8. MALNUTRITION AND POVERTY

A. Introduction

8.1 Malnutrition is a longstanding and serious problem in Zambia. Micronutrient (vitamins and minerals) status is generally poor throughout the year because the daily diet is monotonous and consists of one or two staple crops and little else. The nutritional status of the entire population (most particularly rural inhabitants) deteriorates during the pre-harvest season, when the supply of food is most limited and transmission of disease is highest due to heavy rains. Children under five, school-age children and women of reproductive age are most vulnerable to malnutrition because their requirements for energy, micronutrients and protein are high during these periods of rapid growth.

8.2 The prevalence of stunting or chronic malnutrition (measured as low height for age) in children under five years of age has increased in Zambia from 40 percent in 1992 to 48 percent in 2002/3. The prevalence of wasting or acute malnutrition (measured as low weight for height) has remained the same over the same period at 5 percent in children under five.

8.3 The problem of malnutrition is largely ignored in Zambia. Other than nutritional support in the extreme cases that result in hospitalisation, malnutrition is usually considered to be a by-product of poverty, hence essentially only solvable as the economy develops. However, two arguments suggest that this approach is not appropriate.

8.4 Firstly, the impact of malnutrition on the national human capital base is sufficiently large to pose a serious threat to prospects for economic development. Malnutrition affects access to school, capacity to learn, physical development, and energy to work, as well as ensuring that productive years are lost in additional morbidity and mortality. The interrelationship between malnutrition and both HIV/AIDS and malaria entrenches both epidemics, which are acknowledged to have had (and to be having) a negative effect on economic development. This argument supports the view that nutrition programs need to be given a higher priority in future.

8.5 Secondly, malnutrition is not solely related to poverty. The statistics presented in this chapter show that although somewhat better than the poorest, a sizeable proportion of children even from the richest quintiles suffer from malnutrition. Ensuring adequate nutrition requires not only access to food, but also adequate knowledge on how to prepare it, the nutritional needs of children, and how often feeding is required. Further, there needs to be someone present, with enough time to feed children. This argument supports the view that nutrition-specific interventions are required to complement income-focused programming, in order to overcome the non-income dimensions of poverty.

8.6 This section reviews key aspects of malnutrition in Zambia, and proposes ways in which programming could be scaled up to better address both immediate and longer term problems.

B. Child Malnutrition

Incidence of Child Malnutrition

8.7 There are three measures of **malnutrition: wasting, stunting and underweight** which is a composite indicator of wasting and stunting. Each indicator uses cutoffs[68] developed by the U.S. National Center for Health Statistics based on the heights and weights of healthy children in the U.S. WHO adopted U.S. standards and recommends their use in developing countries because children under 5 years of age from diverse ethnic backgrounds who are well-fed and healthy have similar growth patterns worldwide (Habicht, et al., 1974).

8.8 **Underweight** (low weight for age), often used because the required data is easiest to collect, is the indicator of choice for the first Millennium Development Goal, eradicating hunger. However, because underweight is a composite of wasting and stunting, the discussion in this chapter will be restricted to wasting and stunting. **Wasting** (low weight for height or weight for length in younger children), or *acute* malnutrition reflects recent illness and/or decreased food intake, often due to the anorexia that accompanies an episode of infection or a decline in the availability of food. Wasting increases during seasonal fluctuations (e.g., when infection rates are high or before harvest when the food supply is limited) and in emergencies (i.e., floods, droughts). **Stunting** (low height for age or low length for age in younger children) or *chronic* malnutrition is a cumulative measure of past nutritional insult and is the best measure of malnutrition.

8.9 Stunting is linked to wasting in that repeated loss of weight in the short term will cause stunting in the long term, if children are not fed more after they recover from illness or a period when food supply is short. Most stunting occurs below 2-3 years of age and is not reversible later in life.

8.10 Over the period 1992 to 2002, the incidence of stunting increased in Zambia. Wasting remained fairly stable.

Table 8.1: Trends in Rates of Malnutrition in Zambia (percent of children 0-5 years of age with stunting, wasting and underweight) from 1992 to 2000/1

	1992			1996			2001/2			2002/3		
	Nat	**Urb**	**Rur**	**Nat**	**Urb**	**Rur**	**Nat**	**Urb**	**Rur**	**Nat**	**Urb**	**Rur**
Stunting	40	32.5	46	42	32.7	48.7	47	36.8	51.3	47.7	38.7	51.4
Wasting	5	5.4	5	4	3.1	4.8	5	5.1	5.0	4.5	4.9	4.4
Underweight	25	20.8	29	24	16.5	28	28	23.4	30.3	22.6	17.4	24.7

Sources: ZDHS 1992, 1996 & 2001/2; LCMS, 2002/3

8.11 Based on the most recent ZDHS, 47 percent of children under five are currently stunted; 5 percent are wasted; and 28 percent are underweight. Although not shown in Table 8.2, rates of severe stunting are high with almost one-quarter of children (22 percent) severely stunted for their age. The 2002/3 Living Conditions Monitoring Survey (LCMS) had similar findings for stunting

[68] A child more than two standard deviations below the norm is termed moderately malnourished and a child more than three standard deviations below the norm is termed severely malnourished.

and wasting with 48 percent of children<5 years stunted (24 percent were severely stunted) and 4.5 percent wasted, although only 23 percent were underweight. Stunting amongst children <5 years of age has increased by 18 percent increase from 1992 to 2001/2-2002/3.

8.12 Using 2001/2 ZDHS, stunting is 28 percent higher (14.5 percentage points) in rural areas compared to urban areas. This pattern has been consistent for stunting in all the data presented since 1992.

8.13 While wasting in children<5 years appears to be the same from 1992-2001/2-2002/3, disaggregating by age group using the ZDHS shows a decrease in wasting in children 0-3 years of age, when most of wasting occurs, between the 1992 (8 percent wasting) and 2000/1 (6 percent wasting) surveys (a 25 percent reduction). Both the 1992 and 2001/2 ZDHS surveys were conducted during the lean or hungry season (November through March) when wasting is highest so they are comparable based on time of year. The 1996/7 ZDHS survey was conducted in only part of the hungry season, making it difficult to compare with the two other surveys. Like stunting, underweight also has increased. Because underweight is a composite indicator of stunting and wasting, the increase in underweight is being driven by the increase in stunting rather than wasting.

8.14 To look at the relationship between poverty and nutrition outcomes, both 2001/2 ZDHS and 2002/3 LCMS data have been disaggregated by income quintile. Table 8.2 shows prevalence of stunting by income group using ZDHS estimates of household income and both stunting and wasting by income group using LCMS estimates of household income. Wasting information by quintile is not available from ZDHS.

Table 8.2: Changes in Prevalence (%) of Stunting in Children 6-59 Months, By National Welfare Quintile

	Quintiles						
ZDHS	Poorest 20%	Quintile 2	Quintile 3	Quintile 4	Wealthiest 20%	Average	% Point Decrease Lowest to Highest
Moderate Stunting	26.9	26.3	25.3	24.0	19.5	24.7	7.4
Severe Stunting	27.2	26.1	24.2	16.7	12.1	22.1	15.1
Total Stunting	54.1	52.4	49.2	40.7	31.6	46.8	22.5
LCMS							
Moderate Stunting	24.2	24.2	24.8	22.3	21.1	23.3	3.1
Severe Stunting	28.5	23.8	26.6	22.9	19.9	24.4	8.6
Total Stunting	52.7	48.0	51.4	45.5	41.0	47.7	11.7
Moderate Wasting	3.7	3.5	3.1	3.9	3.7	3.6	0
Severe Wasting	1.1	0.8	1.1	0.9	0.9	1.0	0.2
Total Wasting	4.8	4.3	4.2	4.8	4.6	4.6	0.2

Source: World Bank, 2004 using 2001/2 ZDHS and 2002/3 LCMS.

8.15 According to both the ZDHS and the LCMS, stunting decreases as income increases -- by 22.5 percentage points (from 54.1 percent to 31.6 percent) in the ZDHS and by 11.7 percentage points (from 52.7 percent to 41 percent) in the LCMS. The surveys were conducted under different circumstances, and cannot be directly compared.

8.16 While stunting prevalence is lower in the richest households in both surveys, significant declines only start after the middle quintile, with 78 percent of the decrease in percentage points occurring after the middle income group in the ZDHS and 89 percent of the decrease in percentage points occurring after the middle income group in the LCMS. Only children in the two richest quintiles have significantly less malnutrition. However, stunting does not disappear even in the highest income group and 32 percent of children in the richest families in the ZDHS and 41 percent of children in the richest families in the LCMS are stunted.

8.17 According to LCMS data, changes in wasting prevalence are much smaller across income groups than stunting, with no difference in moderate wasting and only a 0.2 percentage point decrease in severe wasting when the poorest and richest households are compared. The trend is therefore that *wasting* is similar whilst *stunting* decreases steadily as incomes increases. This may reflect the fact that that while all children suffer from the causes of wasting, particularly illness, children in richer households are able to recover faster and fewer become stunted in the long term.

8.18 In urban areas, there is a stronger link between income quintile and nutritional status. Table 8.3 shows the prevalence of stunting, wasting and underweight by income group in urban areas, using 2002/3 LCMS data.

Table 8.3: Nutritional Status of Children in Urban Areas by National Welfare Quintile

	Stunting (Long-Term) Height for Age		Wasting (Acute) Weight for Height		Underweight Weight for Age	
Background Characteristics	Percentage below -2 SD	Percentage below -3 SD	Percentage below -2 SD	Percentage below -3 SD	Percentage below -2 SD	Percentage below -3 SD
Quintiles of Consumption						
Poorest 20%	50.7	21.7	6.5	0.7	25.6	6.0
2	41.7	20.0	3.8	0.3	17.7	2.1
3	43.7	22.6	4.6	1.6	18.9	2.7
4	35.0	16.6	5.4	1.3	14.6	2.9
Richest 20%	29.2	13.8	4.5	1.1	13.7	2.9
All	**38.7**	**18.3**	**4.9**	**1.0**	**17.4**	**3.2**

Source: 2002/3 LCSM

8.19 In rural areas, however, the difference between the poorest and better off is less evident. Table 8.4 shows the prevalence of stunting, wasting and underweight by income group in rural areas, using 2002/3 LCMS data. Provincial data also are included to show geographical differences.

Table 8.4: Nutritional Status of Children by Province and in Rural Areas by National Welfare Quintile

Background Characteristics	Stunting (Long-Term) Height for Age: Percentage below -2 SD	Stunting (Long-Term) Height for Age: Percentage below -3 SD	Wasting (Acute) Weight for Height: Percentage below -2 SD	Wasting (Acute) Weight for Height: Percentage below -3 SD	Underweight Weight for Age: Percentage below -2 SD	Underweight Weight for Age: Percentage below -3 SD
Quintiles of Consumption						
Rural						
Poorest 20%	53.3	30.6	4.2	1.2	27.4	7.5
2	50.0	25.0	4.5	0.9	24.7	6.9
3	54.0	27.9	4.1	0.9	25.6	5.8
4	49.4	25.5	4.5	0.8	23.4	5.3
Richest 20%	50.1	24.6	4.7	0.8	21.8	4.6
All rural	**51.4**	**26.8**	**4.4**	**0.9**	**24.7**	**6.1**
Province						
Central	44.0	23.0	7.0	2.3	20.0	4.2
Copperbelt	42.5	19.7	5.6	1.0	19.6	4.6
Eastern	55.5	29.6	2.4	0.4	24.3	5.9
Luapula	50.9	29.7	7.0	2.6	28.4	8.6
Lusaka	40.5	22.9	4.3	1.1	16.4	2.7
Northern	55.4	27.5	3.1	0.6	25.9	7.0
Northwestern	51.9	28.8	4.3	0.5	28.4	5.8
Southern	40.5	17.3	5.4	0.4	22.2	4.2
Western	46.5	22.1	3.1	0.4	19.4	4.6
Total	**47.7**	**24.4**	**4.5**	**1.0**	**22.6**	**5.3**

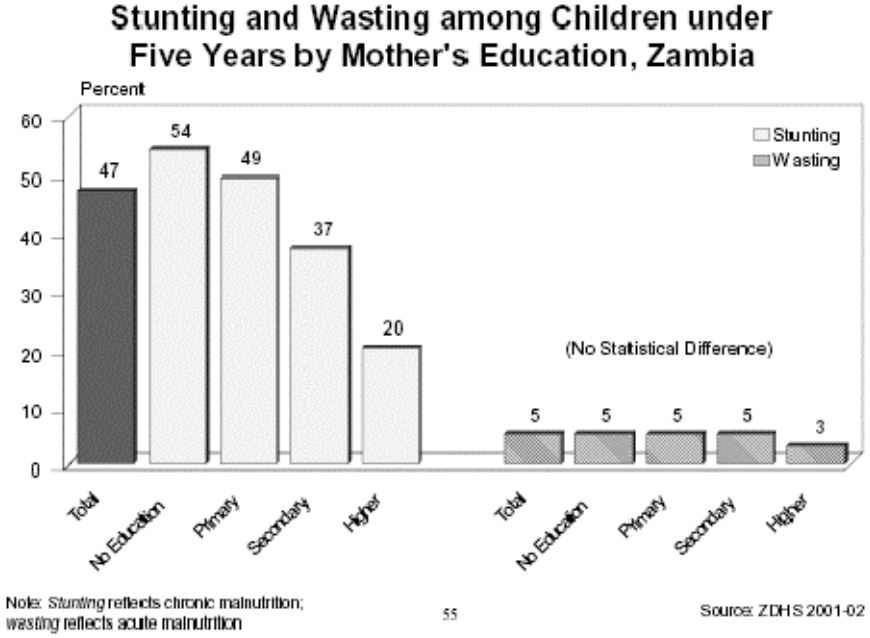
Source: 2002/3 LCMS

Risk factors for Child Malnutrition

8.20 The ZDHS 2001/2 presents data on risk factors for child malnutrition. These include having a mother with no education; being a first-born child; being born less than two years after a sibling; being small at birth. Having a mother age 20 to 24 is in fact a worse risk factor than a teenage mother – most likely because the teenagers are more likely to live with and be supported by their own mother or older woman. UNICEF estimates that about 50 percent of malnutrition in children worldwide is due to poor feeding practices, and not lack of food. Poor infant and child feeding practices are often due to lack of education in mothers and caregivers who are not informed about what and how often to feed their children.

8.21 Analysis from the 2001/2 ZDHS found that nationally educational level has a significant impact on stunting with 54 percent of children stunted when their mothers with no education compared to only 20 percent of children were stunted when their mothers had a higher education.

Figure 8.1: Stunting and Wasting among Children under Five Years by Mother's Education, Zambia



8.22 In urban areas, malnutrition decreases noticeably by income group. All stunting (<-2 S.D.) decreases by 21.6 percentage points (43 percent) for children from the poorest to the richest households. Severe stunting (<-2 S.D.) decreases 7.9 percentage points (36 percent). The decline in malnutrition in urban areas reflects that the richest of the urban population have more assets, education/knowledge and better access to health services. Nonetheless, 29 percent of their children are stunted - an unacceptably high proportion.

8.23 Further analysis on the causes of malnutrition (based on Annex) shows a highly significant effect of income using per person consumption and residence in low-cost urban areas as proxies for income. Increased stunting is associated with being male, the first child, an increase in mother's education, use of an unprotected source of water while a decrease in stunting is associated with household size and immunization, but the analysis does not confirm statistic significance for these associations.

Table 8.5 Factors that Affect Nutritional Status in Urban and Rural Areas

	Stunting (Low height for age)		**Wasting (Low weight for age)**
	Rural	**Urban**	**Rural Only**
Male child	n.s.	n.s.	Significant ↑ wasting
First child	Significant ↑ stunting	n.s	Significant ↓ wasting
Mothers' Education	Significant ↓stunting	n.s	NA
PAE (per person consumption in household)	n.s	Significant ↓stunting	n.s.
Unprotected water source	Significant ↑ stunting	n.s.	NA
Grass roof	Significant ↑ stunting	NA	NA
Household size	Significant ↓stunting	n.s.	Significant ↓ wasting
BCG immunization	Significant ↓stunting	n.s.	NA
Access to health facility	NA	NA	NA
Sick or injured in last 2 weeks	NA	NA	Significant ↓ wasting
Low cost urban area		Significant ↑ stunting	NA

n.s. not significant; NA not available.

8.24 In rural areas in 2002/3, there is only a 3.2 percent change (6 percent decrease) in stunting (<-2 S.D.) from the poorest to the richest quintile (see Table 8.4). The decrease in severe stunting (<-3 S.D.) is higher with a 6 percent change (20 percent decrease) from poorest to the richest quintile.

8.25 The decrease in wasting, by income level, is not consistent across income level, making it more difficult to interpret, and the richest households have more wasting in their children than the poorest. It may be that all stunting and wasting are not affected by income in rural areas because children have very similar access to health services and food. The dearth of information about caring practices hampers analysis.

8.26 Differences in provincial rates of stunting are similar to other surveys, with rates highest in Luapula, Northern, Northwestern and Eastern provinces. Lusaka, the Copperbelt, Southern and Central provinces (where agriculture production is higher, income opportunities are more diverse, markets more lively, and main urban areas also located) have the lowest rates of stunting. Wasting across provinces is more difficult to interpret by province and does not follow the patterns of stunting.

C. Consequences of Child Malnutrition

8.27 Malnutrition or underweight is the outcome of insufficient intakes of food (in both quality and quantity), and also of disease. There is a cyclic relationship between malnutrition and disease: malnutrition increases the severity of illness through a reduction in immune function, whilst disease increases nutritional requirements and anorexia, exacerbating prevalence of malnutrition. It is estimated that malnutrition is an underlying cause of death in 49 percent of under-five child deaths in all developing countries (said another way, half of children dying from a childhood illness would not die if they were well-nourished).

8.28 The disease burden amongst young children in Zambia is high, which causes and is caused by malnutrition. Diarrhea prevalence stands at 22 percent (ZDHS 2001/2), whilst the malaria infection rate is 1133 cases per 1000 (CBOH 2002). Full immunization covers 70 percent of children (ZDHS), leaving nearly one-third vulnerable to potentially fatal childhood diseases.

8.29 Severe malnutrition increases the risk of dying in young children (by 8.4 times) and moderate malnutrition also contributes significantly to the risk of mortality (4.6 times). For malaria, children with severe and moderate undernutrition are 9.4 and 4.6 times, respectively, more likely to die than well-nourished children (Caulfield, et. al., forthcoming).

8.30 The under-5 mortality rate in Zambia has risen over the past twenty years, as shown below in table 6.3. Whilst the increases seen are a result of multiple factors, there is no doubt that malnutrition plays a major part in the fatality in many cases.

Table 8.6: Under 5 mortality rate 1980 to 2001/2

Under-5 mortality rate	1980	1990	2000	2001/2
Rural	132	164	180	182
Urban	108	128	126	140
Total	121	151	162	168

Source: Census 1980, 1990, 2000; ZDHS 2001/2

8.31 Malnourished children are developmentally disadvantaged and are slower to attain skills than their well-nourished counterparts (Behrman, et al., 2004). Children who are stunted in their first three years of life rarely meet their potential for growth and are permanently stunted as adults (Ruel, et al., 1995) with a number of consequences including reduced levels of productivity and earned income in short adults (Haddad & Bouis, 1990). Stunted children are often not sent to school on time, attend school less frequently because they are ill more often and repeat more grades than their taller counterparts (Glewwe, Jacoby & King, 2001).

8.32 Girls who were stunted in childhood grow into stunted adults. Short stature is associated with increased risk of pelvic disproportion and the need for assisted delivery (i.e., C-sections) and increased risk of maternal mortality (Krasovec & Anderson, 1991). Women who are undernourished during pregnancy (i.e., do not gain enough weight) are at greater risk of delivering prematurely. These women are also at risk of delivering a low birthweight infant

which is 40 times more likely to die than a normal weight infant. If the low birth weight infant survives, he or she is at-risk of development problems as an older child and at-risk of pre-mature death from hypertension, diabetes and cardiovascular diseases as an adult (Barker, 1998).

D. Micronutrient Malnutrition

8.33 Micronutrients deficiencies contribute to increased morbidities and risk of dying. The focus of international attention has been on vitamin A, iron and iodine deficiencies, more recently extended to zinc and folic acid deficiencies. Other micronutrient deficiencies are known to exist in tandem with deficiencies in these five micronutrients and, in fact, with energy deficiency leading to undernutrition. However, the focus in Zambia is on vitamin A, iron and iodine deficiencies.

Vitamin A Deficiency

8.34 The impact of vitamin A deficiency is severe. Vitamin A is an essential micronutrient for the normal functioning of the visual system, growth and development, resistance to disease, and for reproduction. Vitamin A is believed to improve immunity, and hence reduce mortality rates in children and women.

8.35 When a child with vitamin A deficiency contracts measles, his or her risk of dying increases by 40 percent (Sommer & West, 1996). A recent analysis found that 20 percent of the malaria morbidity could be attributed to vitamin A worldwide. Vitamin A deficiency can also result in blindness and increased mortality in young children. Studies examining vitamin A deficiency and mortality conclude that there is on average a 23 percent reduction in child mortality when vitamin A supplements are given to children suffering from a deficiency (Beaton, et al., 1993).

8.36 Studies on the consequences of vitamin A deficiency in adults are limited, but one study in Nepal found that when women were supplemented with vitamin A before and during pregnancy there was a decrease in mortality from obstetric complications (West, et al., 1999). Two-thirds of children under 5 years and almost a quarter of women have low serum retinol which is indicative of vitamin A deficiency (Rassas, et al., 2003).

8.37 Zambia's response to Vitamin A deficiency has been to fortify sugar with vitamin A, and to provide vitamin A supplementation for children under five years of age. Zambia is largely self-sufficient in sugar, the majority of which is produced through a single factory. The program to fortify sugar has therefore been relatively easy to set up and monitor.

8.38 The ZDHS 2001/2 showed that for urban households, 45 percent had sugar available, and most of that was appropriately fortified. Adjustments to the fortification program, to encourage the use of opaque rather than transparent bags, would increase fully satisfactory results to over 80 percent of sugar, whilst information about a further 10 percent of sugar (unlabelled) would probably reveal that it emanated from Zambia Sugar, and was therefore fortified.

8.39 The fact that over 50 percent of households had no sugar at the time of interview does not mean that they never have sugar, and do not benefit from fortification. Habits in Zambia place a high priority on sugar, and it is likely that many households have sugar sometimes rather than never.

8.40 However, in rural areas only 13 percent of households reported having sugar. The lack of markets, problems in transporting and storing sugar to remote and small markets, and the availability of alternatives such as honey suggest that many households never access fortified sugar. This situation is unlikely to change in the near future. In rural areas, therefore, the successful implementation of the vitamin A supplementation scheme is a particular imperative.

Iodine

8.41 Iodine deficiency is caused by low levels of iodine in the soil. Because it controls thyroid function, a deficiency in iodine is associated with poor birth outcomes (prematurity, stillbirth, low birthweight) and severe mental retardation (cretinism) (Levin, et al., 1993). More recently it has been estimated that a population can lose on average 13.5 IQ points per person even when iodine deficiency is moderate (Herrnstein & Murray, 1994).

8.42 The lack of iodine in the diet poses a severe threat to the human capital base of Zambia. In 1993, 32 percent of school children were iodine deficient. This finding lead to a change in legislation, insisting that all salt produced or imported into Zambia was iodized. However, because the sources of salt are more diverse and the legislation not the same in other countries, this has been much harder to monitor or control. Cheaper non-iodized salt, or salt derived from non-iodized stock-feed salt, are both readily available.

8.43 The ZDHS 2001/2 tested salt in respondents' households. Only 77 percent of salt tested was adequately iodized, conforming that the implementation of the iodization regulation still needs to be tightened. Salt was not available in 10 percent of urban households, but like sugar it is possible that this lack is temporary. In rural areas, 20 percent of households had no salt, which raises the question of the extent of regular dependence on traditional salt, made from burning specific grasses, which has no iodine content. Investigation of this issue could suggest that iodine interventions should be targeted at areas where the traditional practices are common.

Iron Deficiency

8.44 Iron deficiency anemia is the most prevalent nutritional deficiency in the world, with 50-70 percent of pregnant women and young children under two years of age suffering from anemia. While there are several major causes of anemia, including malaria, it is estimated that 50 percent of the anemia is caused by iron deficiency. Iron deficiency anemia is associated with a number of poor birth (low birthweight, prematurity, etc.) and maternal outcomes (e.g., mortality) (Galloway, 2003). Anemia caused by iron deficiency and malaria increase risk of dying in young children. Iron deficiency has a profound effect on the attention span and capacity to learn in young and older children. For all age groups, iron deficiency affects capacity to work and play, decreasing capacity to work by 10-20 percent for every 10 percent decline in hemoglobin (Levin, 1986). From studies in 10 countries, including Mali and Tanzania, it is estimated that there is a 4.05 percent loss in gross domestic product due to iron deficiency (Horton & Ross, 2003). For Zambia this means an annual loss of US$118 million from iron deficiency anemia alone.

8.45 The Zambian population is at high risk for iron deficiency malnutrition. Half of pregnant women and 40 percent of all women are anemic while a staggering 82 percent of children ages 6-18 months are anemic (Luo, et al., 1999).

8.46 According to GRZ policy, all pregnant mothers attending antenatal clinics are supposed to be supplemented with iron tablets during their pregnancy. International recommendations are that iron tablets be taken daily for at least three months during pregnancy. However, the ZDHS

2001/2 showed that although 60 percent of women reported having taken iron tablets during their pregnancy, more than half of these took them for less than two months.

8.47 Repeated or chronic malaria infections result in anemia, which in turn increases vulnerability to infections including malaria. Reducing malaria interventions in Zambia would have a significant impact on reducing anemia among adults and children. Bed-net interventions, other prevention strategies and adequate treatment of malaria will all result in improvements in iron deficiency.

E. Breastfeeding and weaning

8.48 Appropriate feeding practices are of fundamental importance for the survival, growth, development, health and nutrition of infants and children and for the well-being of mothers. Early feeding strategies are an underlying determinant of children's long term nutritional status, which in turn influences the risk of illness and ultimately death (ZDHS 2001/2).

8.49 Breastfeeding benefits depend on the length of time a child is breastfed, and the frequency and intensity of breastfeeding. Ideally, babies should be exclusively breast fed for the first six months of life, and continue to have breast milk as part of the diet until the age of two.

8.50 In Zambia, over 98 percent of children are breast feed, with a mean duration of 21 months. By 18 months old, only 15 percent of babies are not being breast fed. Although most do not reach the target of breast feeding for two years, the vast majority very nearly do so.

8.51 The key concern in the feeding of young babies is related to the *exclusiveness* of breast feeding. According to the ZDHS only 40 percent of children < 6 months of age are exclusively breastfed in 2001/2, although this is an improvement since 1992 when only 8.7 percent of children< 6 months were exclusively breastfed. The LCMS, representing a later date for data collection, reports lower rates of exclusive breastfeeding with only 25 percent of infants <6 months being exclusively breastfed.

8.52 Even in the first weeks of life, many children are given plain water as a supplement to breast milk (31 percent of children under 2 months, ZDHS 2001/2). It is widely believed in Zambia that breast milk is not adequate to stop a baby being thirsty, and that water is essential. In an environment where only 49 percent of households have access to safe water supplies (very much lower in rural areas), this practice is particularly dangerous as babies are exposed to unclean water, resulting in diarrhea infections and other water borne diseases.

8.53 There is little information on the adequacy of complementary feeding. While 87 percent of infants 6-9 months are receiving breast milk and complementary foods, there is no information about the amount of food that is given to these children, although due to high rates of stunting, the amount of food is likely to be inadequate. Looking at the differences in this indicator across income group, there is little difference with only an 11 percent increase in the proportion of children 6-9 months receiving complementary food in the richest income group (95 percent) over the poorest income group (85 percent) (World Bank, 2004).

8.54 The LCMS gives another proxy for the adequacy of feeding young children. In children 6-9 months only 59 percent of children are fed the recommended 3 times daily. By 10-12 months only 3 percent of children are receiving the recommended 5 meals per day.

8.55 Mothers who know or fear that they are HIV positive often fear transmitting HIV to their children through breast milk. However, where access to formula milk, or to clean water for preparing formula or cleaning bottles is limited, breast milk may still be the safer option. Adhering to the regime necessary for safe bottle feeding is difficult, and women may be unable to maintain the necessary standards consistently.

8.56 The ZDHS concludes that the nutrition of young children up to the age of three is often inadequate in terms of both the content of the diet and the frequency of feeding. The content of the diet is dominated by foods made from grains, with fewer and less varied fruits, vegetables, beans and animal proteins than is desirable. Children, like adults, often only eat twice a day, which is way below the recommended 3 to 5 times a day (WHO 1998).

8.57 In Zambia, the infrequency of feeding may be a major cause of malnutrition amongst children in the richer income groups. Even where adequate food is available in the household, children may be malnourished as a result of feeding practices that do not reflect their needs.

8.58 There is a balance between demand for resources, and sufficient labor for food preparation. In rural areas, household size is associated with *less* stunting. In both urban and rural areas, there is less wasting in larger households. Having more adults in a household may increase coping mechanisms by providing more income to the household, and having more adults or older children ensures that there are more hands to feed young children. Having a sick or injured person in the household affects wasting in rural/urban areas (again these data were combined), suggesting that having fewer able-bodied adults to provide for children affects nutritional status in the short-term.

8.59 Clearly, the feeding of young babies and weaning needs to be improved – and many changes could be made at no cost at household level; some even creating savings. Continued errors in how babies are fed create unnecessary morbidity and mortality, draining the time and resources of parents.

F. Responses to Malnutrition

8.60 While prevalence of malnutrition is highest in the poorest countries of the world, the link between family income or proxies of income are not as straight-forward as might be expected in Zambia. In urban areas there is a strong link between income and stunting but in rural areas where stunting prevalence is highest, this link is not as strong and other factors take the lead in determining malnutrition. From this review, determinants of stunting can be used to develop immediate and long term strategies to address malnutrition in Zambia. If malnutrition is not addressed, the effects of malnutrition will follow the malnourished child, if he or she survives, throughout life by affecting health, learning, earning potential and productivity. There are serious ramifications for the economy of any country where prevalence of malnutrition is high.

8.61 Several reviews in the last few years (Galloway, 2003; DeCromier-Plosky, 2005) have concluded that high rates of malnutrition (stunting) in Zambia have increased in the last decade because there has been little government and donor support to reduce it. There have been some successes and even best practices to reduce vitamin A deficiency through fortification of sugar with vitamin A and vitamin A supplementation for children under five years of age. Use of iodized salt, most of which is imported, has increased. Breastfeeding practices have improved from 1992 to 2001/2 through the Baby Friendly Hospital Initiative although some of these gains may now be threatened by mothers' worries about transmitting the HIV virus to their infants

through breast milk. These activities have received major financial and technical support from USAID and UNICEF. Little has been done beyond pilot projects to decrease stunting (i.e., by improving infant and young child feeding starting at six months) and improve the nutritional status of school-age children.

8.62 In the last few years, institutional and policy issues related to nutrition and donor commitment to reducing malnutrition have also been examined in Zambia (Galloway, 2003; DeCromier-Plosky, 2005). Zambia institutions train a cadre of people who have some nutrition training. Many of these graduates work for the National Food and Nutrition Commission (NFNC) which was established in 1968 to help promote nutrition issues in the country. Most of the others work as agriculture extension agents and are helping to provide rural women with information about agriculture, cooking and family caring practices. To date, these professionals have been largely unsuccessful in their efforts to reduce malnutrition for a variety of reasons documented in these recent reviews, including the awkward institutional set up for nutrition, lack of donor support, lack of focus on operationalizing policy into nutrition programs on the ground, and neglect of programs that could reduce high rates of stunting.

8.63 While the solutions for reducing malnutrition lie in a number of Ministries, NFNC, which is a parastatal of the Ministry of Health, has been limited because it does not function as a multi-sectoral coordinating body, and instead has been limited to work through the MOH, usually dealing with Central policy issues rather than supporting implementation of nutrition interventions at district level and below. There are some nutritionists at the district level but they are limited by lack of budget, technical support, and plans of action that would help them have meaningful impact.

8.64 A variety of other activities by Government, NGOs and CBOs, discussed in chapter 3, seek to reduce malnutrition through increasing and stabilizing household food production and livelihood security. Whilst non-availability of food is an obvious cause of malnutrition, however, this chapter has demonstrated that food availability alone is not a reliable indicator of nutritional status. Whilst food security programs are clearly essential, complementary nutrition promotion interventions are also necessary to ensure that food security is translated into improved nutritional status.

G. Recommendations – a Multisectoral Approach

8.65 The following recommendations on the immediate and long-term actions, which involve many sectors, to reduce malnutrition take into consideration the current analysis on targeting activities and some of the recommendations made by the Galloway and DeCormier Plosky reports.

Immediate Interventions

Rural Areas

8.66 **Fill the information gap.** The first priority in reducing malnutrition in Zambia is to provide information about infant and young child caring practices, particularly adequate feeding practices. Caregivers need to know the types and amounts of foods children need at different ages and creative ways to encourage children to eat. These interventions should be targeted particularly to all rural mothers where stunting rates are highest. In rural areas because increased stunting was associated with being a first child, the mother's lack of education, and a smaller

household size, special efforts will need to be made to ensure that women who are young, just married, not attending school and living in smaller households have access to this information. Targeting other family members with this information will provide mothers, who have a number of responsibilities in households, with help in caring for small children.

8.67 **Increase the quality and coverage of health services in rural areas.** While distance to a health facility did not make a significant difference in the prevalence of stunting, this is probably because the quality of health services is so poor everywhere in rural areas. Wasting in both urban and rural areas, not disaggregated because the sample size of wasted children was too small, and in fact significantly *increased* when children were closer to a health facility or the child had been sick or injured in the last two weeks.

8.68 Nonetheless, improving the quality of health services and ensuring that the majority of families have access to these services is an important intervention for reducing malnutrition. While improving the health system requires correcting systemic problems such as infrastructure and training which may require a long-term commitment, any immediate interventions delivered by the health system to reduce malnutrition should focus on known preventive and cost-effective activities, including nutrition education to improve infant and young child feeding, promoting consumption of fortified food such as iodized salt and vitamin A-fortified sugar, iron supplementation for pregnant women, and vitamin A supplementation for children under five. Adequate recuperative feeding after illness is an important message to give to mothers to reduce wasting in children.

8.69 **Improve the availability of clean water and improving housing in rural areas.** Use of an unprotected water source had a profound and significant effect on stunting in rural areas. Improving family access to clean water is both an immediate and long-term activity to decrease stunting in rural areas. Children living in houses with grass roofs were at higher risk of being stunted. Improving rural infrastructure is both an immediate and long-term need in the country.

8.70 **Delay the age of first pregnancy.** In rural areas, the first child was at increased risk of being stunted. This suggests first time mothers don't have the experience or knowledge base to care for their first child. It also suggests that young mothers, who may still be growing themselves, may have compromised nutritional status which puts their infants at increased risk of malnutrition. Increasing modern methods of family planning or delaying first sexual contact is an important strategy to decrease malnutrition. Improving the nutritional status of young mothers also is an important intervention to reduce stunting in first born children.

8.71 **Target food aid.** An immediate intervention for people suffering or at immediate risk of malnutrition, is the provision of targeted supplementary food aid, particularly for the poor, to households affected by HIV/AIDS and malnutrition, and to people exposed to extreme risks.

Urban Areas

8.72 **Provide safety nets in urban areas.** Unlike rural areas, there was no significant effect on stunting from mother's education, birth order, water source, grass roof, or household size in urban households. The present analysis found that families living in low cost urban areas or where per person consumption in the household was low had significantly more stunted children than families living elsewhere or with higher consumption levels, suggesting that cash transfers targeted to the poorest families will be the most efficient way to improve the nutritional status of the most malnourished children in urban areas. Providing nutrition education messages can improve the efficiency of cash transfers in improving nutritional status.

Urban and Rural Areas

8.73 **Improve micronutrient status.** While micronutrient status was not included in the analysis for this chapter, improving micronutrient status is essential to ensure the adequate utilization of any energy by young children. Because micronutrients are involved in co-enzyme processes in the production of energy in the body, improving the diversity of the diet and its micronutrient content is an important longer term strategy for decreasing stunting in Zambia. In the immediate term, interventions such as provision of vitamin A, iron and possibly zinc for young children will ensure that these micronutrients do not limit energy utilization when adequate complementary feeding is given. The nutritional status of women needs to be attended to in order to ensure their health and the health of their infants. Iron deficiency, for example, in pregnant women is associated with low birthweight and prematurity both which, if the infant survives, affects growth in early life. Supplying a cost-effective package of micronutrients to school children can act as incentive for children to attend school and reduce illness and increase attendance. Iron deficiency has been associated with poor attention span and by supplying iron and deworming school children can improve their iron status.

H. Longer-Term Strategies

8.74 **Increase the diversity of the diet.** While improving agriculture production is not associated with improving nutritional status in the short term, increased diversification of what people are growing and consuming could improve the quality of the diet in Zambia. In Zambia, provincial stunting rates are lowest in Central province where most of the agricultural production takes place. In areas more dependent on crops like cassava and sorghum, stunting is higher. This is not to say these crops should be replaced because they are more drought resistant than maize and more suited to areas where rainfall is limited. However, increasing the number of crops people produce and consume will increase the quality of diet and provide nutrients that all Zambians need for good health. However, improving the nutritional status of infants and young children needs to be facilitated by accompanying messages to utilize new foods and include them in adequate amounts when feeding children.

8.75 **Increase incomes.** While there was little relationship between incomes and stunting rates in rural areas, measures to eradicate poverty in the long-term will improve resources and information available to households and ultimately improve nutritional status. Rural development efforts should be a top priority to increase the livelihoods and improve the lifestyles of the rural poor.

8.76 **Increase the educational levels of girls.** Mother's education was an important determinant of stunting in rural areas. Mothers with higher levels of education have greater access to knowledge and resources that can improve the welfare of their families. This suggests that a long-term strategy must be to increase the number of girls finishing at least secondary schools by giving them (and their families) incentives to stay in school and making education more relevant to them from primary to secondary school.

The Nutrition Policy Framework and Institutional Setting

8.77 Based on this analysis and the Galloway, 2003 and DeCromier Plosky 2005 reviews, several recommendations can be made about how to reduce malnutrition. The most important short term activity is to fill the information gap, particularly in rural areas, and ensure that every caregiver has the information needed to adequately feed children.

8.78 Zambia has an institutional setting that could be recast to improve the efficiency at which the country is addressing malnutrition. Because nutrition is not a sector but sub-sector in several major sectors (agriculture, health and education), national efforts to reduce malnutrition need to be coordinated across these sectors. To date a major disadvantage is that National Food and Nutrition Commission (NFNC) is a parastatal of health and does not work well with other sectors. There are nutritionists in education and agriculture but a coordinated effort will be needed across these three main ministries if malnutrition is to be reduced. An advantage that

8.79 Zambia has is that it has a cadre of trained nutritionists in the country working at the National Food and Nutrition Commission (NFNC), in Agriculture as extension agents for subsistence farmers, and in Education on school health and nutrition, but these nutritionists need to have specific tasks to support implementation of district level nutrition interventions.

8.80 While the decentralizing of health services has been less effective than its heady start in the early 1990s, several vertical programs, such as vitamin A supplementation, have been devolved to the district level with great success, which has given districts more experience in implementing nutrition interventions, and has greatly reduced the cost of delivery. This experience can be used to expand nutrition activities to ensure that a package of cost-effective nutrition interventions is implemented in districts with an emphasis on community-based activities that will prevent malnutrition. The USAID-funded community-based growth monitoring and promotion project should be examined as a possible model for expansion. A program of this type builds capacity in caregivers and communities to adequately care for their children and prevent malnutrition from occurring and at lower cost than what could be provided at a health facility. Nutrition staff at NFNC and elsewhere need to be available to give technical assistance when implementing these interventions. They should not be implementers but build capacity to implement at the district level and below and providing monitoring and evaluation skills to ensure process and impact are being tracked.

8.81 Zambia has a history of putting most of its nutrition program resources into rehabilitating severely malnourished children. It is much more cost-effective to prevent malnutrition at the community level and this should be a major focus of work in districts. The Program Against Malnutrition (PAM), a local NGO set up to distribute food during the drought in the early 1990s, now works with a quarter of farm families to increase family food security. PAM and other NGOs provide an extensive network that can be used to get the information out to households about how they can reduce malnutrition and improve the dietary diversity of the entire household. Some excellent pilot projects exist that can be scaled up to larger areas, if not at the national level.

8.82 To increase the work at district level, however, more nutrition expertise and oversight is needed at the district level. Coordination of NGOs, including PAM, in each district could help give technical assistance in training and monitoring and evaluation. NFNC staff should be divided into several sections: one that assists with monitoring and evaluation, one that helps with development of IEC materials, and one that is directly involved with implementation by giving technical assistance to districts that do not have technical expertise in nutrition. In the long-term nutrition expertise in implementing nutrition activities needs to be built at the district level where at least one nutritionist should reside to assist with implementation. At the district level, the sectors involved/related to reducing malnutrition (health, education and agriculture) should be coordinated to develop a plan of action to address malnutrition which would include whatever expertise that would be needed to address the problem.

Annex Table 6-1: Chronic Malnutrition: Stunting (Low Height-for-Age)

Dep. Var.: Stunted Height-for-age z-score < - 2 SD	Rural (1)	Urban (2)
Male child	0.117 (1.28)	0.114 (1.14)
First child	0.437 (3.99)***	0.176 (1.30)
Mother's education	-0.032 (2.02)**	0.008 (0.42)
Log Consumption PAE, pr. adj.	-0.024 (0.31)	-0.419 (4.41)***
Unprotected Source	0.269 (2.68)***	0.231 (1.50)
Grass roof	0.298 (2.30)**	
Household size	-0.031 (1.89)*	-0.010 (0.39)
Dependency ratio	0.047 (0.87)	0.051 (0.85)
Cluster prop. with BCG immunization	-0.259 (1.02)	-0.316 (0.57)
Health Facility	0.006 (1.43)	0.000 (0.01)
Low-cost urban area		0.456 (3.13)***
Constant	-0.285 (0.28)	3.536 (3.08)***
Observations	3281	2542
Notes: Absolute value of t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.		

Annex Table 6-2: Acute Malnutrition: Wasting (Low Weight-for-Height)

Dep. Var.: Wasted Weight-for-height z-score < - 2 SD	Urban and Rural (1)
Male child = 1	0.343 (2.21)**
First child, ind.	-0.289 (1.66)*
Log Consumption PAE, pr. adj.	-0.117 (0.97)
Household size	-0.091 (2.54)**
Health Facility	0.013 (2.42)**
Rural dummy	-0.121 (0.55)
death1549	0.383 (0.83)
Sick or injured in the last two weeks	0.303 (1.66)*
Constant	-1.219 (0.82)
Observations	6108
Notes: Absolute value of t statistics in parentheses. Province dummies included. * significant at 10%; ** significant at 5%; *** significant at 1%	