2. POVERTY IN ZAMBIA: MEASUREMENT, LEVELS, AND TRENDS

A. Introduction

2.1   This chapter examines poverty—broadly defined as ***unacceptable deprivation in well-being***—in terms of material deprivation, human deprivation, vulnerability, destitution, and social isolation. It draws on a range of data sources and methods to define the extent of poverty in the state, as well as shed light on recent trends in poverty.

2.2   Poverty cannot be understood in terms of a single indicator or measurement methodology. Consequently, this Assessment takes a multidimensional view of poverty and draws upon a variety of information to analyze the situation faced by the poor in Zambia. The broad definition of poverty used here includes three components – poverty of private resources, poverty of public goods and services, and poverty of relationships. *Poverty of private resources* refers to lack of access to both material assets and human capital—health, education, and skills. The poor also suffer from *poverty of access to public goods and services* like schools, roads, clean water and security. Finally, many of the poor suffer from *poverty of social relations and networks.* The very poor often belong to fewer social networks and informal systems of support; some are even isolated from their kinship networks and close family members. All three of these components should be taken into account to fully understand poverty in Zambia. To present a full picture of poverty, this Chapter draws upon both qualitative and quantitative information drawn from both nationally representative household surveys and from in-depth participatory studies. Where possible, comparisons between multiple data sources are made.

B. Self-Assessed Poverty Levels in Zambia

2.3   Perceptions of poverty in Zambia are partially determined by expectations based on past experience. Zambia was once relatively prosperous, with per capita income at the time of independence in 1964 that placed it among the wealthier countries in sub-Saharan Africa. As the price of copper fell beginning in the mid-1970s, the country experienced an almost continuous decline in income per person. Only since 2000 has Zambia experienced consistent growth in income per capita. Because Zambians take past prosperity as a reference point for their standard of living, they overwhelmingly view themselves as poor. Table 2.1, based on the LCMS III, shows 97 percent of rural Zambians and 92 percent of urban Zambians consider themselves either "very poor" or "moderately poor."

Table 2.1: Do Zambians Perceive Themselves to Be Poor?
Percentage Distribution of Self-Assessed Poverty Status, 2002-03

Self-Assessed Poverty Status	*All Zambia*	*Rural*	*Urban*
Very Poor (%)	47	52	37
Moderately Poor (%)	48	45	55
Not Poor (%)	5	3	8
Total	100	100	100

Source: 2002-03 LCMS

C. Consumption-Based Poverty Measures: Methodology

2.4   While emphasis is placed in this report on broad measures of poverty, the poverty rates presented here are calculated using consumption data collected in the 2002-03 LCMS. The consumption poverty figures provide a starting point from which to consider the multi-dimensional nature of poverty. This section briefly describes the how the poverty line was determined and used to measure consumption-based poverty rates. A fuller treatment is given in the Annex. The principal steps involved in calculating poverty figures are the following: 1) measure household consumption, 2) adjust for variation in cost of living, 3) determine a poverty line, and 4) calculate a poverty rate. Each of the four steps is explained below.

Measuring Household Consumption

2.5   Households surveyed in the 2002-03 LCMS reported on their levels of consumption of both food and non-food items, including housing. Recorded consumption included purchased items, along with food which the household both produced and consumed. Material consumed was valued at local prices (collected in a separate price survey at markets in district centers), and all consumption was added up to produce a total value of consumption for the household.[16]

2.6   The poverty analysis was conducted using each household's level of consumption per adult equivalent rather than consumption per person. Consumption per adult equivalent for each household was calculated by dividing the household's total consumption by the number of adult equivalents in each household. In calculating adult equivalents, adults each counted as one, while each child counted as a fraction of an adult equivalent, with the exact figure depending on age. The lower adult equivalent values for children reflects the lower calorie needs of children. In terms of how much consumption is needed to meet basic needs, a young child is "equivalent" to less than one adult.

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[16] Purchases of durable goods, i.e. those that are used over a long period of time, are not included in the consumption aggregate, and instead a "durable good user fee" is calculated for households that own such goods. Also, housing costs are imputed for most households. See the Annex for details.

**Box 2.1: Why Measure Poverty with Consumption and Not Simply
Expenditure or Income?**

> A household's consumption is equal to the sum of (1) expenditures plus (2) the value of home-produced food. Expenditure rather than income is used for the first half of the calculation for two reasons. First, household surveys measure what people spend more accurately than their incomes. Second, income is typically variable over the course of the year, so expenditure provides a better measure of welfare over time. Consumption is a better measure of welfare than simple expenditure alone, because much of what many households consume is their own production, which would not be captured by expenditure. Ignoring home-produced food would greatly understate the consumption levels of rural households

Adjust for Variation in Cost of Living

2.7   Because there is wide variation in the cost of living across space in Zambia, it was necessary to adjust the value of household consumption using a price index. This price index was calculated using local price data collected as part of the LCMS. The index also corrects for variation in prices over the 12 months during which the survey data was collected.[17]

Determine a Poverty Line

2.8   This is the key step in the process. The notion of a poverty line is conceptually rooted in a "standard of living." The poverty line is the minimum level of consumption below which people are unable to meet their basic needs for food, housing, and everything else. There is no single correct poverty line, and any poverty line necessarily reflects some measure of judgment about what "basic needs" entails in a particular society. The procedure used to estimate the poverty line here follows the procedure used in a variety of other developing countries:

- *Choose a level for minimum food calorie needs.* Minimum calories per adult were taken as 2464 per day, as per guidelines from the World Health Organization (1985).
- *Determine the composition of food basket for a typical household near poverty line.* Average shares of consumption in different foods were determined for households that ranked in the middle fifth (quintile) of all households nationally.
- *Calculate cost of meeting calorie needs with that food basket.* The cost of reaching 2464 calories with the food basket was found to be 52843 Kwacha per month, at national median prices. This is the core or food poverty line, i.e. the minimum consumption level of food required to meet basic food needs alone.
- *Add additional amount for non-food consumption.* Because basic needs entail more than food, the poverty line should reflect non-food as well as food needs. Like the food basket shares, the non-food share was determined by examining the consumption patterns of a typical household near the poverty line. Specifically, it was found that for the average household in the middle quintile of all households nationally, 28 percent of its consumption was for non-food items. The *total* poverty line was then calculated by adding a corresponding percentage to the food poverty

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[17] Cost-of-living adjustments for both urban and rural households were done using price data collected at markets at district centers, which are generally urban. Consequently, the price index does not reflect differences in prices between urban and rural areas within districts. According to CSO personnel, in many areas district centers are the only locations with active markets, so prices for district centers may in fact represent the most relevant market prices for households in the district. Assuming that spatial price variation is chiefly between rather than within districts, this shortcoming in the price index probably has minimal impact on the analysis presented here.

line.[18] The total poverty line, which is the minimum monthly consumption needed to satisfy basic food and non-food needs, was found to be 73394 Kwacha per adult. The total poverty line is referred to throughout the text as simply the "poverty line."

2.9   At official exchange rates in mid-2003, the poverty line is equal to approximately $US15 per adult per month, or US$0.50 per adult per day. For a typical family of six, the poverty line amounts to about 350,000 Kwacha per month.[19]

2.10   The food basket used for the poverty line calculation reflects the diet of a typical poor person in Zambia. A poor person gets 70 percent of his or her calories from grains, chiefly various forms of maize, and most of the remainder from vegetables. The daily food consumption of a poor Zambian adult with consumption level at the core poverty line would be roughly as follows:[20]

- 2-3 plates of nshima
- a medium-sized vegetable such as a sweet potato or tomato
- a few spoonfuls of oil
- every 3-4 days, a small serving of chicken, beef, or fish
- every 3-4 days, a piece of fruit such as a banana or mango
- a handful of groundnuts
- a couple teaspoons of sugar

Calculate Poverty Rates

2.11   Once the poverty line is determined and consumption per adult equivalent calculated for each household, estimating poverty rates is straightforward. The most common measure is the poverty headcount, which is simply the fraction of individuals with levels of consumption below the poverty line. In addition to the headcount, two other consumption poverty measures were estimated. The poverty gap index expresses the average gap between the consumption of the poor and the poverty line. The poverty gap index is higher not just when there are more people but also when consumption levels are lower among the poor. The poverty severity index is similar to the poverty gap index but gives greater weight to the very poorest individuals.

2.12   Poverty rates are also calculated using both the poverty line and the lower food or core poverty line. The use of two poverty cutoffs provides some indication of the sensitivity of poverty measures to the poverty line.

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[18] Specifically, the food poverty line was multiplied by 1/(1-0.28).

[19] This figure was calculated using the adult equivalent scale for a "typical" family of six consisting of two adults, and one child in each of 4 age categories: 1-2, 3-5, 7-10, and 10-12.

[20] The food basket underlying the poverty line consists of 44 items, reflecting the much wider variation in foods consumed across the whole country than is consumed by a typical individual. This stylized food basket was determined by scaling the poverty-line food basket down to the food consumption level of someone with total consumption at the core poverty level, grouping the foods into major categories, adding up the basket's food quantities by weight in those categories, and then determining corresponding quantities among the most common foods.

Box 2.2: How Can the Core Poverty Line Be Interpreted?

Like many other poverty studies, this analysis defines both a total poverty line and a core poverty line equal to the food poverty line. A problem with the idea of a core poverty line (also sometimes called the food poverty line or the extreme poverty line) is that core poverty does not correspond to any underlying welfare concept. It is simply a lower line, without any clear basis. It is sometimes referred to as the minimum expenditure required to meet basic food needs. However, this is a misleading interpretation. Because some non-food consumption is a part of basic needs and all individuals will have some non-food consumption, someone with total consumption equal to the food poverty line is not meeting his or her basic food needs.

An alternative core poverty line could be constructed by revisiting the underlying calorie requirement. The calorie requirement used here is taken from the WHO's recommended calorie intakes. An alternative core poverty line could reasonably be constructed with food and non-food components, but basing the food component on a calorie requirement of, for example, 70-80% of the WHO's recommended calories.

It is also possible to interpret the usual core poverty line as if it were a basic poverty line calculated from a lower calorie requirement. Given the mathematics of the poverty line calculations and the particular non-food consumption share in Zambia, the core poverty line used in this report is equal to a total poverty line (with food and non-food components) based on a calorie requirement of 72% of the WHO's recommendations. This lower calorie requirement amounts to 1774 calories per adult and correspondingly lower figures for children. This is similar to the lower calorie requirements used in some poverty studies and sometimes associated with "minimum" calorie requirements rather than the WHO's more generous "recommended" calories. Thus the core poverty rates in this paper can be viewed as poverty rates which account for both food and non-food needs but assume a lower calorie requirement. This provides an alternative way of interpreting the core poverty figures.

Poverty Measures

2.13   Using the poverty line and core poverty line described in the previous section, the national headcount estimates are 56 percent for poverty and 36 percent for core poverty. In other words, over half of Zambians have levels of consumption that are insufficient to meet basic needs, and more than a third have consumption levels that would be inadequate to meet basic food needs alone, even if they were able to forego all non-food consumption. Table 2.2 shows poverty and core poverty rates for urban and rural households separately. Poverty rates are highest in rural areas where two-thirds of Zambia's population resides. Consequently, the poor are highly concentrated in rural areas. Seventy-two percent of the poor live in rural zones.

Table 2.2: Headcount Poverty Estimates, 2002-03

|	*National*	*Rural*	*Urban*
Below Poverty Line (%)	56	62	45
Below Core Poverty Line (%)	36	40	28

Source: Analysis of 2002-03 LCMS

Figure 2.1: Where are the Poor?
**Percentages of Nation's Poor Living in Urban and Rural Areas**
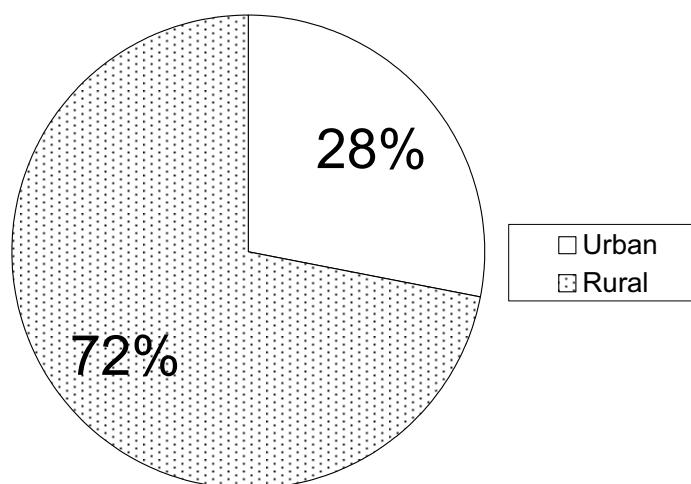
2.14   The urban population of Zambia is found mainly in Copperbelt and Lusaka provinces, which are home to 69% of urban Zambians. The remaining seven provinces are overwhelmingly rural. Poverty is lowest in Southern and Lusaka provinces, which both have headcount poverty rates of 47%. Poverty rates are highest in the most northerly provinces: Northern, Luapula, and Northwestern.

Figure 2.2: Poverty Headcount by Province
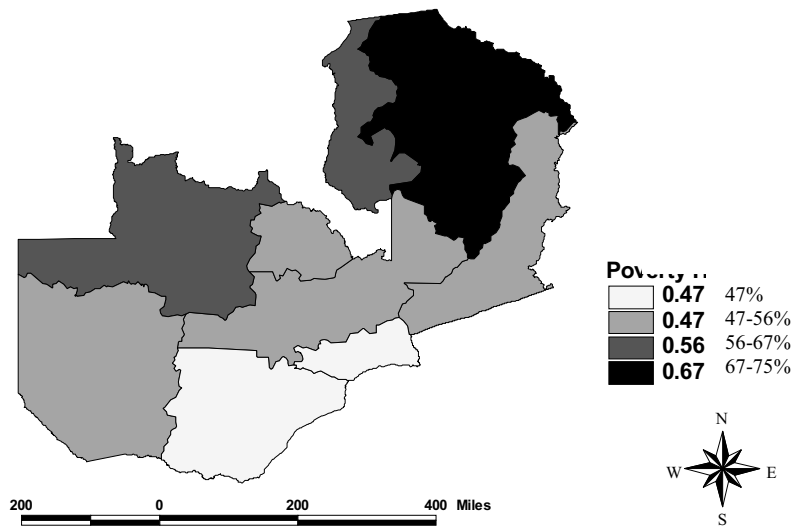
2.15   Figure 2.3 show a breakdown of the location of the poor by province. The largest fraction of the poor on a national basis—17 percent—is found in Northern, which is also the province with the highest poverty headcount rate. Although Lusaka and Copperbelt have relatively low poverty rates, they also have large populations. Consequently, they are home to large fractions of the country's poor.

Figure 2.3: Where are the Poor? Distribution of Poor by Province
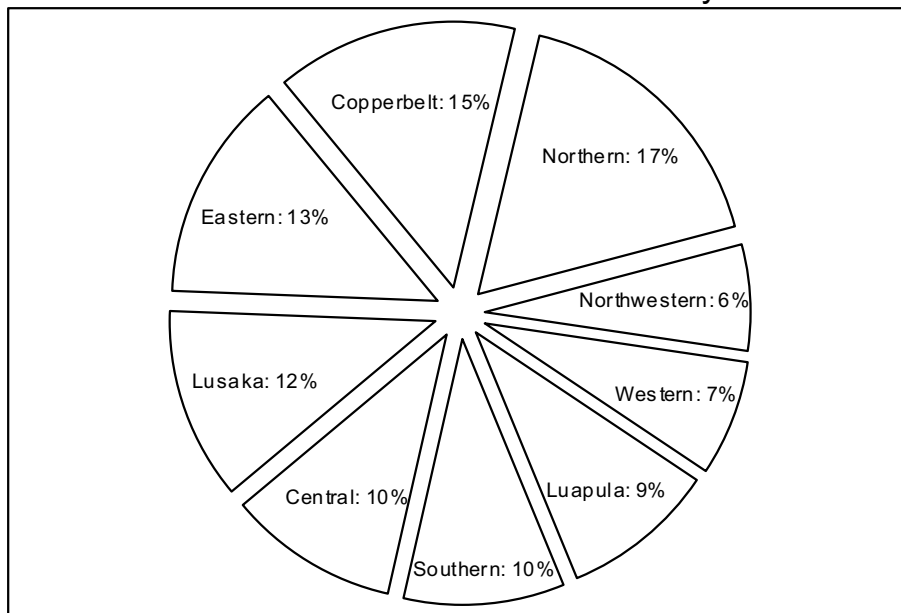
D. Central Statistical Office Consumption-Based Poverty Figures

2.16   There is an internal debate in Zambia about the levels of poverty. In analyzing the same LCMS data used here, the Zambia Central Statistical Office (CSO) implemented a similar methodology to that described above, but with a number of minor variations. CSO made slightly different choices for its food basket, minimum calorie requirements, adult equivalent definition, and price index. Further details are presented in the Annex. As a consequence of these differences, CSO finds higher poverty rates, e.g. a national headcount of 67 percent compared to the 56 percent found using the methodology in this report. It is important to note that the differences in methodology are relatively minor, and that the differences in poverty estimates are largely inconsequential. The ranking of subpopulation and the overall profile of both urban and rural poverty in this report differs little from what is presented in CSO's own analysis of the survey data, CSO (2004). The small differences in poverty point estimates should not distract from the larger picture of poverty in Zambia, which is largely the same whether one uses CSO's figures or those in this report.

2.17   The headcount poverty estimates from this report ("PVA estimates") are shown side by side along with the CSO estimates in Table 2.3. Also shown are the ranking by province in terms of headcount. While there are some differences in provincial rank between the two sets of estimates, the overall differences are small. Both the PVA and CSO estimates show that the poorest areas are Northern, Luapula, Northwestern, and Eastern provinces while the least poor are Copperbelt, Lusaka, and Southern provinces.

2.18   The Jesuit Centre for Theological Reflection (JCTR), a prominent non-governmental organization in Lusaka, monitors the monthly price of a Basic Needs Basket which represents the cost of living for a family of six in Lusaka and other urban areas. The cost of the basket includes a much larger cost for housing than that used for the analysis presented here. Consequently, taking the JCTR cost of living as a poverty line would imply higher poverty rates than those presented here.

Table 2.3: 2002-03 Headcount Poverty Estimates Compared to CSO Estimates

	PVA Estimates	CSO Estimates	Province Rank (PVA)	Province Rank (CSO)
Province				
Central	54	69	5	5
Copperbelt	52	58	7	8
Eastern	56	71	4	3
Luapula	67	70	2	4
Lusaka	47	57	8	9
Northern	75	81	1	1
Northwestern	61	72	3	2
Southern	47	63	9	7
Western	52	65	6	6
All Zambia	56	67		
Rural	62	74		
Urban	45	52		

Source: 2002-03 LCMS

E.   Additional Measures of Well-Being

2.19   Consumption-based poverty figures offer only a partial view of the state of the poor. Table 2.4 provides a snapshot of a variety of additional indicators related to education, HIV/AIDS, childhood mortality, and child malnourishment, separately for men and women. Trends in these figures over time and comparisons to other sub-Saharan African nations are shown in subsequent sections.

Table 2.4: Additional Measures of Well-Being in Zambia

	Both Sexes	*Male*	*Female*
Education			
Adult Literacy Rate (%), ages 15 and above	67	77	58
Mean Years of Schooling, ages 15 and above	5.6	6.4	4.9
School Attendance Rate (%), ages 7-13	75	75	76
School Attendance Rate (%), ages 14-18	64	71	56
HIV/AIDS			
Prevalence Rate (%), Urban and Rural, ages 15-49	16	13	18
Prevalence Rate (%), Urban, ages 30-34	38	34	43
Life Expectancy and Childhood Mortality			
Life Expectancy at Birth	37.4	37.9	36.9
Infant Mortality (deaths per 1000 births before age 1)	95	95	93
Under-5 Mortality (deaths per 1000 births before age 5)	168	176	160
Child Malnourishment			
Stunted (%), ages 5 and under	47	48	46
Wasted (%), ages 5 and under	5	6	4

Sources: 2000 Census (literacy and schooling), 2002/03 LCMS (attendance), 2001/02 Demographic and Health Survey (HIV/AIDS, childhood mortality, child malnourishment), UN World Population Prospects: 2004 Revision (life expectancy)

2.20   The summary figures in the table show substantial differences by gender. There is no significant difference in child malnutrition rates by gender, and as in most countries, child mortality is higher for boys than girls. Primary school age children (7-13) show no difference in attendance rates by gender. For all other measures examined here, women fare worse than men. Adult literacy, mean years of adult schooling, and secondary school age attendance and all much lower for women. HIV prevalence rates are also substantially higher for women. Women are so much more affected by AIDS that unlike almost everywhere else in the world, life expectancy at birth in Zambia is lower for women than men.

F.   Zambia in the Sub-Saharan African Context

2.21   Zambia shares many features with other sub-Saharan African nations, but it also has features which set it apart. Like much of sub-Saharan Africa, Zambia experienced a long period of European colonial rule geared chiefly towards extraction of resources. As the territory of Northern Rhodesia, the area was administered by the South Africa Company from 1891 until it was taken over by the United Kingdom in 1923. The name was changed to Zambia upon independence in 1964. Zambia both achieved independence peacefully and has avoided violent conflict since becoming an independent nation-state, unlike some of its immediate neighbors—namely Angola, Mozambique, the Democratic Republic of Congo, and Zimbabwe. Zambia's peaceful environment and mineral wealth enabled it to fuel large public sector investments in the

1960s and 70s, but the subsequent decline in the international price of copper has caused per capita income to drop precipitously. Although the country's economy outranked its neighbors immediately after independence, it is now among the poorer states on the continent.

2.22   Zambians receive more education on average than residents of most other sub-Saharan African nations. Of large countries in the region, only South Africa and Botswana have populations with higher average years of schooling for adults. This is largely a legacy of the post-colonial period, when the government poured income from copper wealth into education, and rapid gains were made in completed schooling, particularly for women. Zambia's adult literacy rate, however, is no higher than that of nearby countries like Rwanda and Uganda that have much lower schooling rates.

Figure 2.4: Adult Literacy and Schooling: Zambia vs. Other Sub-Saharan African Nations
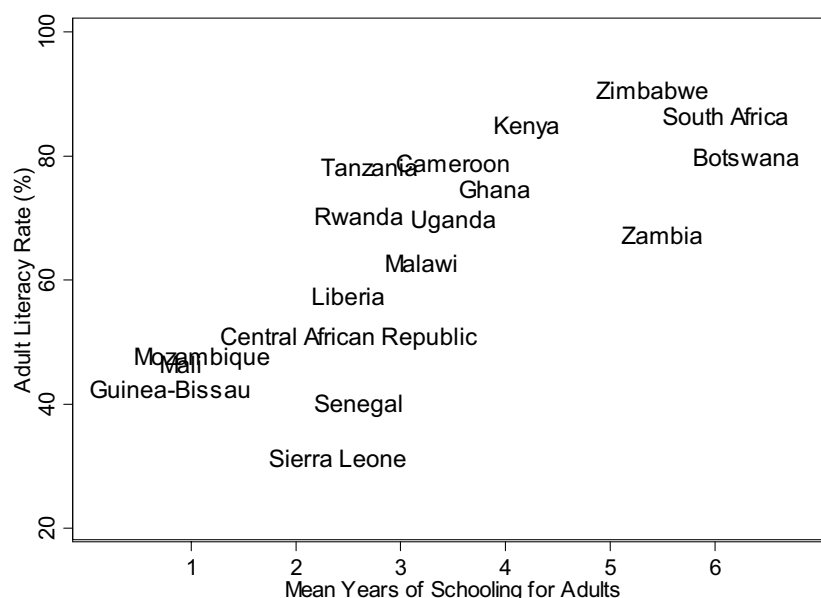
Source: (for countries other than Zambia) CIA World Factbook and Barro-Lee dataset

2.23   Life expectancy at birth in Zambia is the fifth lowest in the world, according to United Nations estimates. Life expectancy for those born 2000-05 was just 37.4 years, a drop of 14.3 years from 25 years earlier.[21] Zambians decline was especially large because it had a long way to fall. During its period of relative prosperity in the early 1970s, Zambians enjoyed a life expectancy at birth of 50 years, one of the longest in region.

2.24   The decline in life expectancy at birth has been driven in large part by HIV/AIDS. Zambia is one of just ten countries worldwide, all in sub-Saharan Africa, with double-digit HIV prevalence rates. Figure 2.5 shows the changes in life expectancy that have taken place in Zambia

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[21] Zambia's CSO has proposed alternative, higher, estimates of life expectancy at birth in 2000. They do not dispute, however, that adult mortality in Zambia has greatly increased. CSO's analysis of census data shows that between 1980 and 2000 life expectancy *at age 15* declined by 14 years for men and 17 years for women (CSO 2003, Table 4, p. 145). This is consistent with the U.N.'s estimate of a decline of 14.3 years since 1970-75 in life expectancy at birth for both sexes combined.

and other large countries hit by the HIV/AIDS pandemic. Like other African nations, Zambia saw large advances in life expectancy from the 1950s up through the 1970s and then a drop due to AIDS-related deaths. Because Zambia was one of the first countries where AIDS took hold, the drop in life expectancy occurred earlier there than elsewhere. Uganda is a notable exception and contrast to the life expectancy patterns of Zambia and other AIDS-affected countries. Uganda and Zambia had very similar life expectancy levels before and during the earlier stages of the pandemic, and life expectancy in both nations was approximately 43 years in the first half of the 1990s.[22] Uganda confronted AIDS with strong political leadership committed to a frank education program and managed to beat back the disease, leading to a rise in life expectancy to 46.8 in 2000-2005.

Figure 2.5: Life Expectancy at Birth Over Time for Zambia and A Selection of Other Sub-Saharan African Countries With Extreme HIV Prevalence Rates
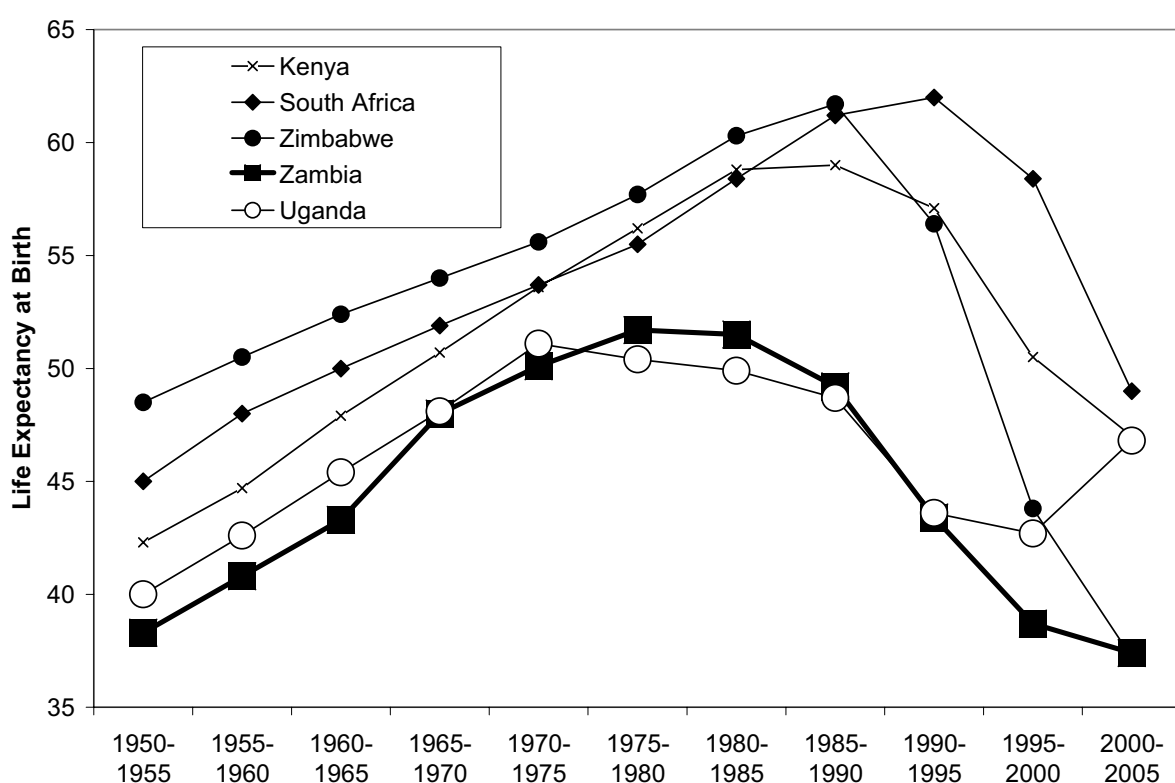

Source: United Nations Human World Population Prospects: 2004 Revision

2.25   Zambia's low life expectancy is also due in part to continued high child mortality rates. Zambia is one of a small number of countries to have both an extremely high HIV rate and one of the world's worst child mortality rates. Figure 2.6 shows infant mortality rates (under age 1) and childhood mortality rates (age 1-4) for Zambia and other sub-Saharan African countries for which recent data is available from Demographic and Health Surveys. Countries are shown ranked by under-5 mortality, which is the sum of the mortality rates up to age 1 and ages 1-4. Child mortality rates in some of Zambia's neighbors—South Africa, Namibia, and Zimbabwe—are lower, despite high HIV prevalence rates, reflecting those nations' relative wealth and more

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[22] The United Nations estimates of life expectancy are for five-year periods.

sophisticated health infrastructure. In contrast, a child's odds of survival in Zambia are among the lowest in Africa. Ninety-five out of 1000 Zambian children do not survive past their 1st year, and an additional 80 die before reaching age five.

Figure 2.6: Child Mortality Rates for Sub-Saharan African Countries
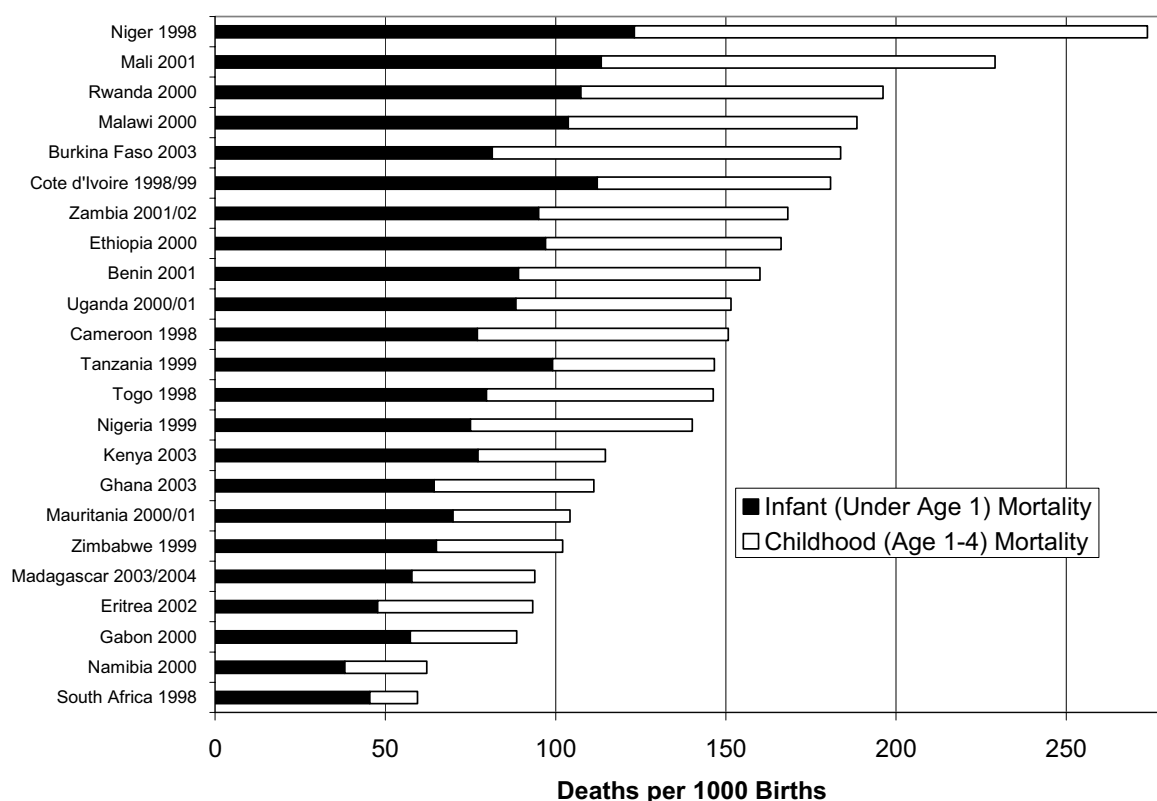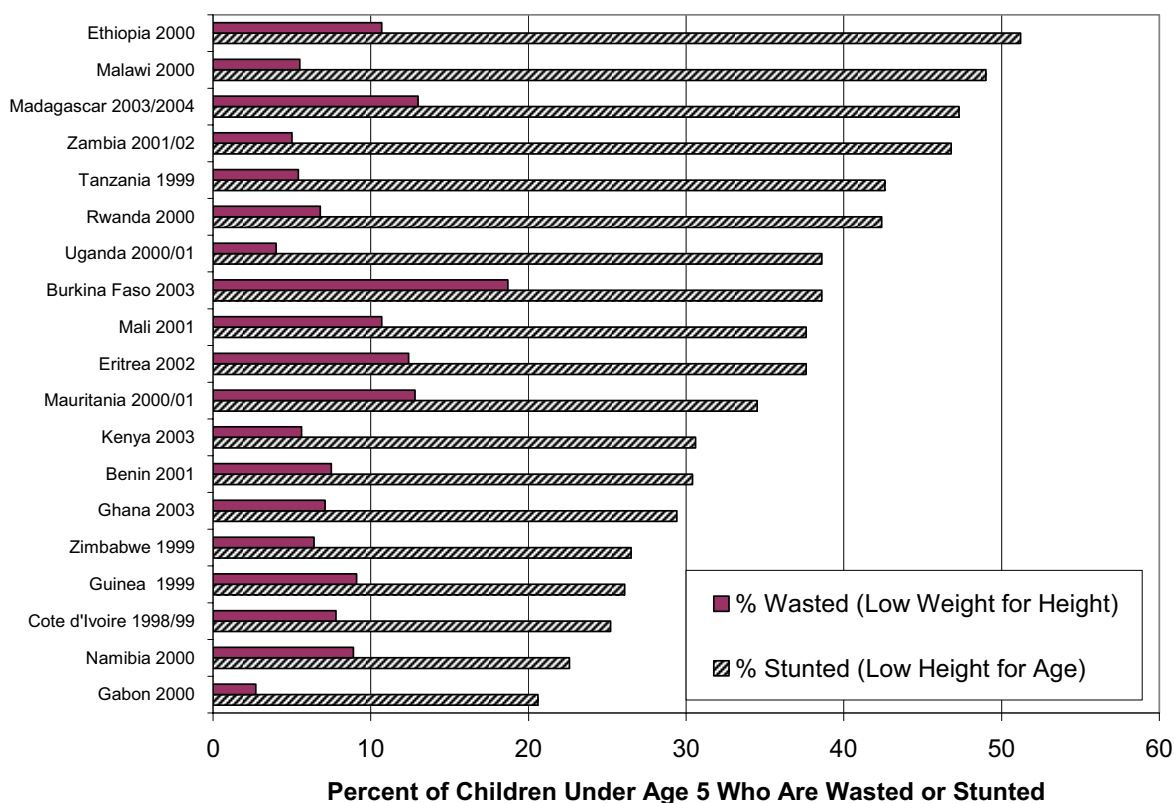

Source: Demographic and Health Surveys
Note: The sum of the two bars is equal to the under-5 mortality rate.

2.26   Another way to compare welfare across countries is by examining child nutrition outcomes. There are two indicators typically used: wasting and stunting. A "stunted" child is substantially below normal height-for-age while a child who is "wasted" is substantially below normal weight-for-height.[23] Stunting generally indicates chronic, long-term malnutrition and disease, while wasting is associated with more recent hunger. Zambia's rate of stunting for children under age five is 46.8 percent, one of the highest among sub-Saharan African countries for which data is available. The percentage of Zambian children that were wasted in 2001-02 is 5 percent, which is relatively low for the region.

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[23] Specifically, a child is considered wasted or stunted if he or she is more than 2 standard deviations below the norm for a reference population.

Figure 2.7: Child Malnutrition Rates For Children Under 5 in Sub-Saharan African Countries


Source: Demographic and Health Surveys

2.27　Compared to other countries in sub-Saharan Africa, Zambia presents a mixed picture. Along the lines of health indicators—HIV prevalence, life expectancy, child mortality, and long-term child nutrition—the country is at or near the bottom. At the same time, the country's human development as a whole still shows the sign of its relative past wealth, with a high mean schooling level and a literacy rate substantially above that of the poorest African states.

G.　Trends Over Time

2.28　A key question for Zambia is the extent to which things have changed since the country embarked on a series of economic reforms in the early 1990s. Unfortunately, due to technical changes in the way data was collected in the most recent household survey, consumption-based poverty figures based on that survey cannot be compared to figures from earlier surveys. Other measures of well-being examined in this Assessment can be tracked over time. Two types of variables are useful for considering changes over time. On the one hand, average completed schooling and literacy rates of adults describe the well-being of the population as a whole but evolve only slowly over time. Separately, while child malnutrition, mortality, and school attendance rates are only directly relevant to children, they change more rapidly over time in response to changing conditions. Both sets of variables are examined in this section.

2.29   At the macro level, the economy has finally emerged from a period of great instability and achieved stable but modest growth. The economy experienced severe declines in the first years after the implementation of reforms. Output per capita declined by 11 percent in 1994 and a further 5 percent in 1995. (The pattern of growth since 1991 is examined in more detail in Chapter 3.) Evidence does suggest that the reforms set the stage for later growth. In recent years, Zambia has experienced its longest period of sustained growth since independence, averaging 2 percent annual GDP per capita growth 2000-2003. Given the rocky pattern of growth at the aggregate level that Zambia experienced during the 1990s, it would be surprising if there had been substantial improvements in human welfare on average over that period. Indeed, most welfare indicators show only small changes over the course of the decade.

Figure 2.8: GDP Per Capita, Levels and Annual Growth Rates
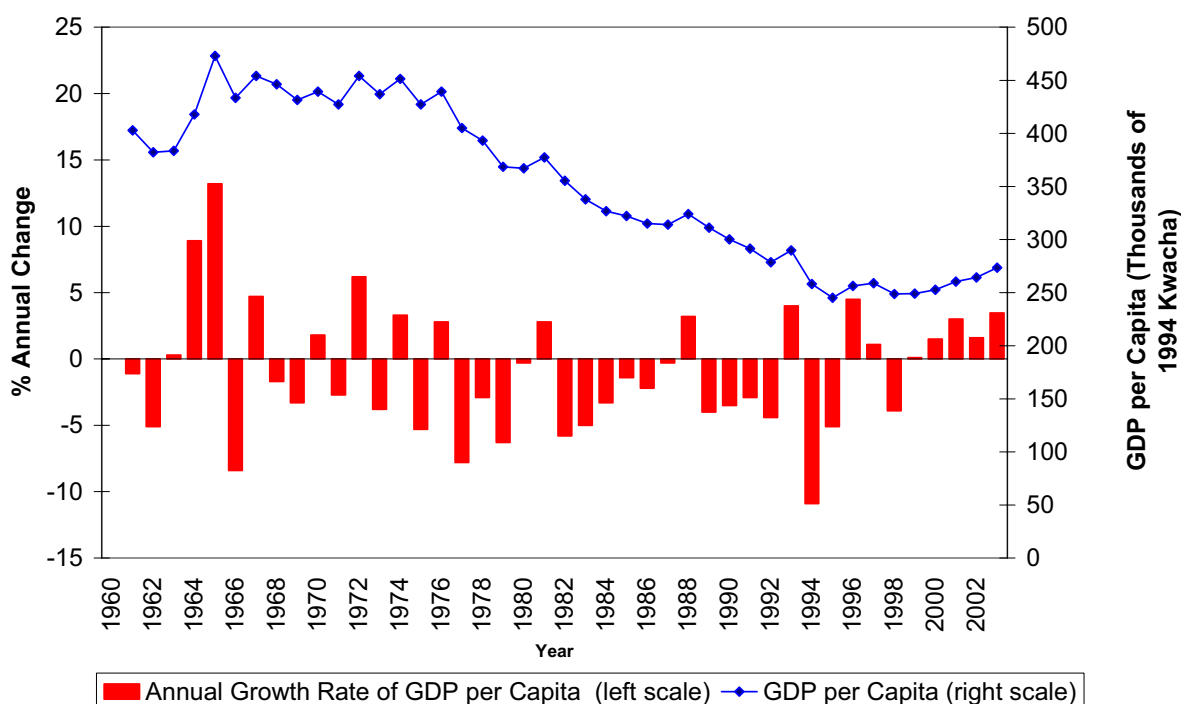
Source: IMF

2.30   Over the course of the post-independence period, there were large advances in education levels, and gains were particularly rapid for women. Average years of education by sex and year of birth are shown in Figure 2.9. The average Zambian woman born in 1940 received just over one year of schooling, while women born in 1960 averaged over six years of education. Later cohorts of women showed continued modest gains, but average education levels for men have declined slightly. Overall, forward progress on education has stagnated since Zambia's economic woes intensified in the 1970s.

Figure 2.9: Average Years of Schooling by Year of Birth and Sex
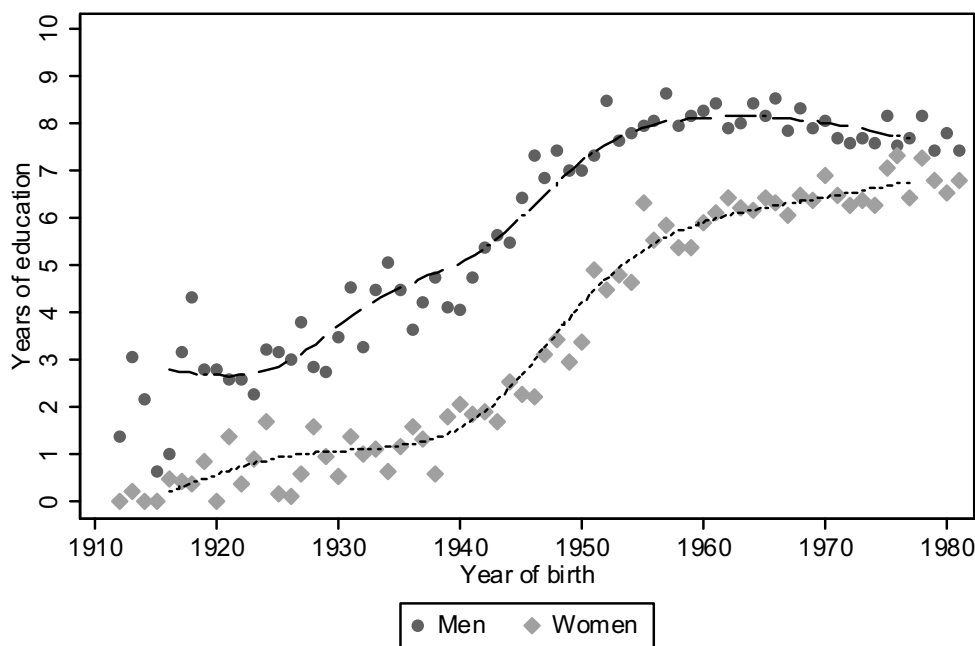
Source: 2002-03 LCMS

2.31   The same pattern can be seen by focusing on changes in primary school completion rates over time.   Table 2.5 shows the percentage of adults that have completed primary school by age group and gender, in both 1990 and 2000. Reading down a column takes one back through history and illustrates the dramatic progress in education Zambia made in the years after independence. The gains in education levels are most visible in the contrast between primary school completion rates for the youngest Zambian and those over age 65. In 2000, only 18 percent of Zambian men in the oldest age group completed primary school, compared to 66 percent of those age 15-24. Likewise, primary school completion rates increased by a factor of 10 for women, from 5 percent for those over age 65 to 50 percent for women 15-24. The reversal in education gains for men that took place in the 1980s and early 1990s is also visible in the table. In 1990, 71 percent of men age 25-34 had finished primary school. By 2000, the completion rate for that same age group had dropped to 66 percent. For both men and women, completion rates among the youngest age group were higher in 2000 than in 1990. The figures suggest that primary school completion rates have recovered somewhat after falling during the 1980s and the early 1990s.

2.32   With two censuses, it is also possible to track cohorts over time. For example, men age 35-44 in 2000 are the surviving members of the group that was age 25-34 in 1990. A cohort can be followed by reading along the diagonal of Table 2.5. Although only 52 percent of men age 15-24 in 1990 had completed primary school, 66 percent of the same cohort had finished primary school by 2000. This reflects the fact that due to late entry to school, many men finish primary school in their late teens. A similar pattern, but with a smaller increase, is seen for women. For the cohorts of both men and women who were 25-44 in 1990, there were drops between 1990 and 2000 with a primary school education. This may reflect higher mortality rates for those with

HIV/AIDS. Urban residents are more than twice as likely to be infected with HIV and also much more likely to have completed primary school.[24]

Table 2.5: How Have Primary School Completion Rates Changed Over Time?
Percentages Finishing Primary School by Age Group and Sex, 1990 and 2000

| Age Group	Men 1990	Men 2000	Women 1990	Women 2000
15-24	52	56	48	50
25-34	71	66	49	50
35-44	63	67	28	44
45-54	35	58	9	26
55-64	18	34	6	9
65+	11	18	6	5
All adults	52	57	37	43

Source: 1990 and 2000 Censuses

2.33   Another way to track the evolution of human capital over time is to examine changes in literacy by age group. Literacy figures from both the 2000 Census and the most recent Demographic and Health Survey are shown in Figure 2.10. Although the DHS and the census collect literacy information in very different ways, the two series are similar, except that the DHS shows higher rates of literacy for older men.[25] Both show that literacy rates are roughly unchanged for adult women up to age 44 and that they have declined in recent generations of adult men.

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[24] It is not possible to examine actual HIV/AIDS prevalence rates by education level. Prevalence data comes from testing done for the 2001/02 Demographic and Health Survey. Only province, age, and sex information are reported with HIV status.

[25] The census collects literacy information by asking if household members can read and write. The DHS assumes that those with post-primary education are literate and tests literacy skills of other respondents by asking them to read a sentence written on a card.

Figure 2.10: Literacy Rates by Age Group
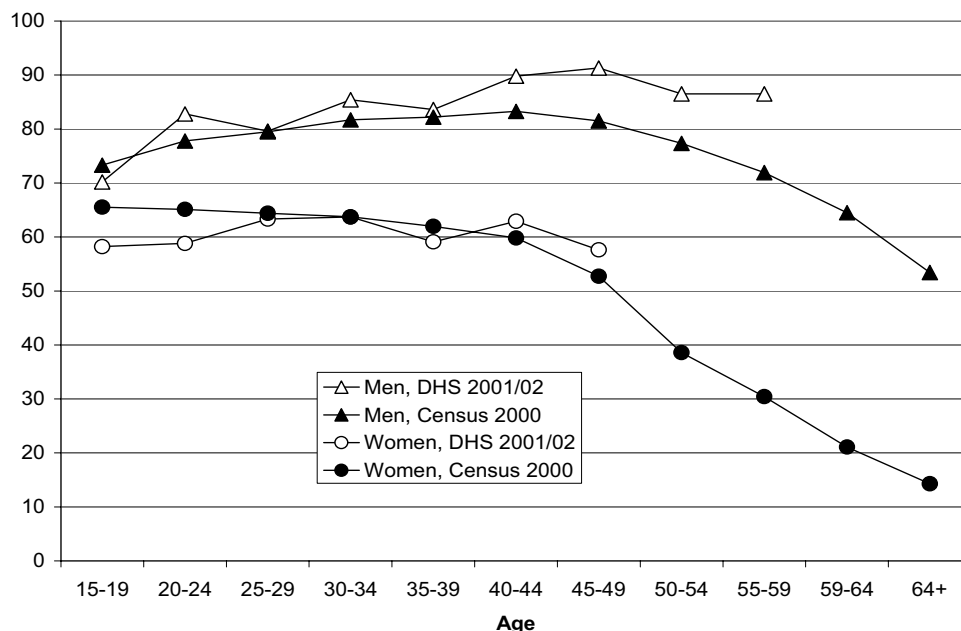
2.34   Next we consider measures of child well-being, which are more responsive to short-term changes in the environment. Figure 2.11 shows age-specific school attendance rates in both 1992 and 2001/02 from Demographic and Health Surveys. Primary school attendance rates dropped off markedly between 1992 and 1996, following the imposition of school fees and during the economic contraction of 1994-95.[26] In various surveys, the high cost of schooling is the most cited reason that children are not attending school. In 2002, the government abolished school fees for primary school. The 2001/02 data, however, is from the 2001 school year and does not reflect changes that occurred after the end of fees.

**Figure 2.11: School Attendance Rates by Age and Sex, 1992 and 2001/02**
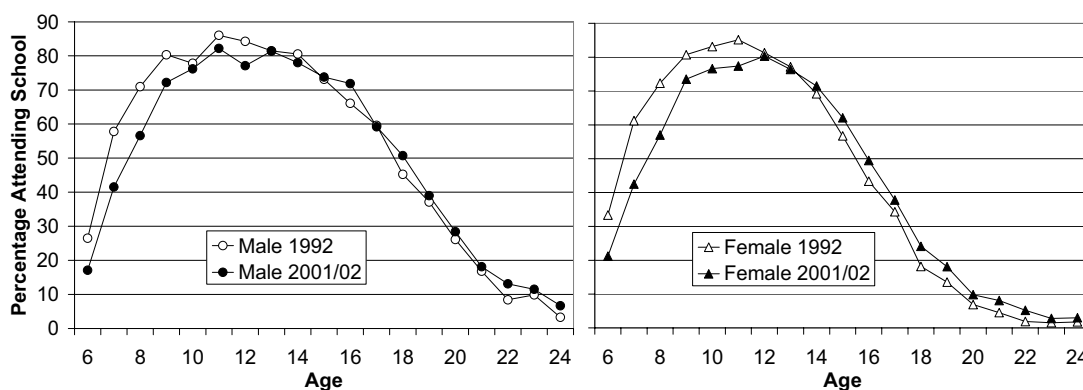
Source: Demographic and Health Surveys

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[26] Primary school attendance rates calculated from the 1996 DHS (not shown here) are very similar to those in 2001-02.

2.35   Child malnutrition worsened in Zambia over the course of the 1990s. The stunting rate for children under age five increased from 40 percent in 1992 to 47 percent in 2001-02. The percentage of Zambian children who are wasted remained constant at 5 percent. The percentage of Zambian children underweight increased from 25 to 28 percent between 1992 and 2001-02. Malnutrition is examined further in Chapter 8.

2.36   Typically, an increase in child malnutrition would be associated with an increase in child mortality. Additionally, one would expect that adult HIV/AIDS infection rates to catastrophic levels would have depressed child survival rates, because many children are born infected with HIV. However, in Zambia, despite the fact that surviving children are less healthy, child mortality dropped during the 1990s. Under-five mortality per 1000 live births rose slightly from 191 to 197 between 1992 and 1996 and then declined to 168 in 2001/02, according to figures from Demographic and Health Surveys. The decline, which is statistically significant, is puzzling. The observed change may partially the fact that the DHS figures omit the experience of children whose mothers have died, although this phenomenon could not fully explain the drop. In any case, even after the decline, child mortality rates in Zambia are among the highest in Africa.

Figure 2.12: Child Malnutrition Rates, Children Under Age 5
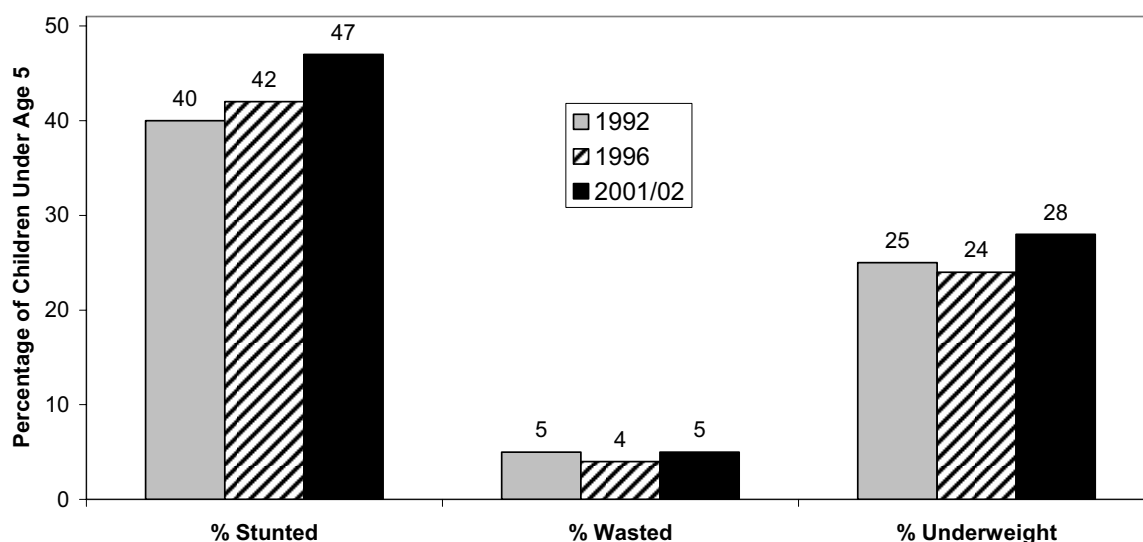
Source: Demographic and Health Surveys

2.37   As a whole, the trends of the welfare measures examined here imply a worsening of conditions in the 1990s. However, the available data is insufficient to evaluate how conditions have evolved during the period of steady growth that began in 2000.

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ANNEX 1: POVERTY METHDOLOGY

1.   This section details the methodology used to calculate the poverty estimates in this paper. It explains the construction of the consumption aggregate, the price index, and the poverty line, along with the parameters used for the calculation of the poverty figures. The final portion of this section explains differences in the approach used by the Zambia Central Statistical Office (CSO) for its parallel set of calculations.

Consumption Aggregate

2.   The nominal household consumption aggregate was constructed following the guidelines in Deaton and Zaidi (2002). The World Bank and the Zambia CSO used identical procedures to construct their consumption aggregates. The consumption aggregate consists of four components: food, housing, consumer durable user fee, and other non-food. The aggregate was calculated on the basis of total monthly consumption. The consumption aggregate excluded water payments, remittances, and consumer durable purchases.

3.   Housing rental costs were also collected in the survey. However, rental values were reported for less than two percent of rural households and only 34 percent of urban households. For households not reporting rent, rent was imputed using a single national-level regression of log rent on provincial dummies, an urban dummy, and housing characteristic variables. Actual rent values were used for those households reporting rent. Both reported and imputed rental values were trimmed at the bottom; monthly rent values below 10,000 Kwacha were set to 10,000.

4.   A consumer durable user fee was calculated following the preferred procedure in Deaton and Zaidi (2002), using the average annual inflation rate, interest rate, age of assets, value at the time of purchase, and current value. User fees were calculated for the following items: bicycle, motorcycle, motor vehicle, tractor, television, video player, radio, electric iron, refrigerator, land telephone line, cellular phone, satellite dish, electric or gas stove, computer. The total consumer durable user fee was equal to the sum of the individual item user fees.

Price Index

5.   Prices in Zambia vary widely over time and space. The LCMS survey was collected over the course of a calendar year, in ten separate survey periods referred to as "cycles." Consequently it was necessary to adjust not only for spatial price variation but also for variation over time. A price index was calculated with price data collected as part of the survey and used to adjust all consumption values to national median prices. The single price adjustment accounts for both spatial and temporal differences in prices.

6.   The food price index is a Paasche price index (with weights based on each household's consumption) to adjust consumption to national median prices. For each item, a single national median price was calculated across all households reporting consumption of the item, in all

provinces and cycles.[27] The price index is a single-stage index which adjusts for spatial and temporal differences in one step. Specifically, the index for household h is defined as follows:

$$P^h = \frac{1}{\sum w_k^h \left(\dfrac{p_k^0}{p_k^h} \right)} \, ,$$

where w_k^h is the share of good k in household h's total consumption, p_k^0 is the national median price of good k, and p_k^h is the price of good k reported for household h's cycle-province. This can also be written in terms of a log approximation:

$$\log P^h = \sum w_k^h \log\left(\frac{p_k^h}{p_k^0} \right)$$

7.   The set of household-level price index values is also summarized at the province and cycle levels using a regression procedure analogous to the Country-Product Dummy method proposed by Summers (1973). The household-level index is modeled as the product of a provincial-level index, a cycle-level index, and a household-specific term. If household h is surveyed in province r and during cycle c, the household-level value can be expressed as the produce of the three terms:

$$P_{hrc} = A_r B_c e_h,$$

In log terms, this is

$$\ln P_{hrc} = \ln A_r + \ln B_c + \ln e_h$$

Defining $\alpha_r = \ln A_r$, $\beta_c = \ln B_c$, and $\varepsilon_h = \ln e_h$, this becomes

$$\ln P_{hrc} = \alpha_r + \beta_c + \varepsilon_h.$$

8.   The provincial- and cycle-level food price indices can then be estimated from the household level index values with a regression of the log of the index on a set of nine provincial and ten cycle dummies:

$$\begin{aligned}
\ln P_{hrc} = \alpha_2 * PROV2_{hrc} + \alpha_3 * PROV3_{hrc} + \ldots + \alpha_9 * PROV9_{hrc} + \ldots \\
+ \beta_2 * CYCLE2_{hrc} + \beta_3 * CYCLE3_{hrc} \ldots + \beta_{10} * CYCLE10_{hrc} + \varepsilon_h
\end{aligned}$$

Note that this regression includes no constant term. The province- and cycle-level index

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[27] Prices for each item were only recorded for province-cycles that included households consuming the item. The medians were taken across households reporting consumption of the item, rather than across province-cycles. Weights were not used in the calculation of median prices.

values are defined as equal to one for the omitted province and cycle dummies (province 1 and cycle 1 as written here).[28] The province- and cycle-level values of the index are equal to the antilogs of the estimated coefficients.

9.   A separate housing price index was calculated at the stratum (province-urban/rural) level based on the coefficients from the housing imputation regression . First, national means of all the explanatory variables were calculated. The imputation coefficients were then used to calculate a value for national predicted rent at the national means of all variables, including the province and urban/rural dummies. A predicted rent value was also calculated for each of the 18 strata using the national means of housing characteristics, *excluding* the province and urban/rural dummies. (For each prediction calculation, province and urban/rural dummies were set appropriate to the stratum in question.) The housing index was calculated at stratum level as the ratio of the stratum-level predicted rent to national predicted rent. This index captures differences in housing price across strata, holding housing characteristics constant at national means.

10.   The total price index was constructed using Paasche-type (household-level) weights and the corresponding price indices for the four components: food, housing, durable good use fee, and other non-food. Data was not available to calculate a price index for non-food items and durable good user fees. The price index treats the nominal values for these components as the real values.

Poverty Line

11.   A new poverty line was calculated from the 2002-03 LCMS, using the cost-of-basic-needs method outline in Ravallion (1998). Calculation of the poverty line involves determining a calorie requirement, creating a food basket, evaluating the cost of meeting the calorie requirement using that food basket, and then developing a non-food component of the poverty line. All calculations for the poverty line were done on a per-adult-equivalent basis. Both the adult equivalents and the calorie requirement underlying the poverty line were determined using a widely used analysis of energy intake needs from the World Health Organization (1985). The WHO figures are shown in Table 2.6 below.

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[28] The omitted dummies are for cycle 1 and Lusaka province.

Table 2.6 Recommended Calories by Age, Sex and Workload and

Adult Equivalents by Age

Age	Workload	Male	Female	Average of male and female	Implied Adult Equivalent (based on 2464 per adult)
<1		820	820	820	0.33
1-2		1150	1150	1150	0.47
2-3		1350	1350	1350	0.55
3-5		1550	1550	1550	0.63
5-7		1850	1750	1800	0.73
7-10		2100	1800	1950	0.79
10-12		2200	1950	2075	0.84
12-14		2400	2100	2250	0.91
14-16		2650	2150	2400	0.97
16-18		2850	2150	2500	1.0
18-30	Light	2600	2000	2300	
30-60	Light	2500	2050	2275	
>60	Light	2100	1850	1975	
18-30	Medium	3000	2100	2550	
30-60	Medium	2900	2150	2525	
>60	Medium	2450	1950	2200	
18-30	Heavy	3550	2350	2950	
30-60	Heavy	3400	2400	2900	
>60	Heavy	2850	2150	2500	
Adult Averages		2817	2111	2464	

Source: World Health Organization (1985) "Energy and Protein Requirements."
WHO Technical Report Series 724. Geneva: World Health Organization.
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12.   The calorie requirement was taken to be 2464, the unweighted average of the calorie requirements for adult men and women in the three workload categories and three age groups. For those under 18, the average calorie requirement of males and females by age group was calculated. The adult equivalent for each child age group was then calculated by dividing by the adult requirement of 2464. Gender was not used in assigning adult equivalents.

13.   In general, constructing a food basket requires detailed food consumption by quantity at the household level. Although households in the 2002-03 LCMS did report quantities in their household diaries, quantity data was not recorded by enumerators or transferred to the electronic data files. Because actual quantities at the household level were not available, item quantities were estimated by dividing household consumption (in Kwacha) by reported prices. To generate a preliminary food basket, average quantities were calculated for households in the middle (3rd) quintile.[29] The items in this food basket were ranked in descending order by cost

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[29] Quintiles were calculated on the basis of price-adjusted consumption per adult equivalent, using weights equal to household sampling weights multiplied by household size. Thus, these are properly viewed as quintiles of individuals in the population.

for the average quantity, at national median prices. The final food basket was defined as the top 44 items, which accounts for 90% of the cost of the preliminary basket.

14.	Quantity-calorie conversions were done using a conversion table of calorie values for African foods from the Food and Agriculture Organization. The final food basket was found to amount to 2120 calories per day. The quantities were scaled upwards so that the total calories equaled 2464 calories per day. The price of this scaled food basket, in terms of national median prices, was multiplied by 31 to produce the food poverty line in monthly terms.

15.	The non-food component of the poverty line was determined by estimating the average non-food share in consumption for households with food consumption in the third quintile of consumption. This was found to be 0.28. The food poverty line was multiplied by 1/(1-0.28) to scale up to the total poverty line. A single poverty line was calculated for urban and rural areas.

Poverty Measure Calculations

16.	The headcount, poverty gap, and poverty severity indices were calculated using the price-adjusted consumption aggregate. The poverty measures calculated are those of the Foster-Greer-Thorbecke (1984) class. Calculations were weighted using weights equal to household size multiplied by household sampling weights. All poverty measures were calculated based on total household consumption per adult equivalent terms. Standard errors were calculated taking into the account both the sample stratification and cluster design.

17.	Poverty figures were calculated primarily using the "total" poverty line, which is equal to the consumption level sufficient to meet basic needs for both food and non-food consumption. Additionally, "core" poverty rates were determined using a lower core poverty line, which is defined as the food component of the total poverty line. In analyses conducted in other countries, core poverty rates are sometimes referred to as rates of extreme or severe poverty.

Poverty Estimates

Basic Poverty Estimates

18.	This section presents the basic poverty estimates by the main subgroups. The complete estimates for all three Foster-Greer-Thorbecke measures—the headcount rate, poverty gap index, and poverty severity index—with associated standard errors are shown in Table 2.7, Table 2.8, and Table 2.9.[30] A graphical presentation of the estimates and a discussion follows, focusing on the headcount poverty estimates.

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[30] Standard errors were calculated taking into account the survey's two-stage sampling design.

Table 2.7 Headcount Poverty Estimates, 2002-03 LCMS

	Poverty	Std. Err.	Core Poverty	Std. Err.
National	0.56	0.01	0.36	0.01
Rural	0.62	0.01	0.40	0.01
Urban	0.45	0.02	0.28	0.02
Type of Household				
Small Farm	0.63	0.01	0.41	0.01
Mid-Size Farm	0.47	0.04	0.24	0.03
Large Farm	0.30	0.12	0.13	0.10
Rural				
Nonagricultural	0.46	0.05	0.34	0.04
Urban Low Cost	0.53	0.02	0.33	0.02
Urban Mid-Cost	0.28	0.04	0.13	0.03
Urban High Cost	0.12	0.03	0.06	0.02
Province				
Central	0.54	0.04	0.32	0.03
Copperbelt	0.52	0.04	0.35	0.03
Eastern	0.56	0.03	0.34	0.03
Luapula	0.67	0.03	0.47	0.04
Lusaka	0.47	0.03	0.29	0.03
Northern	0.75	0.03	0.54	0.03
Northwestern	0.61	0.03	0.37	0.03
Southern	0.47	0.03	0.25	0.03
Western	0.52	0.04	0.35	0.04
Time of Survey (Cycle)				
Nov-Dec 02 (1)	0.59	0.04	0.40	0.04
Dec-Jan 03 (2)	0.59	0.04	0.40	0.04
Jan-Feb 03 (3)	0.54	0.03	0.34	0.04
Feb-Mar 03 (4)	0.48	0.04	0.27	0.03
Mar-Apr 03 (5)	0.50	0.04	0.29	0.03
Apr-May 03 (6)	0.51	0.04	0.33	0.04
May-Jun 03 (7)	0.53	0.03	0.32	0.03
Jun-Jul 03 (8)	0.61	0.04	0.38	0.03
Jul-Aug 03 (9)	0.59	0.04	0.39	0.04
Sep-Oct 03 (10)	0.63	0.04	0.45	0.04

**Table 2.8 Poverty Gap Index Estimates, 2002-03 LCMS**

	Poverty	Std. Err.	Core Poverty	Std. Err.
National	0.21	0.01	0.11	0.01
Rural	0.23	0.01	0.12	0.01
Urban	0.17	0.01	0.09	0.01
Type of Household				
Small Farm	0.24	0.01	0.13	0.01
Mid-Size Farm	0.15	0.02	0.07	0.01
Large Farm	0.09	0.04	0.02	0.01
Rural				
Nonagricultural	0.19	0.02	0.11	0.02
Urban Low Cost	0.20	0.01	0.11	0.01
Urban Mid-Cost	0.08	0.02	0.04	0.01
Urban High Cost	0.03	0.01	0.01	0.00
Province				
Central	0.19	0.02	0.09	0.01
Copperbelt	0.20	0.02	0.11	0.01
Eastern	0.19	0.02	0.09	0.01
Luapula	0.28	0.02	0.17	0.02
Lusaka	0.18	0.02	0.10	0.01
Northern	0.32	0.02	0.19	0.02
Northwestern	0.22	0.02	0.11	0.01
Southern	0.15	0.02	0.07	0.01
Western	0.19	0.02	0.10	0.01
Time of Survey (Cycle)				
Nov-Dec 02 (1)	0.24	0.02	0.14	0.02
Dec-Jan 03 (2)	0.24	0.02	0.14	0.02
Jan-Feb 03 (3)	0.20	0.02	0.10	0.01
Feb-Mar 03 (4)	0.16	0.02	0.08	0.01
Mar-Apr 03 (5)	0.18	0.02	0.09	0.01
Apr-May 03 (6)	0.19	0.02	0.10	0.02
May-Jun 03 (7)	0.18	0.02	0.09	0.01
Jun-Jul 03 (8)	0.22	0.02	0.11	0.01
Jul-Aug 03 (9)	0.23	0.02	0.12	0.02
Sep-Oct 03 (10)	0.26	0.03	0.15	0.02

Table 2.9 Poverty Severity Index Estimates, 2002-03 LCMS

	Poverty	Std. Err.	Core Poverty	Std. Err.
National	0.10	0.00	0.05	0.00
Rural	0.12	0.01	0.05	0.00
Urban	0.08	0.01	0.04	0.00
Type of Household				
Small Farm	0.12	0.01	0.06	0.00
Mid-Size Farm	0.07	0.01	0.04	0.01
Large Farm	0.03	0.01	0.01	0.01
Rural Nonagricultural	0.10	0.01	0.05	0.01
Urban Low Cost	0.10	0.01	0.05	0.00
Urban Mid-Cost	0.04	0.01	0.02	0.00
Urban High Cost	0.01	0.00	0.00	0.00
Province				
Central	0.09	0.01	0.03	0.01
Copperbelt	0.10	0.01	0.05	0.01
Eastern	0.09	0.01	0.03	0.01
Luapula	0.15	0.02	0.08	0.01
Lusaka	0.09	0.01	0.04	0.01
Northern	0.17	0.02	0.09	0.01
Northwestern	0.10	0.01	0.04	0.01
Southern	0.07	0.01	0.03	0.01
Western	0.09	0.01	0.04	0.01
Time of Survey (Cycle)				
Nov-Dec 02 (1)	0.13	0.02	0.07	0.01
Dec-Jan 03 (2)	0.12	0.01	0.06	0.01
Jan-Feb 03 (3)	0.09	0.01	0.04	0.01
Feb-Mar 03 (4)	0.07	0.01	0.03	0.01
Mar-Apr 03 (5)	0.08	0.01	0.04	0.01
Apr-May 03 (6)	0.09	0.01	0.04	0.01
May-Jun 03 (7)	0.08	0.01	0.04	0.01
Jun-Jul 03 (8)	0.10	0.01	0.04	0.01
Jul-Aug 03 (9)	0.11	0.01	0.05	0.01
Sep-Oct 03 (10)	0.14	0.02	0.07	0.02

19.   The national headcount estimates are 0.56 for poverty and 0.36 for core poverty. In other words, over half of Zambians have levels of consumption that are insufficient to meet basic needs, and more than a third have consumption levels that would be inadequate to meet basic food needs alone, even if the individual were able to forego all non-food consumption. Figure 2.13 shows poverty and core poverty rates for urban and rural households separately. Due to weaknesses in the price data, it was not possible to satisfactorily adjust the consumption data for urban-rural price differences. As a result comparisons in poverty figures across the urban-rural divide do not reflect differences in the cost of living between urban and rural areas. Poverty comparisons between rural and urban areas should therefore be treated with caution.

20.   The estimates show a higher level of poverty in terms of the headcount in rural areas, where 62 percent are below the standard poverty line and 40 percent fall below the core poverty line. In urban areas, 45 percent of Zambians are in poverty, and the core poverty rate is 28 percent.

Figure 2.13: Headcount Poverty Rates, Urban vs. Rural
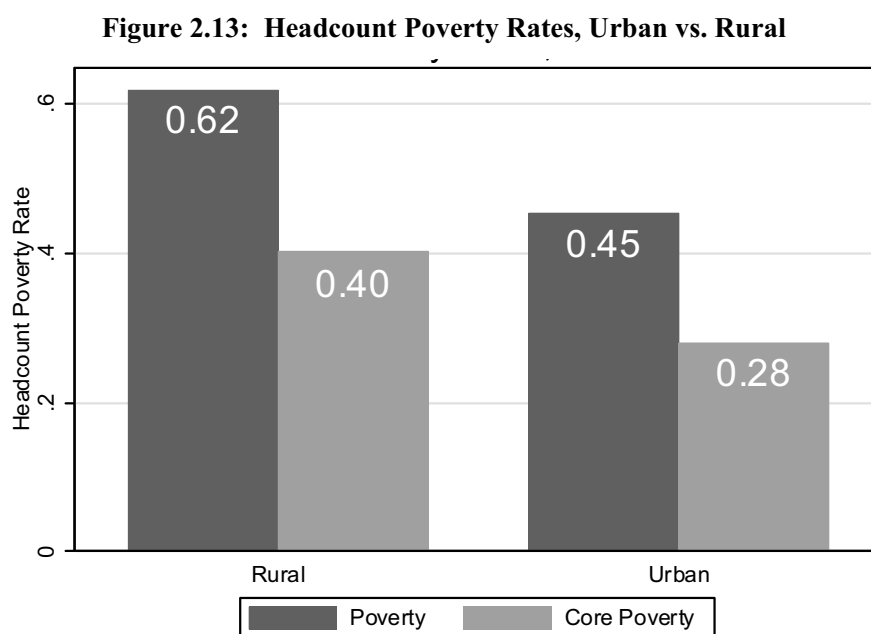
Poverty Estimates by Province and Urban-Rural Subcategories

21.   Although Zambia is much more urbanized than most African countries, it is still predominantly a rural country. In the 2000 national census, from which the LCMS sampling frame and weights are derived, 6.5 million of its nearly 10 million residents lived in rural areas. This fact combined with the higher poverty rate in rural Zambia means that poverty is concentrated in rural areas; 72 percent of the poor live in rural zones.

22.   Households within each survey enumeration area were broken down into household categories. For rural areas these were small-scale farmers, medium-scale farmers, large-scale farmers, and non-agricultural. For urban areas, the categories were high, medium, and low cost. Households were categorized this way in order to stratify the sampling within enumeration areas, to ensure adequate coverage of a diverse set of households.

23.   The headcount poverty rates by household category are shown in Figure 2.14. Unsurprisingly, urban poverty is highest among "low cost" households. In rural areas, poverty is highest among the small farm households that form the bulk of the rural population, while non-agricultural households in rural areas have poverty rates similar to those of medium-size households.

24.   Across provinces, there is substantial variation in poverty. Provincial figures are shown in Figure 4. The lowest poverty rates are found in Lusaka and Southern Provinces, but even there 47 percent of the population has consumption insufficient to meet basic needs. Northern Province stands out as having the highest poverty rate.

Figure 2.14: Headcount Poverty Rates by Urban-Rural Subcategories
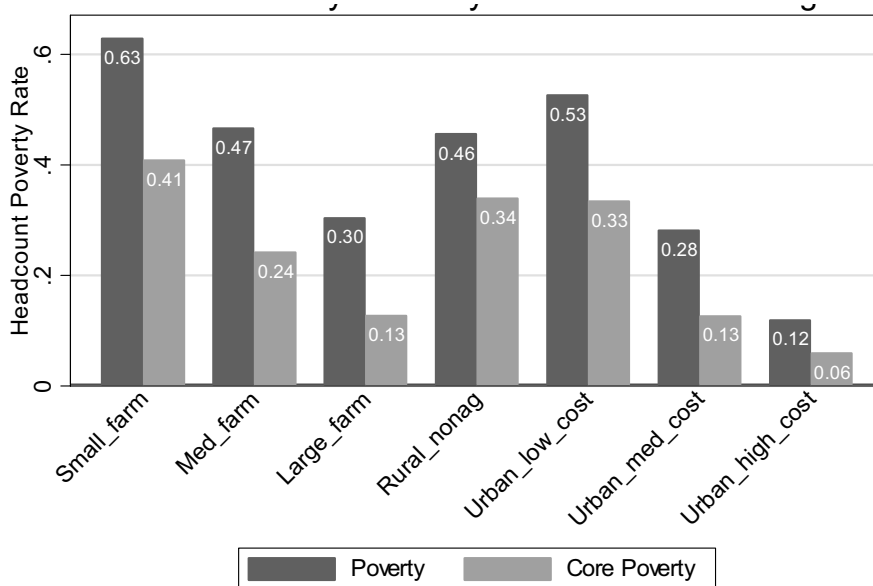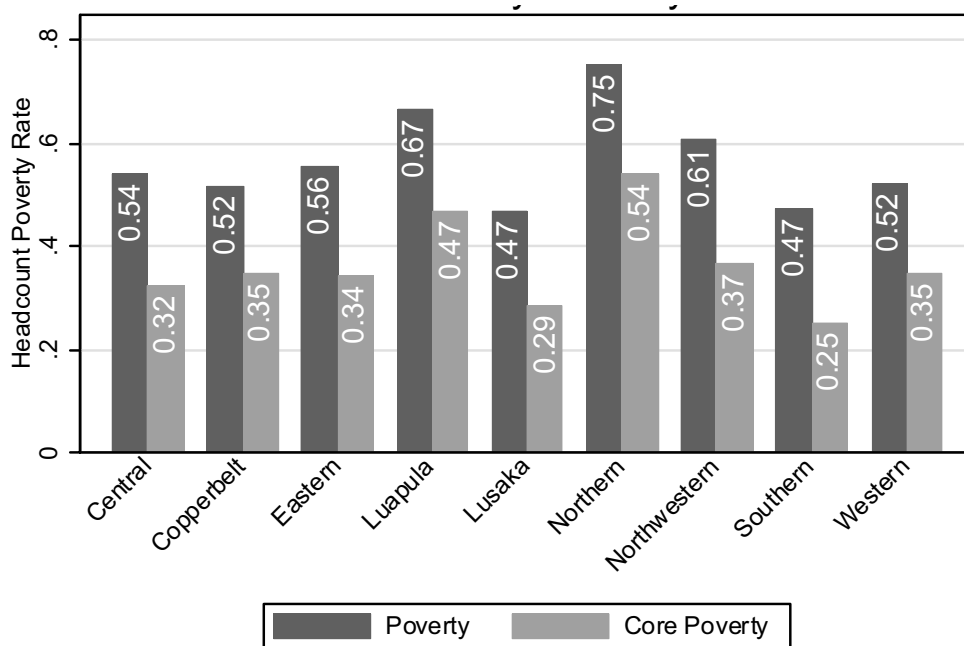

Figure 2.15: Headcount Poverty Rates by Province

25.   Table 2.10 shows separate headcount rates by urban and rural areas within each province, and Table 2.11 displays a corresponding breakdown of where the poor are located. The urban poor are highly concentrated in just two provinces, Lusaka and Copperbelt. The urban areas of just those two provinces are home to 20 percent of Zambia's poor, while the smaller urban areas of the remaining provinces account for only an additional eight percent.

The rural poor are more widely distributed. They are most concentrated in Eastern and Northern Provinces, the rural areas of which are home to 28 percent of the nation's poor.

Table 2.10 Headcount Poverty Estimates by Province and Urban/Rural

	Rural	Std. Err.	Urban	Std. Err.
Central	0.55	0.04	0.52	0.07
Copperbelt	0.65	0.05	0.48	0.04
Eastern	0.58	0.03	0.34	0.09
Luapula	0.70	0.04	0.48	0.08
Lusaka	0.63	0.08	0.43	0.04
Northern	0.78	0.03	0.59	0.07
Northwestern	0.64	0.03	0.37	0.08
Southern	0.51	0.03	0.32	0.05
Western	0.53	0.04	0.40	0.08

Table 2.11 Where Are the Poor? Fraction of National Poor by Province and Urban/Rural

Province	Fraction of National Poor Living in Province	Fraction of National Poor Living in Province's Rural Areas	Fraction of National Poor Living in Province's Urban Areas
Central	0.10	0.08	0.02
Copperbelt	0.15	0.04	0.11
Eastern	0.13	0.13	0.01
Luapula	0.09	0.08	0.01
Lusaka	0.12	0.03	0.09
Northern	0.17	0.15	0.02
Northwestern	0.06	0.06	0.01
Southern	0.10	0.09	0.02
Western	0.07	0.06	0.01
Total	1.00	0.72	0.28

Differences in Methodology with Central Statistical Office

26.   The methodology employed in this paper is broadly similar to that used by the Zambia CSO in its own analysis of the 2002-03 LCMS data. However, the methodology differs in several key details:

Reference prices: Median prices vs. Lusaka cycle 1 prices

27.   As the reference prices for its price index, CSO used prices collected in Lusaka Province during the first of ten cycles, where a cycle corresponds to a data collection period lasting 36 days. The danger in using such a narrow set of prices is that the results will be

sensitive to outliers in the data. The LCMS price data, like much price data from developing countries, is extremely noisy, with implausibly large variation in prices across time and space.

28.   As Deaton and Zaidi (2002) note, "A good choice [for reference prices] is to take the median of the prices observed ...." They argue that the use of medians reduces sensitivity to outliers. Furthermore, "[t]he use of a national average price vector ensures that the money metric measures conform as closely as possible to national income accounting practice, as well as eliminating results that might depend on a price relative that occurs only rarely or in some particular area."

29.   An additional reason to favor the use of median prices is that for future comparisons over time with new data, it will be necessary to replicate the price concept underlying the 2002-03 poverty estimates. Because the timing and design of a future survey may differ somewhat, it may not be possible to collect prices that correspond well to the Lusaka cycle 1 prices in the 2002-03 survey. For these reasons, the analysis in this paper use a price index referenced to national median prices.

Price index: Single-stage vs. two-stage

30.   CSO employed a two-stage price index procedure rather than a single-stage index. First, consumption figures were adjusted over time, to cycle 1 within each province, using a province-specific temporal price index. Second, the consumption data was adjusted to Lusaka cycle 1 using a second spatial price index.

31.   In the judgment of this author, the two-stage index unnecessarily doubles the number of calculations and involves the province-specific cycle 1 price data, which introduces new error into the calculations. The use of a single-stage price index, adjusting consumption directly from a province-cycle set of prices to national median prices, reduces the number of calculations and bypasses the province cycle 1 data. As explained above, this single-stage price index can be used to produce summary price indices at the province and cycle levels.

Price index: Adjust non-food and durable goods components?

32.   Like most developing country household consumption surveys, the LCMS includes price data for food but not non-food goods. The familiar question arises as to what price adjustment, if any, to apply to the non-food portion of consumption. Both for this paper and for the CSO analysis, a composite price index was constructed based on the food price index and a housing price index was constructed using the coefficients from the housing cost imputation. What price adjustment should be applied to the remaining non-food components, which are the durable goods user fee and other non-food? CSO applied the food price index to these components. This is sensible, assuming that food and non-food prices tend to be correlated. However, it is not clear that they are correlated, and they may even be negatively correlated if, for example, transport costs are important so that in rural areas agricultural goods are cheaper and manufactured goods are more expensive. Given this uncertainty, for this paper the remaining non-food components are left in nominal terms.

Calorie requirement used to calculate poverty line

33.   CSO reports that it has used a calorie requirement of 2094 calories per capita, although it calculated its poverty figures on a per adult equivalent basis. CSO employed the same adult

equivalents used in an earlier study, Republic of Zambia (1997), based on calorie requirements established by the National Food and Nutrition Commission (1993).[31]

34.   The analysis in this paper uses calorie requirements based on World Health Organization guidelines. The WHO figures were chosen so as to give the poverty line as solid a basis as possible in a widely recognized reference.

Determination of food basket underlying poverty line

35.   In general, quantity data by food item is required to construct a food basket for a food poverty line. Because the 2002-03 LCMS did not include direct quantity data, it was necessary to use some sort of second best procedure.

36.   CSO chose to calculate average item shares in expenditure for a group of households with expenditure per adult equivalent equal to the unweighted median plus or minus 20 percent. Next, representative expenditures by item were calculated by multiplying these shares by median expenditure. These expenditure values were then divided by Lusaka cycle 1 prices to generate quantities for a preliminary consumption basket.

37.   Given the data imperfections, the first part of the CSO procedure is reasonable. The households in a range around the median provide a plausible set of nationally representative expenditure shares by item. However, because these expenditure shares are for the country as a whole, to convert these shares to quantities, some set of nationally representative prices should be used, rather than Lusaka cycle 1 prices. The obvious choice would be national median prices.

38.   Calculating quantities by dividing national average expenditure shares by Lusaka cycle 1 prices is inconsistent and distorts the composition of the food basket. The resulting basket is representative neither of the nation as a whole nor of Lusaka during cycle 1. Relative to a truly nationally representative food basket, CSO's resulting food basket has too little of foods that are expensive in Lusaka cycle 1 and too much of those that are cheap in Lusaka cycle 1.

39.   For purposes of this paper, a different procedure was used to determine the food basket. Quantities were estimated at the household-item level by dividing reported expenditures by province-cycle prices. Because the price data is noisy and does not reflect the actual prices paid by individual households, this procedure is inferior to the use of true quantity data. Nonetheless, it is the best approximation available to household-level quantities. Next, average quantities were calculated for households in the middle (3rd) quintile nationally. These items were ranked in descending order by cost for the average quantity, at national median prices. The final food basket was defined as the top 44 items, which accounts for 90% of the cost of the preliminary basket.

40.   Using the list of items produced by its method, CSO chose to use the top 61 food items, accounting for 94% of expenditure in the preliminary list. This cutoff (and the 90% cutoff used for this paper) is arbitrary.

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[31] The adult equivalent weights are 0.36 for a child aged less than 4, 0.62 for age 4-6, 0.78 for age 7-9, 0.95 age 10-12, and 1.0 for all others.

41.   Separate from the question of how to determine the quantities in the food basket is the issue of the choice of prices used to cost the food basket when determining the poverty line. The price index is used to adjust nominal consumption values, and the adjusted consumption values are used to determine poverty rates. It follows that the food basket must be priced using the same set of prices which are the reference prices for the price index. Accordingly, CSO priced its basket using Lusaka cycle 1 prices, while for this paper the basket was priced with national median prices.