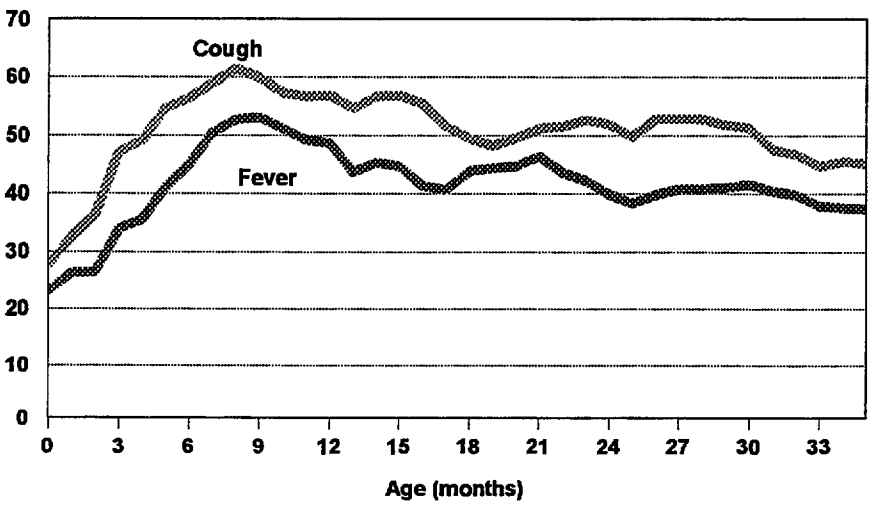
60

Figure 4.5
Diarrhoea and Wasting by Age of Child, Zimbabwe



ZDHS 1994

Figure 4.6
Fever and Cough by Age of Child, Zimbabwe



ZDHS 1994

51

The age-specific patterns of fever and cough peak at around 9 months of age, slightly earlier than those for diarrhoea. They decrease to around 50 percent (cough) and 45 percent (fever) at around 18 months of age, and remain at this level before declining slightly near the end of the third year of life (Figure 4.6).

4.6 Morbidity and Treatment

Overall, advice or treatment was sought for 37 percent of episodes of diarrhoea and 72 percent of episodes of fever/cough (Table 4.2). There were no significant provincial or urban/rural differences in care-seeking behaviour for diarrhoea. With respect to fever/cough, there were provincial but no urban/rural differences. More than 77 percent of women in Mashonaland East and West provinces sought care for their children compared with only 61 percent in Matabeleland North province.

About two-thirds of all women seeking treatment for their child's diarrhoea illness reported using a public facility (Table 4.3), 17 percent used a private facility, 9 percent used a traditional practitioner, and 8 percent used another private source such as a shop, store, relative or other. Women in urban areas were far more likely to use a private facility compared with women in rural areas (33 versus 13 percent, respectively). There were no provincial differences in source of treatment.

Table 4.3 Source for treatment of diarrhoea

Percent distribution of children under three years with diarrhoea whose mothers sought treatment/advice from various sources, by province and residence, Zimbabwe 1994

Province and residence	Source for treatment of diarrhoea: Public facility[1]	Private facility[2]	Traditional practitioner	Other private[3]	Total	Number of children	Inter-province/ residence differences
Province							
Manicaland	46.2	23.1	23.1	7.7	100.0	13	
Mashonaland C.	73.7	5.3	15.8	5.3	100.0	19	
Mashonaland E.	94.4	5.6	0.0	0.0	100.0	18	
Mashonaland W.	39.1	26.1	26.1	8.7	100.0	23	
Matabeleland N.	66.7	13.3	13.3	6.7	100.0	15	
Matabeleland S.	71.4	14.3	14.3	0.0	100.0	7	
Midlands	73.0	16.2	5.4	5.4	100.0	37	
Masvingo	68.0	12.0	0.0	20.0	100.0	25	
Harare/Chitungwiza	58.8	29.4	0.0	11.8	100.0	17	
Bulawayo	71.4	14.3	0.0	14.3	100.0	7	NS
Residence							
Urban	61.3	32.3	0.0	6.5	100.0	31	
Rural	66.9	13.2	11.3	8.6	100.0	151	$p<0.05$
Total	65.9	16.5	9.3	8.2	100.0	182	

NS = Not significant
[1] Public hospital, health center, clinic, health post
[2] Private hospital, doctor, clinic, pharmacy
[3] Shop, store, relative, other

Slightly more than half of all women who sought treatment for their child's illness of fever/cough reported using a public facility for treatment (Table 4.4). Another 17 percent used a private facility, 4 percent a traditional practitioner, and 14 percent another private source. As with treatment for diarrhoea, there were significant urban/rural differences in the source of treatment, with urban women being more likely to seek treatment from

52

a private facility and rural women more likely to seek treatment from another private source. There were provincial differences in treatment seeking behaviour with women in the Harare/Chitungwiza and Bulawayo provinces more likely to use a private facility compared with women from the other provinces. This is undoubtedly due to the fact that these provinces are largely comprised or urban areas, where there are many private medical practitioners available.

Table 4.4 Source for treatment of fever and cough

Percentage of children under three years sick with fever/cough whose mothers sought treatment/advice from various sources, by province and residence, Zimbabwe 1994

	Source for treatment of fever/cough						
Province and residence	Public facility[1]	Private facility[2]	Traditional practitioner	Other private[3]	Total	Number of children	Inter-province/ residence difference
Province							
Manicaland	37.0	13.0	12.0	38.0	100.0	92	
Mashonaland C.	49.3	7.0	2.8	40.8	100.0	71	
Mashonaland E.	49.3	9.0	3.0	38.8	100.0	67	
Mashonaland W.	45.9	19.7	3.3	31.1	100.0	122	
Matabeleland N.	55.1	16.3	2.0	26.5	100.0	49	
Matabeleland S.	58.1	19.4	9.7	12.9	100.0	31	
Midlands	57.3	20.2	2.4	20.2	100.0	124	
Masvingo	66.7	11.6	2.9	18.8	100.0	69	
Harare/Chitungwiza	60.0	27.5	3.8	8.8	100.0	80	
Bulawayo	48.1	33.3	0.0	18.5	100.0	27	p<0.0001
Residence							
Urban	56.0	26.2	3.6	14.3	100.0	168	
Rural	50.9	14.5	4.4	30.2	100.0	566	p<0.0001
Total	52.0	17.2	4.2	26.6	100.0	734	

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

Among children with diarrhoea, nearly 80 percent, were given some form of oral rehydration therapy (ORT) (Table 4.5). The vast majority of these (78 percent) were treated with sugar-salt-water solution (SSS). There were provincial but no urban/rural differences in use of the SSS. Women in the provinces of Mashonaland East, Matabeleland South, and Bulawayo were most likely to use SSS and women in the provinces of Matabeleland North and Manicaland least likely to use SSS.

Knowledge of proper treatment for diarrhoea is high; 99 percent of women are aware of sugar-salt-water solution for the treatment of diarrhoea (Table 4.6). Feeding practices for children with diarrhoea varied by mother's age, urban/rural residence, province and mother's education level. Mothers in the youngest age group (15-19 years) were most likely to decrease the amount of liquids for their child during a diarrhoeal episode, while mothers in the other age groups were likely to increase liquids. Women in urban areas were slightly more likely to increase liquids than women in rural areas. Women residing in Mashonaland East, were most likely to increase liquids, while women in Bulawayo were least likely. Women with secondary school or higher education were also more likely to increase liquids compared with women with none or primary education. Overall, 73 percent of women increased the amount of liquids given to the child during the diarrhoeal episode.

Table 4.5 Use of oral rehydration therapy for treatment of diarrhoea

Percentage of children under three years who had diarrhoea in the preceding two weeks whose mothers treated them with oral rehydration therapy (ORT): sugar-salt-water solution (SSS) and/or other recommended home fluids (RHF), by province and residence, Zimbabwe 1994

Province and residence	Gave SSS[1]		Gave RHF[2]		Gave ORT[3]	
	Percent	Number	Percent	Number	Percent	Number
Province						
Manicaland	60.9	64	14.3	63	60.9	64
Mashonaland C.	80.4	51	5.9	51	80.4	51
Mashonaland E.	92.5	40	20.0	40	92.5	40
Mashonaland W.	80.9	68	4.4	68	80.9	68
Matabeleland N.	71.4	42	9.8	41	71.4	42
Matabeleland S.	87.5	16	13.3	15	87.5	16
Midlands	82.7	81	18.5	81	82.7	81
Masvingo	74.2	66	16.7	66	74.2	66
Harare/Chitungwiza	83.3	54	13.0	54	87.0	54
Bulawayo	87.5	16	6.3	16	87.5	16
	p<0.001		NS		p<0.005	
Residence						
Urban	80.4	97	13.4	97	82.5	97
Rural	78.3	400	12.5	400	78.3	400
	NS		NS		NS	
Total	78.7	497	12.7	497	79.1	497

NS = Not significant
[1] Solution prepared with sugar, salt and water
[2] Other recommended home fluids
[3] Oral rehydration therapy (SSS and/or RHF)

The provision of more solids during diarrhoeal episode is not as varied as liquids, however, there are some differences. Overall, women provided more solids to children during a diarrhoeal episode 51 percent of the time. Women is urban areas were more likely than women in rural areas to provide the same amount of solids rather than increase or decrease the amount of solids. By province, women in Mashonaland East increased solids 45 percent of the time, while those in Mashonaland West increased solids 65 percent of the time. Additionally, women with no education were least likely to provide more solids, compared with women with secondary or higher education (43 to 52 percent, respectively).

Current recommendations by WHO and UNICEF call for the continuation of feeding, with an increase in fluids during a diarrhoeal episode. Women who are breastfeeding are encouraged not only to continue breastfeeding, but also to increase the frequency of these feeds. Data were not collected in ZDHS on breastfeeding patterns during diarrhoea. Hence, the extent to which women are complying with this recommendation cannot be determined. However, the data do show that among women with children less than three years, 17 percent think that a child ill with diarrhoea should receive less to drink, and 23 percent said that they should get less to eat (Table 4.6). Women with secondary education are more likely to have knowledge about the need to increase liquids and foods during a diarrhoeal episode. Women in rural areas were also more likely to say that children should receive less liquids and food during a diarrhoeal episode compared with women in urban areas. Young teenage mothers were also likely to say that children should receive less liquids during a diarrhoeal episode.

Although the majority of women reported correct knowledge with respect to recommended child feeding practices during diarrhoea, 22 percent of children ill with diarrhoea were given less to drink (Table 4.7). It cannot

Table 4.6 Knowledge of diarrhoea care

Percentage of children born in the last three years whose mothers know about the use of sugar-salt-water solution (SSS) for treatment of diarrhoea and the percent distribution of children by mother's knowledge of appropriate feeding during diarrhoea, according to background characteristics, Zimbabwe 1994

		Percentage of children whose:									
		Mother said to give less, the same, or more fluids during diarrhoea				Mother said to give less, the same, or more solid foods during diarrhoea					
Background characteristic	Mother knows about SSS for treatment of diarrhoea	Less	Same	More	Don't know/ Missing	Less	Same	More	Don't know/ Missing	Total	Number of children
Age											
15-19	96.7	22.8	16.1	59.4	1.7	21.7	30.0	46.7	1.7	100.0	180
20-24	98.4	16.1	10.9	72.4	0.6	21.3	23.4	54.8	0.5	100.0	615
25-29	99.5	15.2	8.4	75.8	0.7	20.0	26.8	52.5	0.7	100.0	444
30-34	99.3	18.2	7.8	73.5	0.5	26.8	25.5	47.0	0.7	100.0	411
35-49	99.7	13.5	8.8	76.6	1.1	23.1	27.3	48.8	0.8	100.0	363
			p<0.05				NS				
Residence											
Urban	99.0	10.8	8.1	80.7	0.4	20.7	30.8	48.0	0.6	100.0	517
Rural	98.9	18.5	10.4	70.2	1.0	23.1	24.2	51.9	0.8	100.0	1,494
			p<0.0006				p<0.05				
Province											
Manicaland	98.4	15.7	7.3	77.0	0.0	22.6	24.2	52.8	0.4	100.0	248
Mashonaland C.	98.9	14.4	11.1	74.4	0.0	19.4	28.9	51.1	0.6	100.0	180
Mashonaland E.	99.1	10.0	8.5	80.1	1.4	32.1	23.1	44.8	0.0	100.0	212
Mashonaland W.	98.7	15.9	10.5	73.6	0.0	19.2	15.9	64.9	0.0	100.0	239
Matabeleland N.	98.1	20.9	8.2	65.2	5.7	25.8	21.9	47.7	4.5	100.0	155
Matabeleland S.	99.2	30.5	7.6	61.0	0.8	23.7	31.4	44.9	0.0	100.0	118
Midlands	99.3	18.2	9.8	71.6	0.4	18.2	28.5	52.9	0.4	100.0	274
Masvingo	100.0	22.6	15.4	61.5	0.5	24.0	25.0	50.5	0.5	100.0	208
Harare/ Chitungwiza	98.9	7.0	7.7	85.3	0.0	21.0	27.3	51.7	0.0	100.0	271
Bulawayo	99.0	22.1	13.5	62.5	1.9	22.1	43.3	31.7	2.9	100.0	104
			p<0.008				p<0.005				
Mother's education											
No education	98.8	20.6	13.1	64.3	2.0	31.9	24.3	43.0	0.8	100.0	251
Primary	98.5	20.0	10.3	69.0	0.7	23.3	23.5	52.6	0.6	100.0	1,021
Secondary +	99.5	10.1	8.1	81.1	0.7	18.3	29.5	51.2	0.9	100.0	738
			p<0.05				NS				
Total	98.9	16.5	9.8	72.9	0.8	22.5	25.8	50.9	0.7	100.0	2,010

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

be determined from the data the extent to which liquids may have been offered, which the sick child refused, or if increased liquids were not offered at all. These data, however, point to the importance of breastfeeding during illness as breast milk provides an important source of nutrients during a time when a child may be unwilling to take in other liquids and foods.

4.7 Factors Associated with Diarrhoea

Diarrhoea among children under 3 years of age in the previous two-weeks was significantly related to a number of both biological and non-biological factors (Table 4.8). In general, women of higher socio-economic status as defined by floor material, type of toilet, possession score, education, and husband's education were

significantly less likely to report that their children had diarrhoea. Among the biological factors, mothers of male children and with children less than 24 months of age were significantly more likely to report diarrhoea. As seen in Figures 4.4 and 4.5, age is strongly associated with diarrhoea. Fever and cough were also associated with diarrhoea: children with fever were more than twice as likely to have diarrhoea compared with children without fever and children with a cough were nearly twice as likely to have diarrhoea compared with children without a cough. These results are not unlike findings from studies elsewhere in Africa (Manun'Ebo et al., 1994).

Table 4.7 Changes in feeding practices among children with diarrhoea

Among children under three years with diarrhoea, the percent distribution of those who received the same, more, or less fluids, by province and residence, Zimbabwe 1994

Province and residence	Amount of fluids received				Number of children
	Same	More	Less	Total	
Province					
Manicaland	32.8	53.1	14.1	100.0	64
Mashonaland C.	18.0	48.0	34.0	100.0	50
Mashonaland E.	14.6	78.0	7.3	100.0	41
Mashonaland W.	21.7	55.1	23.2	100.0	69
Matabeleland N.	19.0	54.8	26.2	100.0	42
Matabeleland S.	33.3	46.7	20.0	100.0	15
Midlands	13.8	55.0	31.1	100.0	80
Masvingo	15.2	60.6	24.2	100.0	66
Harare/Chitungwiza	9.4	77.4	13.2	100.0	53
Bulawayo	18.8	62.5	18.8	100.0	16
		p<0.01			
Residence					
Urban	12.4	76.3	11.3	100.0	97
Rural	20.3	55.0	24.8	100.0	400
		p<0.001			
Total	18.7	59.2	22.1	100.0	497

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

Because many of the factors associated with diarrhoea in a bivariate fashion are highly correlated, a logistic regression model was developed to identify the factors that best explain the prevalence of diarrhoea in the previous two weeks. The estimates of relative risk, based on the odds ratios from the regression model, are presented in Table 4.8. Although a number of factors were associated with diarrhoeal disease in a bivariate fashion, most of these were explained by three overriding factors: urban/rural residence, age of child, and presence of fever.

For each factor, one category serves as the reference category, as indicated by the value of 1. A net estimated relative risk greater than 1 indicates greater risk while a net relative risk less than 1 indicates reduced risk. The magnitude of increased or reduced risk is directly proportional to the net relative risk value. For example, for the factor urban/rural residence, the reference category is urban residence and is assigned a value of 1. The net relative risk of 2.2 for rural residence indicates that rural infants are a 2.2 times as likely to have diarrhoea compared with children living in urban areas.

Among the biological variables, age of child and the presence of fever were significantly related to diarrhoea (Table 4.8). Age of child is particularly important with children between the ages of 12 and 17 months 2.4 times more likely to suffer from diarrhoea and children 6 to 11 months and 18 to 23 months nearly 2 times as likely to suffer from diarrhoea compared with children 0-5 months of age. Children who had a fever were two times more likely to have diarrhoea compared with children without fever.

4.8 Summary and Recommendations

The results presented in this chapter show that rates of infant and under-five mortality have remained stagnant since the 1988 ZDHS. Malnutrition plays an important role in mortality in Zimbabwe, where nearly 28 percent of all deaths that occur before age five are related to malnutrition. The fact that two-thirds of all under-

56

Table 4.8 Prevalence and estimate of net relative risk of diarrhoea among children under three years

Percentage of children under three years who had diarrhoea in the preceding two weeks and the net relative risk of diarrhoea, by selected background characteristics, Zimbabwe 1994

Background characteristic	Diarrhoea	Net relative risk
Province		
Manicaland	25.7	
Mashonaland C.	28.3	
Mashonaland E.	19.3	
Mashonaland W.	28.5	
Matabeleland N.	26.6	
Matabeleland S.	12.7	
Midlands	29.5	
Masvingo	31.9	
Harare/Chitungwiza	19.5	
Bulawayo	15.5	
n=2013	p<0.0001	
Residence		
Urban	18.7	1.0[a]
Rural	26.8	2.2
n=2013	p<0.0003	
Mother's occupation		
Not working	22.8	
Professional[4]	16.0	
Agric-self employed	25.6	
Services	27.4	
Un/skilled manual	30.1	
n=2013	p<0.03	
Floor material		
Finished[1]	13.3	
Cement	22.6	
Earth/Dung[2]	27.2	
n=2004	p<0.02	
Type of toilet		
Own flush	16.2	
Shared flush	24.7	
Traditional pit	24.6	
Blair	23.8	
None	28.6	
n=2003	p<0.0005	

Table 4.8 — *Continued*

Background characteristic	Diarrhoea	Net relative risk
Possession score[3]		
0	28.0	
1	23.1	
2+	18.4	
n=2002	p<0.0005	
Watch television		
Yes	21.0	
No	25.8	
n=2008	p<0.04	
Child's age (months)		
0-5	15.1	1.0[a]
6-11	32.6	1.9[b]
12-17	37.4	2.4[b]
18-23	28.4	1.8[b]
24-29	19.3	1.2
30-35	15.3	0.98
n=2014	p<0.0001	
Fever (2 weeks)		
Yes	38.4	2.0
No	14.9	1.0[a]
n=2007	p<0.0001	
Cough (2 weeks)		
Yes	31.0	
No	18.1	
n=2011	p<0.0001	
Measles immunisation[5]		
Yes	26.1	
No	22.1	
n=2010	p<0.05	
Total	24.7	

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

five deaths occur during the first year of life coupled with the fact that half of all infant deaths occur within the first month of life point to the first year of life as a critical period to intervene to protect infant nutrition and health. Very early child feeding patterns, in particular, the low prevalence of exclusive breastfeeding, are likely to explain in part mortality patterns in the first year of life. Child spacing also emerges as an important factor for child nutrition and child survival. This suggests that reproductive health programmes that help women space their pregnancies, can be viewed as nutrition interventions in their own right.

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

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

- Public health campaigns are needed to increase the practice of putting the infant to the breast immediately after birth, and exclusively breastfeeding for the first 4 to 6 months of life.

- Similarly, efforts aimed at reducing low birth weight may also have an impact on neonatal death rates.

- Child feeding during and immediately after a diarrhoeal episode need to be improved. Public health campaigns are needed to educate mothers about methods of preparing appropriate liquids and solids for children during and after illness.

- Reproductive health programmes are needed to assist women in planning their pregnancies so as to increase the duration of breastfeeding as well as to increase birth intervals to two years or greater. Shorter birth spaces are especially harmful and can be prevented with exclusive breastfeeding.

- As long-term strategies, improvements in maternal education and environmental sanitation will have profound and sustainable effects on infants and child mortality.

58

CHAPTER 5

FACTORS ASSOCIATED WITH MALNUTRITION

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

5.1 Biological and Health Characteristics of Stunting

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

Among children less than 3 years of age stunting is significantly associated with the perceived size of the child at birth, low birth weight, twin birth, reason for weaning, maternal pregnancy status, birth interval, and the number of antenatal visits. In contrast to the incidence of low birth weight of 12 percent, 18 percent of mothers perceived their child to be "small" or "very small" at birth. The prevalence of stunting among these children was nearly twice as great compared with children perceived by their mothers to be of normal size at birth (35 percent compared with 19 percent, respectively). Low birth weight had a similar striking effect on stunting. The prevalence of stunting among children who had been born with low birth weight was 36 percent compared with 16 percent among children who had been born with normal birth weight. Low birth weight infants are known to be at-risk for growth retardation. Also the factors that cause low birth weight such as poor maternal nutritional status and poverty, are likely to exert their effects after birth. The relationship between perceived size at birth and stunting is less clear. Many of these infants may actually have been born with low birth weight. Twin birth is another risk factor for stunting, in part because of its correlation with low birth weight. The prevalence of stunting among twins was 37 percent compared with 21 percent among singletons.

Children who were weaned because of maternal illness, child illness, or maternal pregnancy were at greatest risk for stunting: these prevalences are 37, 42, and 41 percent, respectively. In contrast, children who are weaned because of "mother factors" (e.g. nipple/breast problems, lack of breast milk, and employment) or that are still breastfed are at lowest risk of stunting: these prevalences are 20 and 16 percent, respectively. These associations need to be interpreted with care, however, because stunting is a cumulative process and younger children (e.g. those still breastfed) are at lower risk because they have been exposed for a shorter time to factors that result in stunting compared with older children. Also, weaning because of "mother factors" was associated with higher maternal education and socio-economic status, indicating that maternal education and wealth may explain why children weaned for this reason have low prevalences of stunting. Stunting is also associated with maternal pregnancy status, as children of women who are currently pregnant face a greater risk of stunting than children of women who are not pregnant (33 versus 21 percent). Although this finding may reflect greater risk associated with short birth intervals, it may also reflect differences in the age distribution of the children and the fact that mothers of older children, who are at greater risk of the cumulative effects of stunting, may also be more likely to be pregnant than mothers of younger children. The number of antenatal visits a mother had was also inversely associated with stunting: the prevalence of stunting among children of mothers who had 7 or more visits was 18 percent compared with about 25 percent among those who had three or less, or no visits. Antenatal care can help prevent low birth weight, birth complications, and poor foetal and maternal health while, at the same time, providing mothers with valuable information about child care, health, and nutrition. However, antenatal care

Table 5.1 Stunting and wasting, by biological characteristics

Percentage of children under three years of age who are stunted and wasted, by biological characteristics, Zimbabwe 1994

Biological characteristic	Stunted	Wasted
Size of child at birth		
Small/very small	34.5	8.5
Average+	18.6	4.8
n=2013	p<0.0001	p<0.006
Birth weight		
Low	35.7	8.5
Normal	15.7	4.6
n=1381	p <0.0001	p<0.0001
Singleton/twin		
Singleton	21.0	5.4
Twin	36.5	7.3
n=2014	p<0.006	NS
Sex of child		
Male	21.7	6.5
Female	21.1	4.5
n=2014	NS	p <0.04
Reason for full weaning		
Mother ill	36.6	2.4
Child ill	42.4	8.5
Mother factors[1]	19.6	3.8
Child's age	26.5	2.6
Pregnancy	41.3	11.4
Currently breastfed	15.8	6.3
n=2006	p<0.0001	p<0.003
Current pregnancy status		
Yes	33.1	10.7
No/ not sure	20.5	5.1
n=2015	p<0.0004	p<0.005
Birth interval		
9-23m	31.4	6.5
24-35m	24.2	6.6
36+m	20.6	4.3
n=1501	p<0.01	NS
No. antenatal care visits		
None	24.2	3.7
1-3	26.4	6.2
4-6	21.1	5.7
7+	17.8	5.1
n=2014	p<0.02	NS
Diarrhoea (2 weeks)		
Yes	23.9	7.2
No	20.6	4.9
n=2013	NS	p<0.04
Fever (2 weeks)		
Yes	22.4	6.7
No	20.8	4.6
n=2006	NS	p<0.05
Total	21.4	5.5

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

is also related to socio-economic status as well as care-seeking behaviours, both of which are positively correlated with child health and nutritional status. Lastly, neither diarrhoea or fever in the previous two weeks was associated with stunting. This finding may reflect the fact that younger children who are most at-risk for both these illnesses have not been alive long enough to experience the cumulative effects of stunting.

5.2 Biological and Health Characteristics of Wasting

Many of the associations of wasting with biological and health characteristics are similar to that for stunting, such as perceived size of child, birth weight, and current pregnancy status (Table 5.1). A number of differences, however, are noted. In contrast to the results for stunting, twin birth was not a risk factor for wasting whereas male sex was a risk factor. Also, although "reason for weaning" is significantly associated with wasting, different reasons appear important than was the case for stunting. The prevalence of wasting among children whose mothers reported "pregnancy" as a reason for weaning was 11 percent. Because wasting peaks at younger ages, between 9 and 16 months, this suggests that premature weaning because of pregnancy may be a major cause of child malnutrition. Weaning because of "child illness" is also strongly associated with wasting. Neither birth interval or the number of antenatal visits was associated with wasting. However, both diarrhoea and fever in the preceding two weeks were strongly associated with wasting.

5.3 Socio-economic and Demographic Characteristics of Stunting

The associations between social and economic factors and stunting presented in Table 5.2 should be interpreted with caution as many of the factors are highly correlated. In general, the results confirm the fact that poverty as measured by maternal education, paternal education and occupation, access to a television and/or radio, possession score, type of transport owned, water source, type of toilet, and floor material are highly associated with stunting. The findings on maternal education and stunting are not expected. In some countries the prevalence of stunting is inversely related to maternal education. For example, in Senegal the prevalences of stunting are 29, 13, and 8 percent for women with no education, primary education, and secondary education, respectively. In contrast, in Zimbabwe the prevalences of

60

Table 5.2 Stunting and wasting, by socio-economic characteristics

Percentage of children under 3 years who are stunted, underweight, and wasted, by socio-economic characteristics, Zimbabwe 1994

Socio-economic characteristic	Stunted	Wasted
Child's age (months)		
0-5	3.5	3.0
6-11	10.2	7.6
12-17	25.2	8.9
18-23	36.1	6.0
24-29	28.7	4.1
30-35	28.7	3.2
n=2014	p<0.0001	p<0.002
Province		
Manicaland	19.2	6.2
Mashonaland C.	27.7	5.3
Mashonaland E.	22.8	1.9
Mashonaland W.	22.3	6.8
Matabeleland N.	28.5	9.8
Matabeleland S.	26.2	5.1
Midlands	12.8	7.5
Masvingo	24.6	2.1
Harare/Chitungwiza	20.9	5.7
Bulawayo	12.8	3.2
n=2012	p<0.0005	p<0.02
Mother's education		
No education	27.1	6.0
Primary	25.0	5.5
Secondary+	14.6	5.3
n=2013	p<0.0001	NS
Child care		
Mother	21.6	5.9
Family/relatives	21..2	4.3
Neighbors/friends	10.3	2.9
Other child	26.8	4.8
n=2014	p<0.03	NS
Mother currently working		
No	21.4	7.3
Yes	21.4	3.8
n=2012	NS	p<0.0005
Husband's education		
No education	34.8	5.1
Primary	25.1	6.0
Secondary+	15.7	4.6
n=1887	p<0.0001	NS
Husband's occupation		
Not working	18.0	6.0
Professional[1]	14.6	3.0
Agriculture/Self-employed	24.6	4.9
Service	21.6	8.1
Skill/Unskilled manual	23.3	5.8
n=1902	p<0.005	NS
Marital status		
Never married	19.2	8.5
Married	21.2	5.5
Widowed	43.1	7.3
Divorced	22.2	2.0
n=2014	p<0.03	NS

Table 5.2—*Continued*

Socio-economic characteristic	Stunted	Wasted
Sex of household head		
Male	21.5	6.2
Female	21.3	3.9
n=2014	NS	p<0.04
Watches TV weekly		
No	23.1	5.7
Yes	15.5	4.8
n=2009	p<0.0006	NS
Listens to radio daily		
No	23.6	6.6
Yes	17.7	3.6
n=2012	p<0.002	p<0.004
Possesses an epicard		
No	28.8	7.3
Yes	21.0	5.4
n=2013	p<0.05	NS
No. of live births		
1-4	19.3	13.8
5+	26.2	19.3
n=2014	p<0.0004	p<0.002
No. dead children		
0	19.0	5.2
1	28.6	5.8
2+	38.9	8.3
n=2014	p<0.0001	NS
Possession score[2]		
0	23.1	6.4
1	24.8	4.8
2+	12.3	4.1
n=2002	p<0.0001	NS
Place of Delivery		
Home	29.1	6.3
Public hospital/Other	18.7	5.0
Private hospital	15.2	5.5
n=2014	p<0.0001	NS
Type of toilet		
Own flush	16.5	3.6
Shared flush	17.0	10.8
Traditional pit	19.2	2.9
Blair	23.1	4.6
None	24.1	6.4
n=2005	p<0.02	p<0.003
Type of floor material		
Natural[3]	25.3	6.4
Cement	18.2	4.6
Finished[4]	6.3	4.5
n=3846	p<0.0001	NS
Total	21.4	5.4

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

stunting for these same levels of education are 27, 25, and 15 percent, which indicates that a very different relationship exists between education and child nutritional status between the two countries. Although maternal educational level is highly correlated with household income, which will also positively affect child nutritional status, many studies have shown that even after holding household income constant, maternal education has a positive effect on child nutritional status. However, in Zimbabwe, it appears from the ZDHS that women need at least a secondary level of education before an effect on child nutritional status is found. Changes may be noted in the near future, however, because child care and nutrition are now included as part of the primary school curriculum.

Child care emerges as an important variable. Children with the lowest prevalences of stunting are cared for by "neighbors/friends" (10 percent). Not surprisingly, those cared for by "another child" fare the worst (27 percent). Those cared for by their mother or family/relative have prevalences of about 21 percent. It may be that children cared for by "neighbors/friends" are given snacks by their mothers in addition to what the child care provider gives, and therefore they are eating more frequently; alternatively, they may be children of professional women who pay for such care and hence the positive effect is related to household wealth. Whether or not the mother is currently working is not associated with stunting.

In contrast to the findings on maternal education and stunting, the effect of paternal employment is consistent with a dose-response effect, illustrating that even primary level education has a positive effect on child nutritional status. The prevalences of stunting among children whose fathers have no education, primary, and secondary level education were 35, 25, and 16 percent, respectively. Not surprisingly, children of men employed in professional occupations have the lowest prevalence of stunting compared with children of fathers in other occupational groups.

Child nutritional status is also associated with marital status; children of widows are at twice the risk (43 percent) compared with all other categories (around 20 percent). Sex of the head of the household was unrelated to stunting.

Both listening to the radio and watching television on a regular basis were negatively associated with stunting. Ownership of a radio or television are associated with household wealth, which in turn is highly and positively associated with child nutritional status. The positive effect of exposure to information about child care may also be reflected in this relationship. However, given that the magnitude of the effect is greater for a television than for a radio, suggests that wealth is the overriding factor influencing this association.

Stunting also is associated with the number of previous child deaths in a family. Children of mothers who have had two or more children die are twice as likely to be stunted than those of mothers who have not lost children (40 versus 19 percent). Children of mothers who have lost one child fall in the middle range (29 percent) This reflects the association between poverty, mortality, and malnutrition.

Other indicators reflecting higher social and economic status, and associated with better nutrition, include the possession of appliances and availability of electricity (which are measured by the possession score), ownership of a car or motorcycle, and having a finished floor (made of ceramic tile or polished wood). Indicators related to sanitation that are associated with better nutritional status both through their associations with household wealth and improved sanitation include having a flush toilet and a private water tap. Improved pit latrines are also associated with better nutrition compared with traditional pit latrines or no latrines at all. While improved water and sanitation facilities may reflect higher income, they also have a direct impact on nutritional status because they reduce levels of infectious disease. Poor households are more likely to obtain water from public or open-air sources and less likely to have toilet facilities. Where water is not readily available, food hygiene is often inadequate and where sanitation is poor an increased number of insects (particularly flies) are present. Both of these increase the risk of illness through contamination of food and water.

Possession of a child health card for the index child (growth and development chart) was negatively associated with stunting. Possession of a health card reflects health seeking behaviours of the mothers, which most likely also translate into other feeding and care behaviours supportive of optimal growth. In addition, it is now Government policy that any child coming into contact with the public health service is issued a child health card.

5.4 Socio-economic and Demographic Characteristics of Wasting

In contrast to the findings for stunting, fewer social and economic factors were significantly associated with wasting (Table 5.2). In general, few of the maternal and paternal factors examined affected the proportion of children who were wasted with the exception of current maternal employment, sex of the household head, access to a radio for regular listening, the number of live births in a family, and the type of toilet. Children of women who are currently working are at about half the risk of children of nonworking mothers (4 versus 7 percent). The effect of maternal employment on child nutritional status depends on two factors: additional income, which has a positive effect on nutrition, versus the loss of time for child care, which has a negative effect (Engle and Pederson, 1992; Leslie, 1989). Thus, the overall effect of maternal employment depends in part on the type of employment, which determines the income a woman receives. Because information are not available on the type of employment Zimbabwean women have, the precise nature of the relationship between wasting and employment status cannot be determined.

Children of male headed households were at greater risk for wasting compared with children of female headed households. This association may reflect gender differences in resource allocation. Several studies have found that women are more likely to purchase food and health care with their cash resources than men (Von Braun and Kennedy, 1992; Hoddinot and Haddad, 1992).

The number of live births in a family is also positively associated with wasting: 19 percent of children from families with 5 or more live births are stunted compared with 14 percent of children from families with 4 or less live births. Lastly, children in households with a shared flush toilet are at particular risk of stunting (11 percent). This finding is difficult to interpret and needs further investigation.

5.5 Multivariate Regression Analysis

The biological, health, social, and economic factors identified as important in the bi-variate analyses were used in a logistic regression model to explain stunting and wasting among Zimbabwean children less than 3 years of age. (See Appendix F for an explanation of logistic regression models.) These models estimate the probability that stunting or wasting will occur. Regression estimates greater than 1 indicate that the risk of malnutrition is greater than that for the reference category; estimates less than 1 indicate that the risk of malnutrition is less than that for the reference category.

The following variables were used to develop the best model to explain childhood malnutrition in Zimbabwe. Only those variables that were significant in the bivariate associations are included in the multi-variate model.

Background Factors

Province (Manicaland, Mashonaland Central, East and West, Matabeleland North and South, Midlands, Masvingo, Harare/Chitungwiza, and Bulawayo)
Age of child (0-5, 6-11, 12-17, 18-23, 30-35 months)
Mother's education (secondary+, primary, none)
Father's education (secondary+, primary, none)

Birth weight (low, normal)
Size at birth (small, average+)
Toilet facilities (flush, improved pit, traditional pit, none)
Possession score (maximum score of 4 based on the availability of electricity and ownership of a TV, radio, and refrigerator)
Reason for stopping breastfeeding (mother ill, child ill, maternal factors (ill, nipple/breast problems, no milk, working), child's age, pregnancy, currently breastfed)
Mother currently pregnant (yes, no)
Number of dead children (0, 1, 2+)
Place of delivery (home, public hospital/other, private hospital)
Fever (yes, no)

5.6 Risk Factors for Stunting

The important determinants of stunting are as follows: province, the age of the child, maternal education, paternal education, birth weight, perceived size at birth, household possession score, the number of children in the family that have previously died, and the place of delivery (Table 5.3). Children from the province of Harare/Chitungwiza are twice as likely to be stunted as children from the provinces of Midlands and Bulawayo. This may be because of the high population of immigrants and squatters in Harare/Chitungwiza, or because of the sharing of resources in households due to in-migration and overcrowding resulting in infection.

Not surprisingly, the risk of stunting increases with age as stunting is a cumulative process that occurs over the course of many individual insults of nutritional deprivation and/or illness. Children between 0 and 5 months of age have the lowest risk of stunting. Those age 6-11 months have nearly three times the risk of younger infants, and beyond 12 months the risk of stunting continues to rise until age 18-23 months when it is 11 times that of the youngest infants. This dramatic rise with age reflects the cumulative effects of repeated illness, inadequate nutrient intake, and most importantly their negative synergistic effect during this critical period of child development. Between 24 and 36 months, the net relative risk of stunting does not increase and in fact decreases to about eight times the risk of the youngest age group. This coincides with the time when diarrhoeal disease and ARI decrease to low levels.

Table 5.3 Estimated net relative risk of stunting, and wasting

Estimated net relative risk of stunting and wasting for children under three years, by background characteristics, Zimbabwe, 1994

Background characteristic	Net Relative Risk	
	Stunting	Wasting
Province		
Manicaland	0.658	
Mashonaland C.	0.960	
Mashonaland E.	0.923	
Mashonaland W.	0.753	
Matabeleland N.	1.075	
Matabeleland S.	0.949	
Midlands	0.435[b]	
Masvingo	0.839	
Harare/Chitungwiza	1.000[a]	
Bulawayo	0.571[b]	
Child's age (months)		
0-5	1.000[a]	1.000[a]
6-11	2.755[b]	2.198[b]
12-17	7.506[b]	2.301[b]
18-23	11.061[b]	1.795
24-29	7.578[b]	1.049
30-35	7.954[b]	0.827
Mother's Education		
No education	0.782	
Primary	1.000[a]	
Secondary+	0.750[b]	
Father's Education		
No education	1.442[b]	
Primary	1.000[a]	
Secondary+	0.893	
Birth weight		
Low (<2500g)	1.779[b]	
Normal (>2500g)	1.000[a]	
Birth size		
Small/Very Small	1.746[b]	1.996[b]
Average/Large	1.000[a]	1.000[a]
Possession score		
0	1.000[a]	
1	1.227[b]	
2+	0.758	
Mother is currently pregnant		
Yes	2.117[b]	
No	1.000[a]	
Number of dead children		
0	1.000[a]	
1	1.298[b]	
2+	1.569[b]	
Place of delivery		
Home	1.000[a]	
Public hospital/Other	0.740[b]	
Private hospital	0.544[b]	
Sex of child		
Male	1.640[b]	
Female	1.000[a]	

[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. Maximum score of 4.

64

Maternal education is significantly related to the net relative risk of stunting. Children of mothers with secondary education are 25 percent less likely to be stunted compared with children of mothers with primary school education. In contrast, children of fathers with no education are nearly 45 percent more likely to be stunted as children of fathers with primary education. Low birth weight is a powerful predictor of risk. Children who were of low birth weight face nearly twice the risk of stunting compared with normal weight children. In part, this association reflects the fact that low birth weight children are at greater risk of stunting because they begin life smaller and more vulnerable. In part, however, this association reflects the fact that the same risk factors that caused low birth weight such as maternal malnutrition and poverty, continue after birth.

The effect of household possession score on the estimated net relative risk is not consistent with the expected effect. Children in households with a possession score of 1 are at 23 percent greater risk of stunting compared with children in households with a score of 0. Children in households with a score of 2 are at a 24 percent lower risk compared with households with a score of 0; however, the difference is not significant. The unexpected relationships between household possession score and stunting may reflect lack of precision in the possession score as an indicator of socio-economic status.

Children in families where a child has died have a net relative risk of stunting of 30 percent greater than children from families where no children have died. Children in families where 2 or more children have died face a 57 percent greater risk of stunting compared with children in families where no children have died. This may serve as an important reminder to health workers to pay special attention to risk factors on the child health card.

5.7 Risk Factors for Wasting

Risk factors for wasting reflect differences in the etiologies and age-specific patterns of wasting compared with stunting (Table 5.3). Not surprisingly, infants less than 6 months of age are least likely of all, but the oldest children, to be wasted. This reflects the fact that birth weights (among those children whose mothers report them) appear to be adequate and the prevalence of low birth weight is low. Breastfeeding, which is nearly universal, also is protective of child health during this period. However, infants 6 to 11 months of age are nearly 2.2 times more likely to be wasted compared with infants 0-5 months of age. This dramatic increase in risk reflects the rapid rise in diarrhoeal disease, and its effect on child nutritional status. Risk of wasting continues to climb precipitously during the 12 to 17 month age interval, increasing to 2.3 times the risk of infants 0-5 months of age. Diarrhoea peaks at 12 months of age and remains high during this interval. Between 18 and 35 months, the risk of wasting again declines to that of infants 0-5 months of age.

Children whose mothers perceived them to be small at birth are almost twice as likely to be wasted compared with children who are perceived to be of average size. In contrast, low birth weight was not a predictor of wasting. This finding suggests that women who perceive their newborn to be small may care for them and feed them differently and in a manner that may put them at risk for wasting compared with normal sized infants. As mothers' perception is a very subjective measure there is a need to further investigate determinants of nutritional status of such children.

Current maternal pregnancy is highly predictive of child wasting: children whose mothers are currently pregnant are more than twice as likely to be wasted compared with children whose mothers are not pregnant.

Lastly, male sex is predictive of wasting, with male children being 64 percent more likely to be wasted than female children. This difference is likely to be due to biological differences between the sexes rather than preferential treatment of girls over boys.

5.8 Summary and Recommendations

Child nutritional status is largely associated with birth weight, age of child, infant feeding practices, early weaning due to pregnancy, diarrhoeal disease, and factors associated with poverty. Diarrhoeal disease, in particular, contributes to the rapid rise in both stunting and wasting at about 6 months of age. Risks of both stunting and wasting remain high throughout the second year of life before starting to decline, suggesting that the first two years of life is a critical period for public health intervention.

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

- As a short term action, there should be a participatory, multi-sectoral workshop to present the results of this study to mid-level managers of various programmes in the provinces, and to obtain their feedback.

- Public health efforts to improve child feeding behaviours should focus on the first two years of life. Specifically, these efforts should concentrate on encouraging women to extend the duration of exclusive breastfeeding, and increasing the provision of food and fluids during diarrhoeal episodes.

- Research is needed to investigate factors related to household hygiene and the preparation of weaning foods to determine if exposure to diarrhoeal pathogens could be reduced.

- Research is also needed into the causes of low birth weight and how issues such as anaemia, low BMI, excessive work burdens during pregnancy and alcohol consumption may be linked to this outcome.

- Efforts should be made to improve family planning so that women may space their births to two or more years apart, as a means to improve child nutrition.

- As a long-term strategy, efforts should also be made to improve environmental sanitation to prevent exposure to diarrhoeal pathogens.

- Other determinants of nutritional status which may be outside the mandate of the MOH should be addressed. The requirements for a multi-sectoral approach which could be adopted through a food and nutrition policy should be investigated.

66

CHAPTER 6

NUTRITIONAL STATUS OF WOMEN

Women's nutritional status prior to conception and during pregnancy is important both as an indicator of overall women's health and as a predictor of pregnancy outcome for both the mother and infant. Women of childbearing age are particularly vulnerable to malnutrition because of the large nutritional costs associated with pregnancy and lactation. In Zimbabwe, the total fertility rate of 4.2 is low relative to other sub-Saharan countries. However, a women's nutritional history, including childhood malnutrition and short pregnancy intervals can be risk factors for adult malnutrition. In this final chapter, anthropometric measures of women of reproductive age are described and the implications for maternal and child health discussed.

6.1 Background

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

Prepregnancy weight is an important determinant of birth weight in both developed and developing countries (Kramer, 1987; Naeye, 1979; Kardjati et al., 1988). Gestational weight gain is also an important determinate of fetal growth, with the optimal gestational weight gain based on prepregnancy weight-for-height. To minimize poor pregnancy outcomes, women with lower prepregnancy weight-for-height need to gain more weight than women with high prepregnancy weight-for-height. The recommended weight gain ranges for pregnant women are shown in Table 6.1. However, the high pregnancy weight gains associated with positive pregnancy outcomes for women with low prepregnancy weight may be unrealistic for many women in developing countries (Krasovec and Anderson, 1991). Therefore, it is important to focus attention not only on pregnant women but on improving the nutritional status of women in general so they do not enter pregnancy in a nutritionally disadvantaged state.

Table 6.1 Recommended weight gain ranges for pregnant women

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

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

Source: IOM, 1990

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

6.2 Data Collected

Maternal height and weight measures were collected from women having living children under the age of three years. This selection criteria produces a sample that is biased toward women who are between 20 and 34 years of age, as this is the age interval in which women are most likely to have a child under three years (Table 6.2). Consequently, the age intervals 15 to 19 and 35 to 49 years are underrepresented.

Women were weighed on a digital scale and weight was recorded in kilograms to the nearest 100 g. Height was measured using an anthropometer with standard gradations and recorded to the nearest millimetre. A total of 1,867 women were measured, of whom 145 (7 percent) were pregnant and 1,132 (61 percent) were lactating. Thus, a total of 590 or 32 percent of women were nonpregnant and nonlactating (NPNL) (Table 6.3).

Table 6.2 Distribution of mother's ages

Percent distribution of mother's ages, Zimbabwe 1994

Agegroup	Percent
15-19	9.5
20-24	30.5
25-29	21.8
30-34	20.0
35-39	11.1
40-44	6.2
45-49	0.9
Total	100.0
Number of women	1,867

Table 6.3 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, Zimbabwe 1994

				Nonpregnant mothers					
	Pregnant mothers			Lactating			Nonlactating		
Anthropometric variables	Mean	Standard deviation	Median	Mean	Standard deviation	Median	Mean	Standard deviation	Median
Height (cm)	160.0	6.1	159.8	159.3	6.1	159.0	159.3	5.9	160.0
Weight (kg)	62.0	9.7	59.7	58.0	10.0	56.4	59.8	10.9	57.6
BMI[1]	24.2	3.2	23.6	22.8	3.6	22.2	23.5	3.9	22.6
Number	145			1,132			590		

[1] Body mass index

6.3 Indicators of Maternal Nutritional Status

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

Weight is predominantly a measure of current nutritional status and is often used as an indicator of overall health and nutritional status. The desirable or appropriate level of weight at different stages of the life cycle, however, is still unknown. It has been found, though, that women who weigh less than 40 kg are at a high obstetric risk.

68

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

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

The key advantage of using BMI to assess maternal nutritional status is that it is a self-contained ratio and does not require reference tables. Data from well-nourished populations show that a normal range maternal BMI is between 21.5 and 23.1. The International Dietary Energy Consultative Group suggests that Quetlet BMIs between 17.0 and 18.5 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 (James et al., 1988). A Quetlet BMI of 12 is the absolute lower limit compatible with life. At the other extreme, women who are 20 percent overweight have BMIs between 25.8 and 27.3 whereas those who are severely overweight, i.e., 40 percent overweight, have BMIs between 30.1 and 32.3.

6.4 Height and Weight

The mean, standard deviation and median for height and weight of pregnant, lactating, and nonpregnant, nonlactating Zimbabwean mothers is shown in Table 6.3. The mean height was 160 cm for pregnant mothers, and 159 cm for lactating and nonpregnant. Less than 1 percent of the mothers were less than 145 cm (Table 6.4). However, young mothers, who are likely to be shorter, may be underrepresented in this sample.

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

Percent distribution of mother's height, weight, and body mass index (BMI), Zimbabwe 1994

		Nonpregnant mothers	
Indicator	Pregnant mothers (n=145)	Lactating mothers (n=1132)	Nonlactating mothers (n=590)
Weight (kg)			
<40	0.0	0.4	0.3
40-45	1.7	5.2	3.6
45-50	6.2	14.5	13.7
50-55	17.0	23.7	19.6
55-60	26.1	21.2	23.9
60+	49.0	35.0	38.8
Total	100.0	100.0	100.0
Height (cm)			
< 145	0.6	0.9	0.9
145-150	3.4	4.8	6.1
150-155	18.4	19.7	13.7
155-160	33.3	30.9	31.2
160-165	22.7	26.8	33.8
165-170	16.2	13.1	10.6
170+	5.3	3.9	3.7
Total	100.0	100.0	100.0
Body mass index (kg/m^2)			
<16	0.0	0.2	0.0
16-17	0.0	0.8	0.4
17-18.5	0.0	5.8	2.6
18.5-25.8	72.8	78.3	73.9
25.8-27.3	4.8	5.1	9.0
27.3	22.3	9.8	14.0
Total	100.0	100.0	100.0
<18.5	N/A	6.8	3.0
>25.8	N/A	14.9	23.0

The mean weight did differ by reproductive status (Table 6.3). Pregnant women were heavier than nonpregnant women. The mean weight of pregnant women was 62 kg compared with 60 kg for nonpregnant/nonlactating women and 58 kg for lactating women which have the highest energy demands. None of the currently pregnant women weighed less than 40 kg (Table 6.4). Less than 1 percent of lactating and nonpregnant/nonlactating mothers weighed less than 40 kg.

6.5 Body Mass Index

The mean BMI for pregnant Zimbabwean women was 24.2, which is greater than that for lactating women (22.8 percent) and nonpregnant nonlactating women (23.5) (Table 6.3). These means are all within the normal range. Using the James classification, the distribution of BMIs was calculated (Table 6.4). None of the pregnant women met the criterion for chronic energy deficiency (BMI < 18.5). However, about 3 percent of the nonpregnant nonlactating women and 6.8 percent of the lactating women did meet the criterion. This level of underweight is indicative of poor maternal nutritional status.

At the other extreme, about 20 percent of the nonpregnant nonlactating women are overweight (BMI > 25.8). Of these, nearly three quarters (72 percent) are severely overweight (BMI > 27.3). These women may be at risk for diabetes and cardiovascular disease (Adair, 1991).

A number of social and economic factors were associated with low BMIs, defined as below 18.5, and high BMIs, defined as greater than 25 (Table 6.5). The variables identified as important in the bivariate analyses, and presented in the first and third columns of Table 6.5, have been included in the multivariate analyses in order to determine their net effects on low and high BMI. The odds ratios derived from the logistic regression analysis were used to create estimates of the net relative risk of these factors for both CED and overweight. Only nonpregnant mothers were included in the analysis.

6.6 Maternal Chronic Energy Deficiency

Although a number of variables were significant in the bivariate analysis (columns 1 and 3, Table 6.5), fewer are significant in the multivariate analysis (columns 2 and 4). The most important determinants of low BMI among Zimbabwean women were province of residence, education, and current breastfeeding status.

The province where a mother lives was a strong predictor of maternal CED. Compared with women in the province of Harare/Chitungwiza, women were six and nine times as likely to suffer from CED in the provinces of Mashonaland West, Matabeleland South and Bulawayo. Women in the province of Matabeleland North faced the greatest risk of chronic energy deficiency. In this province, women were nearly 13 times more likely to suffer from chronic energy deficiency compared with women in the province of Harare/Chitungwiza. This finding is undoubtedly related to the fact that Matebeleland North is a very dry, drought prone region.

Maternal education had a significant effect on risk of chronic energy deficiency. Women with a secondary education are about 40 percent less likely to suffer from chronic energy deficiency compared with women with a primary school education.

Breastfeeding status was an important predictor of maternal risk of chronic energy deficiency. Using nonbreastfeeding women as the reference category, breastfeeding women were nearly two times more likely to suffer from chronic energy deficiency. This may be due to the unavailability of the additional food needed by the breastfeeding mother in many regions of Zimbabwe, and further reinforces the need for a food and nutrition policy. This finding also has implications for public health programmes designed to improve maternal nutritional status. In particular, adequate dietary intake during pregnancy should be encouraged. The exact messages to use in these programmes, however, needs to be carefully developed. The data clearly show that breastfeeding is a

70

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

Percent distribution of nonpregnant mothers age 15 to 49 years with children under 3 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 characteristics, Zimbabwe 1994

Background characteristic	BMI <18.5 Low	BMI <18.5 Net relative risk	BMI >25.0 High	BMI >25.0 Net relative risk
Mother's age				
15-19	10.0	1.000	4.7	1.000[a]
20-24	4.6	0.609	16.9	1.922[b]
25-29	6.3	0.719	27.4	2.912[b]
30-34	3.8	0.451[b]	29.9	3.407[b]
35-49	5.3	0.590	28.9	3.575[b]
n=1722	p<.05		p<.0001	
Province				
Manicaland	4.2	4.667	24.0	0.873
Mashonaland central	5.2	5.332	13.0.	0.542[b]
Mashonaland east	5.9	6.910	19.0	0.624[b]
Mashonaland west	7.3	7.943[b]	16.3	0.578[b]
Matabeleland north	12.3	12.747[b]	13.1	0.599[b]
Matabeleland south	8.1	9.056[b]	17.4	0.680[b]
Midlands	5.8	6.975[b]	21.8	0.690[b]
Masvingo	3.8	3.946	19.5	0.697[b]
Harare/Chitungwiza	0.7	1.000[a]	42.8	1.000[a]
Bulawayo	5.9	8.172[b]	36.0	0.827
n=1722	p<0.001		p<0.0001	
Residence				
Urban	2.6		40.4	
Rural	6.5		16.7	
n=1722	p<0.002		p<0.0001	
Mother's education				
No education	4.9	0.700	16.1	0.728
Primary	7.1	1.000[a]	19.9	1.000[a]
Secondary+	3.4	0.549[b]	28.9	1.302[b]
n=1722	p<0.007		p<0.0001	
Mother's occupation				
Not working	6.0		21.3	
Professional/other[1]	1.2		48.4	
Agric.(self employed)	5.8		15.6	
Services	5.0		29.5	
Unskilled/Skilled manual	5.3		27.5	
n=1721	NS		p<0.0001	
Husband's education				
No education	8.7		18.0	
Primary	6.1		21.0	
Secondary+	4.0		26.7	
n=1722	p<0.04		p<0.01	
Watches TV regularly				
Yes	3.0		39.2	1.371[b]
No	6.2		18.2	1.000[a]
n=1717	p<0.01		p<0.0001	

Table 6.5—*Continued*

Background characteristic	BMI <18.5 Low	BMI <18.5 Net relative risk	BMI >25.0 High	BMI >25.0 Net relative risk
Assistance at delivery of last born child				
Doctor	1.5		38.0	
Nurse/Midwife/Auxiliary	5.7		23.0	
TBA[2]	5.7		19.2	
Relative/Friend	8.8		12.5	
No one	5.5		13.8	
n=1722	p<0.05		p<0.0001	
Place of delivery of last born child				
Home	6.8		16.1	
Public hospital/Other	4.8		27.3	
Private hospital	5.6		19.0	
n=1722	NS		p<0.0001	
Currently breastfeeding				
Yes	3.0	1.899[b]	28.7	
No	6.8	1.000[a]	19.8	
n=1722	p<0.001		p<0.0001	
Possession score[3]				
0	6.5		16.6	
1	5.1		20.1	
2+	2.6		43.3	
n=1711	p<0.02		p<0.0001	
Type of floor material				
Natural[4]	6.9		14.2	1.000[a]
Cement	3.9		29.8	1.562[b]
Finished[5]	4.0		66.2	2.154[b]
n=1713	p<0.02		p<0.0001	
Number of live births				
1-4	5.6		20.2	
5+	5.2		29.0	
n=1722	NS		p<0.0001	
Number of births				
1-2	5.8		17.6	1.000[a]
3-6	5.6		26.3	1.396
7-9	3.0		26.9	1.630
10+	8.4		43.0	3.120[b]
n=1722	NS		P<.0001	
Has underweight child <3 years				
Yes	8.9		15.8	
No	4.9		24.1	
n=1722	p<0.009		p<0.003	

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

71

risk factor for maternal chronic energy deficiency and that promoting better maternal dietary intake during lactation would benefit breastfeeding mothers.

At the other end of the spectrum, it is noteworthy that maternal BMI increases with the number of births and with maternal age, when overweight becomes a greater problem. Women at risk of overweight should be encouraged to breastfeed longer as one means to minimize this risk.

6.7 High Body Mass

The important determinants of high body mass, or overnutrition, among Zimbabwean mothers are age, province of residence, mothers education, the number of times the mother has given birth, type of floor material in the home, and whether the mother watches TV regularly (Table 6.5). Many of these indicators are associated with household wealth.

Using women age 15 to 19 years as the reference category, risk of overweight increased incrementally with each subsequent age group. Thus, women 20 to 24 years were at twice the risk of overweight, women 25 to 29 years at three times the risk, women 30 to 34 at 3.4 times the risk, and women 35 to 49 at nearly 3.6 times the risk.

The number of times a mother has given birth also affected maternal risk of overweight. Women who gave birth to 10 or more children were three times more likely to be overweight than women who had given birth to one or two children.

As with chronic energy deficiency, province of residence predicts risk of being overweight. Although statistically significant, the strength of the association is less than that for chronic energy deficiency. Women in the provinces of Mashonaland C., Mashonaland E. and Mashonaland W., are about 40 percent less likely to be overweight compared with the mothers in Harare/Chitungwiza, and women in Matabeleland N., Matabeland S., Midlands and Masvingo are about 30 percent less likely to be overweight than women in Harare/Chitungwiza.

Because of its association with household wealth, maternal education would be expected to be positively associated with overweight. In Zimbabwe, maternal education had the expected effect on overweight; using women with primary school education as the reference category, women with secondary education were 30 percent more likely to be overweight. This finding reflects changing lifestyles and eating habits in Zimbabwe. Overnutrition, and other related noncommunicable dietary diseases, call for a refocus of efforts by the Government.

Lastly, women with a finished or cement floor or who watch television regularly were at greater risk of overweight compared with women who have a natural floor or who do not regularly watch television. Both these variables are related to household wealth.

Surprisingly, women with children who are malnourished were not at risk for either chronic energy deficiency or overweight compared with women whose children are not malnourished, once the other variables in the model are accounted for. This would tend to indicate that the factors that put children less than 3 years of age at risk for malnutrition are different than those for maternal nutritional status. Thus, infant and child feeding and care patterns and the prevalence of disease, are also important contributors to the child nutrition problem in Zimbabwe.

72

6.8 Summary and Recommendations

In summary, the associations between maternal nutritional status and factors measured in this survey reflect the overwhelming influence of poverty. Although the mean BMI of Zimbabwean women is within the normal range, nearly 7 percent of the lactating women and 3 percent of the nonpregnant nonlactating women met the criterion for chronic energy deficiency. The fact that currently breastfeeding women are nearly two times more likely to suffer from chronic energy deficiency points to the importance of nutrition during lactation as a focal point for intervention.

At the other end of the spectrum, maternal overnutrition is a problem in Zimbabwe, with nearly 20 percent of the nonpregnant nonlactating women overweight and nearly three quarters of these women severely overweight.

Strategies to improve maternal nutritional status of Zimbabwean women need to focus on both short- and long-term inputs. Long-term strategies include the following:

- Improve the nutritional status of female infants and children, focusing on the first 24 month of life. Such an approach overlaps the approach required to improve child nutritional status.
- Efforts to improve household food and economic security by creating a national food and nutrition policy should be accelerated.

Short-term strategies include the following:

- Improve the energy balance of pregnant and lactating women by improving their dietary quantity and quality and minimizing their energy expenditure.
- Improve access to reproductive health services to improve child spacing—ideally two years or more between births—thus allowing women time to recuperate nutritionally.
- Efforts should be made to locate and target women with low BMI for strategies developed to reduce the prevalence of low birthweight.
- There is a need for research into the problem of overweight amongst women and related complications.

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76

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APPENDIX A

SAMPLE DESIGN

The area sampling frame for the ZDHS was the 1992 Zimbabwe Master Sample (ZMS92), which was developed following the 1992 Population Census. A total of 395 EAs were selected with probability proportional to the number of households enumerated in the 1992 Population Census.

The sample for the ZDHS was selected from the ZMS92 master sample in two stages. In the first stage, 230 EAs were selected with equal probabilities. Since the EAs in the ZMS92 master sample were selected with probability proportional to size from the sampling frame, equal probability selection of the subsample of these EAs for the ZDHS was equivalent to selection with probability proportional to size from the entire sampling frame. A complete listing of the households in the selected EAs was carried out. The list of households obtained was used as the frame for the second-stage sampling, which was the selection of the households to be visited by the ZDHS interviewing teams during the main survey fieldwork. Women between the ages of 15 and 49 were identified in these households and interviewed.

A total of 6,483 households were selected, of which 6,075 were found to be occupied. Of the occupied households, 5,984 were successfully interviewed, yielding a household response rate of 98.5 percent. Of all eligible women, 95.6 percent were successfully interviewed (6,128) and information on 2,221 living children under three years of age was collected.

In the analyses used for this report, only children with complete and plausible height and weight values and valid date of birth information were included. Thus, 2,014 children 0-35 months of age were included.

APPENDIX B

HOUSEHOLD AND RESPONDENT BACKGROUND CHARACTERISTICS

Demographic Factors

A total of 2,014 children under the age of three years are included in the analyses presented in this report. Table B.1 shows the distribution of these children by province and urban/rural residence, according to the sex of the child. The pattern of distribution reflects the general population distribution within the country. Over 70 percent of the children surveyed are from rural areas; this closely matches the distribution of the total population. More boys than girls are included in the sample.

An average of 2.8 children per household were found at home during the period of the survey, but this varied significantly by province and urban/rural residence (Table B.2). Thus mothers in Manicaland, Mashonaland East and Masvingo provinces had an average of 3.1 children at home compared with just 2.2 children in Harare/Chitungwiza and Bulawayo provinces. More children are found at home in rural areas than in urban areas.

The mean number of children per woman is 3.6. Mothers in Masvingo have the greatest number of children (4.0) and those in Harare/Chitungwiza the fewest (2.7). Urban households have fewer children (2.8) than rural households (3.9).

Each woman has lost, on average, 0.3 children. The proportion of children who have died is highest in Manicaland province and lowest in Bulawayo province. Rural mothers are twice as likely to lose a child as urban mothers. The number of children who have died in a family is known to be associated with the risk of malnutrition of surviving siblings.

Maternal, Social and Economic Factors

Table B.3 shows the percent distribution of children under three years by age of mother, according to province and urban/rural residence. The mothers sampled in Harare/Chitungwiza province tend to be younger than those in other provinces. The percentage of mothers under 25 ranges from 32 percent in Masvingo province to 47 percent in Harare/Chitungwiza province. There is also significant difference in age among mothers living in urban and rural areas; mothers of rural children sampled tend to be older than mothers of urban children.

Almost 90 percent of the mothers have been to school, with over one-third of mothers having attained secondary levels of schooling or higher (Table B.4). Wide variations are observed when mother's education is two-thirds of mothers in these provinces have secondary or higher education compared with about one-fourth of children in Matabeleland North, Mashonaland Central, Masvingo and Manicaland provinces. Rural mothers are less likely to have attained secondary or higher levels of education than their urban counterparts, 66 and 26 percent, respectively.

Over 40 percent of mothers are not employed (Table B.5). Twenty-nine percent of working mothers are engaged in agricultural or self-employed activities, while only 5 percent are professional, technical or managerial workers. The remainder of working women are divided between service-oriented occupations and skilled and unskilled manual labour. Over 70 percent of mothers in Matabeleland North and South and Manicaland do not work compared with other provinces. Mothers in Mashonaland Central and Masvingo are more likely to work

79

in agricultural or self-employed occupations than mothers living elsewhere. Urban mothers are more likely to be in non-agricultural occupations than rural mothers.

Thirty-six percent of working mothers depend on family members or relatives to care for their children while they are at work (Table B.6). Variations across provinces and urban/rural residence are evident in the provision of child care for working mothers. In two provinces, Manicaland and Mashonaland East, a smaller proportion of working mothers rely on family members or relatives for child care compared with working mothers in other provinces. In Harare/Chitungwiza and Bulawayo over one-fourth of children are usually attended to by neighbours and friends when their mothers are working. Similarly, children in urban area more likely to be attended to by a neighbour or friend than rural children. Rural mothers more often care for their children than urban mothers.

Seventy-one percent of the mothers live with their husbands, but large differences are evident among provinces and by urban/rural residence (Table B.7). Mothers are more likely to live with their husbands in Mashonaland Central and West, Bulawayo and Harare/Chitungwiza provinces (over 80 percent) than in other provinces, and urban mothers are more likely than rural mothers to live with their husbands.

Eighty-eight percent of the mothers are currently married or living with a partner; 7 percent are widowed or divorced and 5 percent have never been married (Table B.8). Mothers in Matabeleland South and Bulawayo are less likely to currently be in union than those in other provinces. The highest proportions of never-married mothers are observed in Matabeleland North and South and Bulawayo provinces. There is little difference in the proportion of rural or urban mothers who are currently in union.

Ninety-three percent of husbands have had formal education, a slightly higher percentage than their female counterparts (Table B.9). Forty-six percent of husbands have received secondary or higher education compared with 36 percent of mothers. The best educated husbands live in Harare/Chitungwiza and Bulawayo provinces. Urban husbands are almost twice as likely to have attained secondary levels of schooling or higher than rural husbands.

Just 3 percent of husbands are not employed (Table B.10). Over one-third of the husbands are manual workers, while over a quarter of husbands work in agricultural-related occupations or are self-employed. Another 20 percent of husbands are professional, technical or managerial workers. Husbands in Harare/Chitungwiza and Bulawayo are less likely to work in agriculture or be self-employed than those in other provinces. Not surprisingly, urban husbands are more likely to work in professional, technical, managerial, service and manual labour positions, while rural husbands are more likely to be in agricultural or self-employed occupations.

Over 40 percent of children live in households that have no toilet facilities, while another third depend on traditional pit or blair toilets. (Table B.11). Over 60 percent of households in Harare/Chitungwiza and Bulawayo provinces have flush toilets, compared with less than 13 percent of households in other provinces. In contrast, 71 percent of children in Matabeleland North province live in a household without a toilet. Almost 90 percent of children in urban households have access to a flush toilet, either owned or shared, compared with 4 percent of rural children.

Two in five children live in households that obtain their drinking water from taps and protected wells (Table B.12). Private tap water is widely available in Harare/Chitungwiza and Bulawayo provinces, while children are more likely to depend on unprotected well and surface water sources in Matabeleland South, Masvingo and Manicaland provinces. The major source of drinking water in rural localities is a borehole (42 percent); however, most urban households (84 percent) have access to either private or public taps.

Half of the children live in homes with cement or finished floors; the other half of children live in homes with earth or dung floors (Table B.13). The proportion of children by type of floor varies by province and urban/rural residence. Eighty-two percent of children in Matabeleland North province reside in houses with earth or dung floors, while almost all children in Bulawayo live in a home with a cement or finished floor. Only 7 percent of urban children live in households with earth or dung floors, compared with almost two-thirds of rural children.

More than one-third of mothers listen to the radio everyday, and about one-fifth watch television at least once a week (Table B.14). There are large differences between provinces and by urban/rural residence. For example, over 70 percent of mothers listen to the radio daily in Harare/Chitungwiza and Bulawayo provinces compared with between one-fourth and one-third of mothers in other provinces. The percent of mothers who watch TV weekly ranges from 65 percent in Harare/Chitungwiza province to 3 percent in Matabeleland South. About two-thirds of urban mothers listen to the radio daily and also watch television each week, while only 26 percent of rural mothers listen to the radio each day and only 7 percent watch television weekly.

Over three-quarters of the children belong to households that do not own any means of transportation (Table B.15). Bicycles are generally the more common type of transport owned. Twenty-eight percent of household in Matabeleland South have a bicycle, compared with only 10 percent of households in Manicaland province. Children in Harare/Chitungwiza and Bulawayo provinces are most likely to live in a household that owns a motorcycle or a car than children in other provinces. Urban households are more likely than rural households to own a car; the reverse is true for bicycles. Overall, a larger proportion of rural mothers than urban mothers live in households that own some means of transportation.

Devised as a proxy for wealth, the possession score sums up a household's assets, with one point each scored for the ownership of a radio, a refrigerator, and a television set and for the availability of electricity. A score of zero refers to the poorest households, while a score of 2 to 4 represents the wealthiest households. Table B.16 shows that 51 percent of children live in households that lack access to any of these amenities, while 29 percent possess one, and 20 percent possess two or more. The percentage of children with a possession score of at least one varies from 32 percent in Manicaland province to 95 percent in Bulawayo province. Rural children are almost four times as likely to have a score of zero as urban children. The fact that less than half of the children belong to households with a possession score of at least one suggests widespread poverty.

Antenatal Care

The use of antenatal services was quite high among the mothers interviewed. About 93 percent had consulted a trained medical practitioner during the pregnancy of the child (Table B.17). With the exception of one province (Manicaland), 90 percent or more received antenatal care from a doctor, nurse or midwife. Urban mothers are more likely to receive antenatal care from a doctor, while rural mothers are more likely to receive antenatal care from a nurse or midwife.

Table B.1 Anthropometric measurement of children

Percent distribution of children under three years for whom height and weight measurements were collected by sex, according to province and residence, Zimbabwe 1994

Province and residence	Children measured			Number of children
	Male	Female	Total	
Province				
Manicaland	52.4	47.6	100.0	248
Mashonaland C.	44.3	55.7	100.0	179
Mashonaland E.	51.1	48.9	100.0	212
Mashonaland W.	51.8	48.2	100.0	239
Matabeleland N.	50.7	49.3	100.0	157
Matabeleland S.	43.7	56.3	100.0	118
Midlands	50.5	49.5	100.0	275
Masvingo	49.4	50.6	100.0	208
Harare/Chitungwiza	45.6	54.4	100.0	272
Bulawayo	50.0	50.0	100.0	103
Residence				
Urban	51.1	48.9	100.0	518
Rural	50.7	49.3	100.0	1,495
Total	50.8	49.2	100.0	2,014

Table B.2 Mean and number of living and dead children

Among women with children under three years, the mean number of children living at home (and SD), the total mean number of children (and SD), and the mean number of dead children per mother (and SD), by province and residence, Zimbabwe 1994

Province and residence	Number of children at home Mean (SD)	Total number of children Mean (SD)	Number of dead children Mean (SD)	Number of children
Province				
Manicaland	3.05 (1.95)	3.92 (2.61)	0.42 (.85)	248
Mashonaland C.	2.81 (1.80)	3.51 (2.40)	0.31 (.66)	179
Mashonaland E.	3.10 (1.87)	3.87 (2.58)	0.25 (.53)	211
Mashonaland W.	2.86 (1.99)	3.70 (2.56)	0.32 (.68)	239
Matabeleland N.	2.93 (1.94)	3.82 (2.52)	0.26 (.62)	157
Matabeleland S.	2.75 (1.96)	3.64 (2.67)	0.22 (.52)	118
Midlands	2.84 (1.86)	3.62 (2.45)	0.25 (.60)	275
Masvingo	3.12 (1.93)	4.02 (2.77)	0.30 (.66)	208
Harare/Chitungwiza	2.22 (1.48)	2.73 (1.85)	0.18 (.51)	272
Bulawayo	2.21 (1.41)	2.85 (1.95)	0.07 (.28)	103
	p<0.0001	p<0.0001	p<0.0001	
Residence				
Urban	2.25 (1.43)	2.82 (1.87)	0.16 (.47)	518
Rural	3.00 (1.94)	3.85 (2.61)	0.31 (.67)	1,495
	p<0.0001	p<0.0001	p<0.0001	
Total	2.80 (1.86)	3.58 (2.48)	0.27 (.63)	2,013

Note: Levels of significance determined using ANOVA.

83

Table B.3 Mother's age

Percent distribution of children under three years by mother's age, according to province and residence, Zimbabwe 1994

Province and residence	Mother's age (years)						Number of children
	15-19	20-24	25-29	30-34	35-49	Total	
Province							
Manicaland	7.2	31.7	19.8	20.1	21.2	100.0	248
Mashonaland C.	11.1	28.6	20.7	19.3	20.3	100.0	179
Mashonaland E.	6.6	32.0	19.8	18.0	23.6	100.0	212
Mashonaland W.	12.0	30.9	16.1	22.0	19.0	100.0	239
Matabeleland N.	15.9	26.8	17.0	22.1	18.1	100.0	157
Matabeleland S.	8.3	34.3	20.9	19.5	17.0	100.0	118
Midlands	5.8	30.0	25.9	22.3	15.9	100.0	275
Masvingo	7.3	24.5	28.3	18.4	21.5	100.0	208
Harare/Chitungwiza	9.5	37.3	22.8	22.2	8.2	100.0	272
Bulawayo	7.7	26.3	30.8	16.7	18.6	100.0	103
			$p<0.0008$				
Residence							
Urban	8.3	33.7	25.1	21.7	11.3	100.0	518
Rural	9.2	29.6	20.9	19.9	20.4	100.0	1,495
			$p<0.0001$				
Total	8.9	30.6	22.0	20.4	18.1	100.0	2,014

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

84

Table B.4 Mother's education

Percent distribution of children under three years by level of mother's education, according to province and residence, Zimbabwe 1994

Province and residence	Mother's education				Number of children
	No education	Primary	Secondary+	Total	
Province					
Manicaland	20.0	54.4	25.7	100.0	248
Mashonaland C.	16.3	61.0	22.7	100.0	179
Mashonaland E.	10.0	56.8	33.3	100.0	212
Mashonaland W.	21.3	54.6	24.1	100.0	239
Matabeleland N.	18.0	59.7	22.2	100.0	157
Matabeleland S.	8.0	56.1	35.9	100.0	118
Midlands	12.0	45.7	42.3	100.0	275
Masvingo	10.5	64.6	24.9	100.0	208
Harare/Chitungwiza	1.9	27.2	70.9	100.0	272
Bulawayo	2.6	31.4	66.0	100.0	103
		$p<0.0001$			
Residence					
Urban	3.5	30.1	66.4	100.0	518
Rural	15.6	58.0	26.4	100.0	1,495
		$p<0.0001$			
Total	12.5	50.8	36.7	100.0	2,014

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

Table B.5 Mother's occupation

Percent distribution of children under three years by mother's occupation category, according to province and residence, Zimbabwe 1994

Province and residence	Mother's occupation						Number of children
	Not working	Profes-sional/ Technical/ Managerial	Agricultural self-employed	Services	Unskilled/ Skilled manual	Total	
Province							
Manicaland	70.6	5.4	12.0	6.2	5.9	100.0	248
Mashonaland C.	15.9	3.3	58.8	9.0	13.1	100.0	179
Mashonaland E.	36.7	3.4	41.2	10.6	8.2	100.0	212
Mashonaland W.	21.5	4.6	49.5	9.0	15.4	100.0	239
Matabeleland N.	87.0	2.1	2.7	4.2	4.1	100.0	157
Matabeleland S.	72.6	5.0	6.0	10.3	6.2	100.0	118
Midlands	36.1	5.6	32.2	13.2	12.9	100.0	275
Masvingo	10.5	2.3	59.7	9.8	17.7	100.0	208
Harare/Chitungwiza	47.5	7.6	3.2	19.6	22.2	100.0	272
Bulawayo	58.3	12.8	0.6	20.5	7.7	100.0	103
	p<0.0001						
Residence							
Urban	45.6	10.4	3.6	19.0	21.5	100.0	518
Rural	42.2	3.1	37.2	8.5	9.0	100.0	1,494
	p<0.0001						
Total	43.0	5.0	28.5	11.2	12.2	100.0	2,014

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

86

Table B.6 Usual caretaker of children of working mothers

Percent distribution of children cared for by their mothers, family/relative or by neighbors/friends, according to province and residence, Zimbabwe 1994

Province and residence	Child's caretaker				Number of children
	Mother	Family/ relative	Neighbor/ friend	Total	
Province					
Manicaland	71.8	18.3	9.9	100.0	71
Mashonaland C.	61.0	30.8	8.2	100.0	146
Mashonaland E.	75.2	18.8	6.0	100.0	133
Mashonaland W.	48.4	45.1	6.5	100.0	184
Matabeleland N.	58.8	29.4	11.8	100.0	17
Matabeleland S.	44.4	51.9	3.7	100.0	27
Midlands	55.5	39.3	5.2	100.0	173
Masvingo	49.2	47.0	3.8	100.0	183
Harare/Chitungwiza	40.4	34.0	25.5	100.0	141
Bulawayo	31.0	35.7	33.3	100.0	42
		$p<0.0001$			
Residence					
Urban	43.3	32.1	24.5	100.0	277
Rural	57.7	37.4	4.9	100.0	839
		$p<0.0001$			
Total	54.1	36.1	9.8	100.0	1,116

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

87

Table B.7 Residence of mother's husband

Percent distribution of children under three years by whether mother's husband resides at home or elsewhere, according to province and residence, Zimbabwe 1994

Province and residence	Husband's residence			Number of children
	At home	Elsewhere	Total	
Province				
Manicaland	54.9	45.1	100.0	237
Mashonaland C.	80.9	19.1	100.0	157
Mashonaland E.	66.1	33.9	100.0	192
Mashonaland W.	82.9	17.1	100.0	216
Matabeleland N.	62.0	38.0	100.0	129
Matabeleland S.	51.7	48.3	100.0	89
Midlands	65.7	34.3	100.0	239
Masvingo	59.9	40.1	100.0	182
Harare/Chitungwiza	89.8	10.2	100.0	254
Bulawayo	84.6	15.4	100.0	78
	$p<0.0001$			
Residence				
Urban	88.3	11.7	100.0	460
Rural	64.3	35.7	100.0	1,310
	$p<0.0001$			
Total	70.5	29.5	100.0	1,770

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

88

Table B.8 Mother's marital status

Percent distribution of children under three years by mother's marital status, according to province and residence, Zimbabwe 1994

Province and residence	Marital status of mother					Number of children
	Never married	Married	Widowed	Divorced	Total	
Province						
Manicaland	1.2	95.6	1.4	1.8	100.0	248
Mashonaland C.	3.4	87.5	2.9	6.2	100.0	179
Mashonaland E.	2.3	90.5	1.0	6.3	100.0	212
Mashonaland W.	2.2	90.2	1.3	6.2	100.0	239
Matabeleland N.	12.9	81.7	2.4	3.0	100.0	157
Matabeleland S.	19.8	74.5	1.1	4.6	100.0	118
Midlands	3.7	86.8	1.3	8.2	100.0	275
Masvingo	2.1	87.4	3.2	7.4	100.0	208
Harare/Chitungwiza	2.5	93.0	0.0	4.4	100.0	272
Bulawayo	16.0	75.6	0.6	7.7	100.0	103
	$p<0.0001$					
Residence						
Urban	5.5	88.9	0.8	4.8	100.0	103
Rural	4.8	87.8	1.7	5.8	100.0	1,495
	$p<0.0001$					
Total	5.0	88.0	1.5	5.6	100.0	2,014

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

89

Table B.9 Husband's education

Percent distribution of children under three years by mother's husband's education, according to province and residence, Zimbabwe 1994

Province and residence	Husband's education				Number of children
	No education	Primary	Secondary+	Total	
Province					
Manicaland	9.3	46.3	44.3	100.0	244
Mashonaland C.	6.7	57.7	35.6	100.0	167
Mashonaland E.	4.9	53.1	42.0	100.0	202
Mashonaland W.	11.2	48.1	40.7	100.0	230
Matabeleland N.	10.9	59.4	29.7	100.0	132
Matabeleland S.	5.9	56.9	37.2	100.0	93
Midlands	8.3	40.1	51.7	100.0	264
Masvingo	9.1	59.1	31.8	100.0	204
Harare/Chitungwiza	2.0	26.1	71.9	100.0	264
Bulawayo	2.3	29.8	67.9	100.0	87
		p<0.0001			
Residence					
Urban	3.5	26.9	69.6	100.0	488
Rural	8.6	53.5	37.9	100.0	1,398
		p<0.0001			
Total	7.3	46.6	46.1	100.0	1,886

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

90

Table B.10 Husband's occupation

Percent distribution of children under three years by mother's husband's occupation category, according to province and residence, Zimbabwe 1994

Province and residence	Husband's occupation					Total	Number of children
	Not working	Profes-sional/ Technical/ Managerial	Agricultural self-employed	Services	Unskilled/ Skilled manual		
Province							
Manicaland	12.2	23.7	18.4	12.7	33.1	100.0	245
Mashonaland C.	5.2	12.6	46.0	7.5	28.7	100.0	174
Mashonaland E.	2.5	17.2	32.4	13.7	34.3	100.0	204
Mashonaland W.	0.0	17.6	42.5	11.6	28.3	100.0	233
Matabeleland N.	0.7	9.6	34.1	20.7	34.8	100.0	135
Matabeleland S.	2.1	11.6	18.9	25.3	42.1	100.0	95
Midlands	0.0	17.9	24.0	16.8	41.2	100.0	262
Masvingo	1.0	15.7	43.6	10.3	29.4	100.0	204
Harare/Chitungwiza	0.8	32.5	0.8	22.3	43.8	100.0	265
Bulawayo	1.1	29.9	0.0	25.3	43.7	100.0	87
	$p<0.0001$						
Residence							
Urban	0.4	32.2	1.4	22.2	43.7	100.0	487
Rural	3.4	15.1	35.5	13.2	32.7	100.0	1,415
	$p<0.0001$						
Total	2.6	19.5	26.8	15.5	35.5	100.0	1,902

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

91

Table B.11 Toilet facilities

Percent distribution of children under three years by type of household toilet facilities, according to province and residence, Zimbabwe 1994

Province and residence	Type of toilet facilities						Number of children
	Own flush	Shared flush	Traditional pit	Blair	None	Total	
Province							
Manicaland	4.1	4.6	34.2	14.6	42.5	100.0	245
Mashonaland C.	3.5	0.4	13.5	33.4	49.2	100.0	179
Mashonaland E.	5.8	3.1	13.6	28.0	49.4	100.0	210
Mashonaland W.	12.8	8.0	13.3	19.0	46.8	100.0	239
Matabeleland N.	4.8	1.0	1.0	22.0	71.1	100.0	157
Matabeleland S.	2.1	1.8	0.0	46.2	49.9	100.0	118
Midlands	8.2	9.2	13.2	18.9	50.4	100.0	275
Masvingo	3.9	3.8	8.4	25.6	58.2	100.0	208
Harare/ Chitungwiza	61.1	22.9	5.1	7.6	3.2	100.0	271
Bulawayo	67.3	28.8	2.0	0.7	1.3	100.0	101
				p<0.0001			
Residence							
Urban	58.0	29.0	4.4	5.8	2.9	100.0	514
Rural	2.4	1.1	14.6	25.9	56.0	100.0	1,490
				p<0.0001			
Total	16.7	8.3	12.0	20.7	42.4	100.0	2,004

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

92

Table B.12 Source of drinking water

Percent distribution of children under three years by source of household drinking water, according to province and residence, Zimbabwe 1994

Province and residence	Source of drinking water						Total	Number of children
	Private tap	Public tap	Pro-tected well	Unpro-tected well	Borehole	Surface/ Other		
Province								
Manicaland	12.3	4.9	6.1	32.4	38.9	5.5	100.0	245
Mashonaland C.	2.8	28.1	7.2	12.2	41.0	8.7	100.0	179
Mashonaland E.	11.4	5.4	15.0	16.6	41.9	9.8	100.0	209
Mashonaland W.	18.4	21.5	6.6	12.4	25.3	15.9	100.0	239
Matabeleland N.	5.2	5.1	25.4	14.2	33.5	16.6	100.0	157
Matabeleland S.	3.4	6.0	0.0	2.3	49.7	38.6	100.0	118
Midlands	15.6	5.7	13.2	19.9	34.0	11.6	100.0	275
Masvingo	6.7	2.6	3.7	16.2	52.5	18.4	100.0	208
Harare/Chitungwiza	83.4	0.6	2.5	2.5	10.2	0.6	100.0	271
Bulawayo	97.4	0.0	0.0	0.6	1.9	0.0	100.0	102
			p<0.0001					
Residence								
Urban	84.1	4.2	2.0	2.3	6.7	0.7	100.0	515
Rural	4.3	9.5	10.5	18.4	42.0	15.3	100.0	1,489
			p<0.0001					
Total	24.8	8.1	8.3	14.3	33.0	11.5	100.0	2,004

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

93

Table B.13 Type of floor

Percent distribution of children under three years by type of floor in household, according to province and residence, Zimbabwe 1994

Province and residence	Floor material				Number of children
	Earth/dung	Cement	Finished[2]	Total	
Province					
Manicaland	67.9	31.3	0.8	100.0	245
Mashonaland C.	59.3	40.2	0.5	100.0	179
Mashonaland E.	41.2	58.8	0.0	100.0	210
Mashonaland W.	52.6	43.8	3.6	100.0	239
Matabeleland N.	82.3	17.0	0.7	100.0	157
Matabeleland S.	62.1	37.9	0.0	100.0	118
Midlands	51.9	46.2	1.8	100.0	275
Masvingo	67.8	31.8	0.4	100.0	208
Harare/Chitungwiza	8.9	85.4	5.7	100.0	271
Bulawayo	2.0	87.6	10.5	100.0	101
		p<0.0001			
Residence					
Urban	7.1	85.8	7.0	100.0	514
Rural	64.5	34.9	0.6	100.0	1,490
		p<0.0001			
Total	49.8	48.0	2.2	100.0	2,004

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

94

Table B.14 Exposure to radio and television

Percentage of children under three years whose mothers listen to the radio daily and watch television at least once a week, by province and residence, Zimbabwe 1994

Province and residence	Listen to radio daily	Watch TV weekly	Number of children
Province			
Manicaland	27.1	8.4	248
Mashonaland C.	25.7	8.0	179
Mashonaland E.	35.0	14.1	212
Mashonaland W.	32.9	18.7	239
Matabeleland N.	23.5	4.0	157
Matabeleland S.	25.7	2.8	118
Midlands	31.4	22.3	274
Masvingo	31.4	11.1	206
Harare/Chitungwiza	71.5	65.2	272
Bulawayo	71.2	55.5	103
	p<0.0001	p<0.0001	
Residence			
Urban	69.9	63.2	518
Rural	26.2	7.4	1,494
	p<0.0001	p<0.0001	
Total	37.4	21.8	2,009

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

95

Table B.15 Transport owned

Percent distribution of children under three years by type of transport owned by household, according to province and residence, Zimbabwe 1994

Province and residence	Type of transport owned				Number of children
	None	Bicycle	Car/ motorcycle	Total	
Province					
Manicaland	89.1	10.3	0.6	100.0	245
Mashonaland C.	69.7	27.3	3.1	100.0	179
Mashonaland E.	77.5	17.5	5.0	100.0	210
Mashonaland W.	79.4	17.8	2.8	100.0	239
Matabeleland N.	75.4	22.1	2.4	100.0	157
Matabeleland S.	71.1	28.2	0.6	100.0	118
Midlands	76.6	18.5	4.8	100.0	275
Masvingo	83.1	14.0	2.9	100.0	208
Harare/Chitungwiza	75.2	12.1	12.7	100.0	271
Bulawayo	71.2	16.3	12.4	100.0	101
		$p<0.0001$			
Residence					
Urban	73.0	14.1	13.0	100.0	514
Rural	79.4	18.7	1.9	100.0	1,490
		$p<0.0001$			
Total	77.7	17.5	4.8	100.0	2,004

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

96

Table B.16 Possession score

Percent distribution of children under three years by household possession score, according to province and residence, Zimbabwe 1994

Province and residence	Possession score[1]				Number of children
	0	1	2+	Total	
Province					
Manicaland	67.8	23.3	9.0	100.0	245
Mashonaland C.	60.7	34.3	5.1	100.0	178
Mashonaland E.	61.0	27.1	11.9	100.0	210
Mashonaland W.	51.0	31.0	18.0	100.0	239
Matabeleland N.	60.5	33.8	5.7	100.0	157
Matabeleland S.	60.2	37.3	2.5	100.0	118
Midlands	53.1	30.5	16.4	100.0	275
Masvingo	59.2	33.0	7.8	100.0	206
Harare/Chitungwiza	22.9	21.0	56.1	100.0	271
Bulawayo	5.0	29.0	66.0	100.0	100
		$p<0.0001$			
Residence					
Urban	16.4	22.6	61.0	100.0	513
Rural	63.3	31.5	5.2	100.0	1,489
		$p<0.0001$			
Total	51.2	29.2	19.5	100.0	2,002

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

97

Table B.17 Antenatal care

Percent distribution of children under three years, by source of mother's antenatal care, according to province and residence, Zimbabwe 1994

Province and residence	Antenatal care provider				Number of children
	Doctor	Nurse/ midwife	Other/ none	Total	
Province					
Manicaland	7.8	78.2	14.0	100.0	248
Mashonaland C.	19.4	73.4	7.2	100.0	179
Mashonaland E.	18.0	73.8	8.2	100.0	212
Mashonaland W.	17.5	76.6	5.9	100.0	239
Matabeleland N.	8.2	86.6	5.1	100.0	157
Matabeleland S.	16.3	78.6	5.1	100.0	118
Midlands	17.4	77.8	4.8	100.0	274
Masvingo	18.3	77.5	4.2	100.0	208
Harare/Chitungwiza	36.1	59.5	4.4	100.0	272
Bulawayo	59.6	35.3	5.1	100.0	103
		p<0.0001			
Residence					
Urban	36.9	58.2	4.8	100.0	518
Rural	14.8	78.0	7.2	100.0	1,494
		p<0.0001			
Total	20.5	72.9	6.6	100.0	2,013

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

98

APPENDIX C

ANTHROPOMETRIC DATA VERIFICATION

Of the 2,221 children under 3 years of age who took part in the survey, 91 percent (2,014) were weighed and measured. Chronic and/or acute nutritional status could not be ascertained for 207 children; of these, 70 percent were not weighed or measured and 30 percent had invalid measurements that is at least one of their anthropometric measurements (height-for-age, weight-for-height and/or weight-for-age) were highly unlikely given the other two measurements. Invalid measurements were defined as: Z-scores for height-for-age and weight-for-age that fall below -6 standard deviations, Z-scores for weight-for-height below -4 standard deviations, or Z-scores for any index above 6 standard deviations.

Z-scores-were imputed for children with invalid or missing Z-scores in order to determine whether the missing and outlying data in any way biased the results of the survey. This was done by assigning each child the Z-score of the previous child in the data set who was born in the same year and whose mother had attained the same level of education. Table C.1 compares the distribution of all imputed Z-scores with that of valid Z-scores. Fifteen percent of the imputed Z-scores for height-for-age fall in the severe and moderately malnourished categories compared with 21.6 percent of the valid Z-scores. Comparable figures for weight-for-age are 6.8 percent of imputed Z-scores and 15.7 percent of valid Z-scores; for weight-for-height, the figures are 3.2 and 5.4. In addition, more children born in 1992 or 1993, that is, a greater proportion of older children, have missing or invalid anthropometric scores, as do more girls than boys. To determine the extent of bias, if any, that may have occurred by excluding these children, a comparison was made between the data set used in this report (which excludes imputed Z-scores) and a data set including both valid and imputed Z-scores. The results in Table C.2 show that including children with missing or invalid data affects the reported prevalences of undernutrition by under one percentage point. The differences are slight, probably because children with invalid or missing data make up only a small proportion of the entire sample.

There is some evidence of digit preference in the height data (Table C.3). For height measurements, terminal digits ending in 0 and 5 were preferred. The data for weight show little integer preference.

Table C.1 Imputed and valid Z-scores

Percent distribution of children under three years of age by nutritional status, year of birth, and sex of child, imputed and valid height-for-age, weight-for-age, and weight-for-height Z-scores, Zimbabwe 1994

	Height-for-age		Weight-for-age		Weight-for-height	
	Imputed	Valid	Imputed	Valid	Imputed	Valid
Nutritional status						
Severe undernutrition	3.3	6.1	0.8	3.0	0.5	0.7
Moderate undernutrition	11.2	15.5	6.0	12.7	2.7	4.7
Mild undernutrition	14.2	30.9	15.9	29.0	7.0	17.8
Normal nutrition	18.1	40.9	23.9	46.5	32.5	60.9
Mild overnutrition	2.6	5.1	3.6	6.6	5.3	11.4
Moderate overnutrition	0.0	0.9	0.0	1.7	2.2	3.4
Severe overnutrition	0.8	0.7	0.0	0.5	0.0	1.1
Missing data	49.7	0.0	49.7	0.0	49.7	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Year of birth						
1991	13.1	7.8	13.1	7.8	13.1	7.8
1992	41.9	31.7	41.9	31.7	41.9	31.7
1993	24.8	33.5	24.8	33.5	24.8	33.5
1994	20.2	27.1	20.2	27.1	20.2	27.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sex of child						
Male	42.8	49.2	42.8	49.2	42.8	49.2
Female	57.2	50.8	57.2	50.8	57.2	50.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number	207	2,014	207	2,014	207	2,014

100

Table C.2 Verification of anthropometric data

Percentage of children under three years by nutritional status, by whether imputed anthropometric data are included or excluded, and the difference in under-nutrition when imputed data are included, Zimbabwe 1994

Nutritional status	Imputed values included		Difference
	Yes	No	
Stunted	20.9	21.6	+0.7
Number	2,221	2,014	
Underweight	14.9	15.7	+0.8
Number	2,221	2,014	
Wasted	5.2	5.4	+0.2
Number	2,221	2,014	

Table C.3 Digit preference in anthropometric data

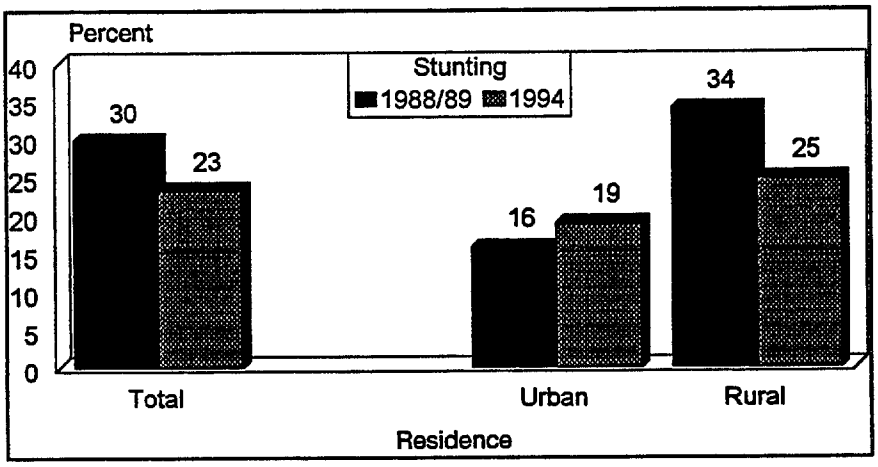
Percentage of weight and height data falling as specific integers, Zimbabwe 1994

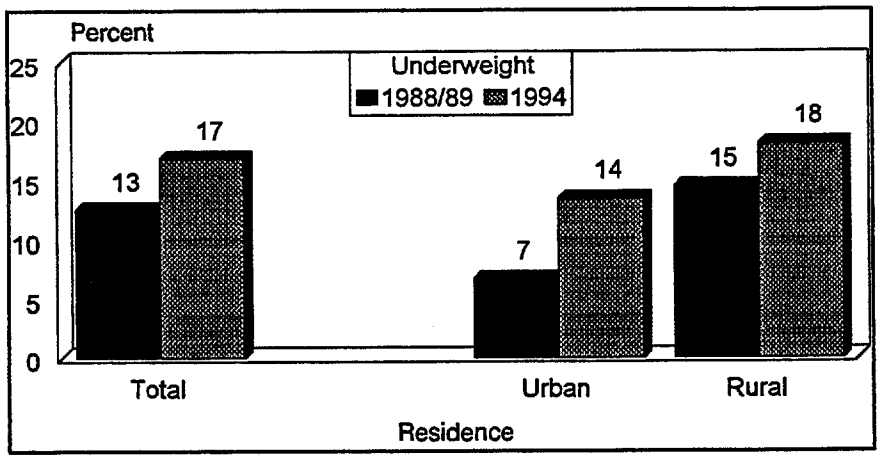
Decimal integer	Height	Weight
0	21.8	10.8
1	7.0	9.4
2	9.5	9.4
3	7.7	8.7
4	6.8	8.9
5	16.3	10.0
6	7.0	10.0
7	6.9	7.5
8	5.7	10.6
9	4.9	8.4
Missing	6.3	6.3
Total	100.0	100.0
Number	2,221	2,221

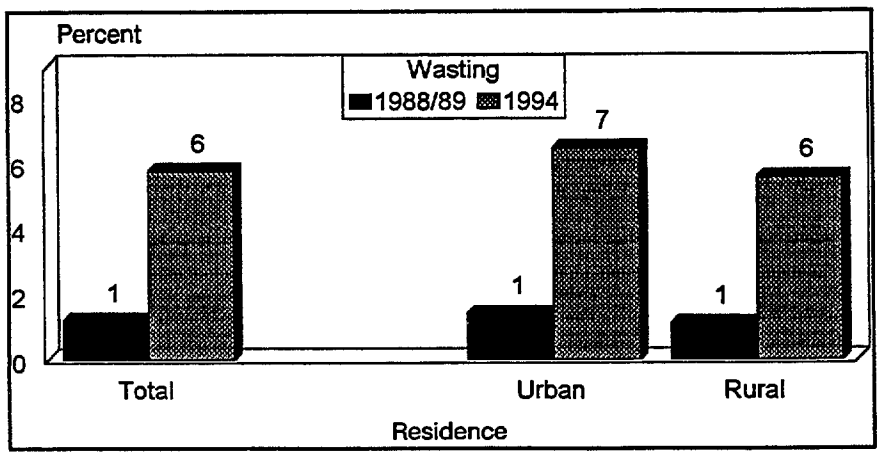
APPENDIX D

PATTERNS IN MALNUTRITION 1988/89 AND 1994

D.1 Malnutrition among Children 3 to 35 Months of Age by Residence, 1988/89 and 1994







103

APPENDIX E

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

Table E.1 Malnutrition by province and age

Percentage of children under three years of age who are malnourished, by province and age, Zimbabwe 1994

Province and age (months)	Malnutrition			Number of children
	Stunted	Wasted	Underweight	
Manicaland				
0-5	3.1	0.0	3.1	48
6-11	5.7	14.3	5.7	52
12-17	7.2	7.2	14.4	41
18-23	30.2	3.8	26.4	40
24-29	32.9	0.0	0.0	27
30-35	49.0	8.5	27.4	40
Total	19.2	6.2	12.8	248
Mashonaland Central				
0-5	6.3	0.0	0.0	27
6-11	10.7	8.0	8.0	32
12-17	34.8	14.8	40.8	23
18-23	45.6	3.0	20.7	29
24-29	33.9	5.7	22.6	30
30-35	34.6	2.3	25.3	37
Total	27.7	5.3	19.2	179
Mashonaland East				
0-5	8.7	0.0	0.0	35
6-11	9.7	4.8	9.7	42
12-17	25.0	3.1	18.7	33
18-23	33.8	0.0	3.9	26
24-29	41.6	0.0	21.2	38
30-35	22.2	2.8	13.9	37
Total	22.8	1.9	11.6	212
Mashonaland West				
0-5	2.3	2.5	0.0	46
6-11	14.1	7.0	13.9	46
12-17	29.2	14.8	38.2	36
18-23	43.0	11.1	27.0	40
24-29	16.5	4.1	12.3	26
30-35	30.5	2.3	28.2	46
Total	22.3	6.8	19.7	239
Matabeleland North				
0-5	6.3	4.7	1.6	34
6-11	20.1	13.3	16.6	32
12-17	33.3	8.9	31.1	24
18-23	49.9	15.8	42.9	24
24-29	31.7	9.0	29.4	24
30-35	44.5	7.9	36.6	20
Total	25.6	9.8	24.0	157

104

Table E.1—*Continued*

Province and age (months)	Malnutrition			Number of children
	Stunted	Wasted	Underweight	
Matabeleland South				
0-5	2.5	2.5	7.5	22
6-11	6.2	3.1	9.3	18
12-17	42.7	0.0	20.1	22
18-23	54.8	9.7	32.3	17
24-29	25.5	8.5	23.4	26
30-35	29.5	7.4	14.7	15
Total	26.2	5.1	17.9	118
Midlands				
0-5	4.0	6.0	4.0	54
6-11	5.6	11.1	14.6	63
12-17	22.8	10.3	17.9	32
18-23	25.5	10.9	25.9	52
24-29	10.6	4.0	10.6	33
30-35	13.1	0.0	7.9	41
Total	12.8	7.5	13.6	275
Masvingo				
0-5	0.0	3.4	0.0	32
6-11	10.9	0.0	5.7	38
12-17	32.5	3.2	29.2	34
18-23	44.0	8.0	28.0	27
24-29	26.6	0.0	13.3	41
30-35	36.6	0.0	18.3	36
Total	24.6	2.1	15.2	208
Harare Chitungwiza				
0-5	0.0	4.3	0.0	40
6-11	10.7	3.6	7.1	48
12-17	17.4	17.4	21.7	40
18-23	31.4	0.0	11.4	60
24-29	40.0	8.0	24.0	43
30-35	20.8	4.2	25.0	41
Total	20.9	5.7	14.6	272
Bulawayo				
0-5	0.0	9.5	4.8	14
6-11	13.0	4.3	4.3	15
12-17	23.1	3.8	7.7	17
18-23	21.4	0.0	3.6	19
24-29	14.8	3.7	14.8	18
30-35	3.2	0.0	6.5	21
Total	12.8	3.2	7.1	103
Zimbabwe				
0-5	3.4	3.1	1.7	352
6-11	10.1	7.5	9.8	386
12-17	25.2	9.0	24.2	302
18-23	36.2	6.0	21.9	334
24-29	28.8	4.2	17.3	306
30-35	28.7	3.3	20.7	333
Total	21.5	5.5	15.5	2,013

105

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

Percentage of children under three years who are malnourished, by gender, urban/rural residence, and age, Zimbabwe 1994

Gender residence and age (months)	Malnutrition			Number of children
	Stunted	Wasted	Underweight	
Male				
0-5	1.0	3.3	0.6	170
6-11	11.0	9.7	13.8	200
12-17	28.1	12.0	30.0	142
18-23	37.0	7.4	24.5	168
24-29	23.9	4.1	15.7	146
30-35	33.2	2.4	21.9	165
Total	21.7	6.5	17.3	991
Female				
0-5	5.8	2.8	3.0	183
6-11	9.3	5.4	5.8	186
12-17	22.7	6.1	18.9	159
18-23	35.3	4.6	19.0	166
24-29	33.1	4.1	18.8	160
30-35	24.2	4.0	19.7	169
Total	21.1	4.5	13.8	1,023
Urban				
0-5	0.0	5.2	0.8	81
6-11	13.1	5.9	8.0	85
12-17	19.5	11.2	16.0	78
18-23	26.8	4.2	12.0	113
24-29	26.9	6.7	17.6	81
30-35	15.7	4.4	20.9	81
Total	17.6	6.1	12.5	518
Rural				
0-5	4.5	2.4	2.1	272
6-11	9.4	8.1	10.5	302
12-17	27.2	8.1	26.9	224
18-23	40.9	6.9	26.8	220
24-29	29.3	3.2	17.3	225
30-35	32.8	2.8	20.8	253
Total	22.8	5.3	16.6	1,495
Zimbabwe				
0-5	3.4	3.1	1.7	352
6-11	10.1	7.5	9.8	386
12-17	25.2	9.0	24.2	302
18-23	36.2	6.0	21.9	334
24-29	28.8	4.2	17.3	306
30-35	28.7	3.3	20.7	333
Total	21.5	5.5	15.5	2,013

106

APPENDIX F

FEEDING PRACTICES BY AGE

Table F.1 Feeding practices by age

Percent distribution of children under 24 months by feeding practices, according to age, Zimbabwe 1994

Age (months)	Breastfed and: Nothing	Water	Other liquids	Milk	Solids	Milk and solids	Fully weaned	Total	Number of children
0-1	20.0	29.5	23.8	5.7	19.0	1.9	0.0	100.0	105
2-3	14.1	18.8	12.5	1.6	43.8	7.8	1.6	100.0	128
4-5	0.8	8.5	1.7	1.7	67.8	18.6	0.8	100.0	118
6-7	0.8	3.9	2.3	2.3	77.5	12.4	0.8	100.0	129
8-9	0.0	2.2	1.5	0.0	72.4	22.4	1.5	100.0	134
10-11	1.6	0.0	0.8	0.0	62.9	29.8	4.8	100.0	124
12-13	1.8	0.9	0.0	0.9	67.3	19.1	10.0	100.0	110
14-15	0.0	0.0	0.0	0.0	68.7	24.2	7.1	100.0	99
16-17	2.2	0.0	0.0	0.0	54.3	21.7	21.7	100.0	92
18-19	0.8	0.0	0.8	0.0	45.7	17.1	35.7	100.0	129
20-21	0.0	2.0	1.0	0.0	29.0	7.0	61.0	100.0	100
22-23	0.0	1.9	0.0	0.0	13.3	8.6	76.2	100.0	105

APPENDIX G

LOGISTIC REGRESSION MODELS

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

For each variable, there is a reference category against which all other values are compared. The reference category for each variable may, for the most part, be arbitrary. For convenience, the reference category for each variable in this report usually, but not always, is the "no" response for a dichotomous variable, the first value in an ordinal series, or the most common response in an otherwise categorical variable. By default, the values of these reference categories are given a regression estimate of 1.00. The results of the other variables will either be higher or lower than the reference category. In order to provide an easier understanding of the logistic regression results, estimates of relative risk have been computed based on the odds ratios from the logistic regressions. A relative risk estimate greater than 1.00 indicates an increased risk (or likelihood) for the outcome, while a relative risk estimate less than 1.00 indicates a decreased risk (or likelihood) for the outcome.

For example, in Table 3.4 (Prevalence and estimates of net relative risk for bottle use), "not working" is the reference category for mother's occupation, so it is assigned a value of 1.00. The net estimate of relative risk for bottle use for children whose mothers work in professional occupations is 4.3. That is, the net estimate for the relative risk of bottle use among children under one with mothers who are in professional occupations is almost four and a one-third times higher than among children with mothers who are not working, a difference which is statistically different.

APPENDIX H

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

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

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