Nutritional and Food Security Status of Orphans and Vulnerable Children: Report of a Research Project supported by UNICEF, IFPRI, and WFP

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Introduction

The HIV epidemic has created over 10 million orphans in sub-Saharan Africa and countless other children are affected by the disease, whether by living with a parent who is chronically ill or living in a household that is hosting orphans. Mortality rates for adults are rising rapidly, for women now faster than men. While efforts are aimed at preventing future orphans, many more children will lose their parents before the epidemic is under control.

One of the major challenges facing governments, international organizations and NGOs in their response is the lack of data on the situation of orphans and the quality and effectiveness of their interventions. Continuous assessments of national strategies aimed at improving the welfare of orphans are needed in order to assess the effectiveness of these interventions. A key area is the food and nutrition situation of orphans and other children made vulnerable by HIV/AIDS. Inconsistent findings make it difficult to assess if orphans and other vulnerable children have specific nutritional needs separate from other children. This report looks to answer this question by establishing the present nutritional status of orphans in sub-Saharan Africa by examining a large number of countries in the region. Specifically, the report answers: a) To what degree is child anthropometry and household food security affected by orphan-hood and chronic sickness?, b) Is underweight the most appropriate indicator to measure the nutritional status of orphans?, c) Which types of households are most affected by food insecurity and which indicators show promise for future monitoring?, and d) How does the concept of vulnerability relate to food security?

In order to answer these questions, 30 DHS and MICS II surveys, 2 Sub-national UNICEF surveys from Blantyre, Malawi and Kingston, Jamaica, and 6 C-SAFE/WFP surveys were utilized. Since the core nutrition indicator (underweight) is limited to measuring the nutritional status of younger children, and the majority of orphans are adolescents, an additional food security indicator was developed. Part of the analysis of the food security status of orphans involved first validating this food security instrument that was field-tested in Blantyre and Kingston. The next section discusses the methodology used, followed by a results and a summary of main findings from this research.

Methodology

To asses the nutritional and food security status of orphaned children in relation to non orphaned children, DHS, MICS II, C-SAFE/WFP (CHS), and UNICEF surveys were examined. The DHS and MICS II surveys were nationally representative and were conducted in countries throughout Sub-Saharan Africa. The C-SAFE/WFP surveys were sub-national in scope and were conducted for monitoring purposes in several countries in southern Africa. The UNICEF surveys were also sub-national in scope, targeting much smaller areas, specifically Blantyre, Malawi and Kingston, Jamaica. In all, data from 13

DHS surveys, 17 MICS II surveys, 6 C-SAFE/WFP datasets, and 6 UNICEF surveys were analyzed, though the number and types of datasets examined for each set of research questions differed. The types of datasets and the countries/areas surveyed are listed in Table 1.

TABLE 1. Area/Country Surveyed, Year and Type of Dataset

Country	Survey Type	Survey Area	Year
Angola	MICS II	National	2001
Benin	DHS	National	2001
Burundi	MICS II	National	2000
CAR	MICS II	National	2000
Chad	MICS II	National	2000
Comoros	MICS II	National	2000
Equatorial Guinea	MICS II	National	2000
Ethiopia	DHS	National	2000
Gambia	MICS II	National	2000
Ghana	DHS	National	2003
Guinea Bissau	MICS II	National	2000
Jamaica/Kingston	UNICEF	Sub-national (Kingston)	2003
Kenya	DHS	National	2003
Lesotho	MICS II	National	2000
Malawi	DHS	National	2000
Malawi/Blantyre	UNICEF	Sub-national (Blantyre)	2003
Malawi (2 CHS)	C-SAFE/WFP	Sub-National	2003/2004
Mali	DHS	National	2001
Namibia	DHS	National	2000
Niger	MICS II	National	2000
Nigeria	DHS	National	2003
Rwanda	MICS II	National	2000
Rwanda	DHS	National	2000
Senegal	MICS II	National	2000
Sierra Leone	MICS II	National	2000
Sudan- North	MICS II	National	2000
Sudan- South	MICS II	National	2000
Swaziland	MICS II	National	2000
Tanzania	DHS	National	1999
Uganda	DHS	National	2000/01
Zambia	DHS	National	2001/02
Zambia	MICS II	National	1999
Zambia (2 Rounds)	C-SAFE/WFP	Sub-National	2003/2004
Zimbabwe	DHS	National	1999
Zimbabwe (2 CHS)	C-SAFE/WFP	Sub-National	2003/2004

Note: Several surveys, though mentioned in this table, were not included in the final analysis because they were missing key variables, such anthropometric status of orphaned children. (e.g. the Zimbabwe DHS was excluded because it did not gather anthropometric measurements of orphans)

Each survey collected information on the orphan status of children residing within households. The two UNICEF surveys measured other vulnerable children outside of the household structure by sampling street children and children in institutions. While the

data from institutions was useful, the number of street children surveyed, unfortunately, was too small to be used in the analysis.

Data cleaning and recoding

The main indicator used to measure nutritional status was weight-for-age (WAZ) z-scores. Two other measures were also explored, height-for-age (HAZ) and weight-for-height z-scores(WHZ), but the main one used was WAZ. Anthropometric data collection in most of these datasets was limited to children under the age of 5. Only the UNICEF Blantyre and Kingston datasets included anthropometric measurements of children up to the age of 8. The DHS and MICS datasets already had the appropriate z-scores calculated and no further variables were created by the researchers. The UNICEF Blantyre and Kingston surveys did not already have the z-scores computed. When EpiInfo software was being used to compute z-scores, it was discovered that while height and weight measurements were collected, there was no information on the child's date of birth. Instead, the child's age in *years* had to be used to calculate the z-scores. To minimize the error introduced by this mistake, each child's age in years was recoded into a month variable using the mid-point between the year it said that they were and the next year, i.e. if it stated that a child was 3 years old (36 months), the child was coded to be 42 months of age.

Preliminary descriptive analysis

Initially, descriptive analyses were completed to determine the prevalence of orphan-hood in children 0-15 years of age in each dataset. The observed prevalence of orphans in the surveys was then compared with expected percentages of orphans, as reported in *Children on the Brink* 2002 and 2004 reports (UNAIDS/UNICEF/USAID, 2002 and 2004)[1]. Descriptive cross-tabulations were completed to determine whether the age distribution of orphans (under 15 years of age) observed in these surveys was similar to that reported by *Children on the Brink*. The age distribution of orphans under the age of five was then examined in relation to the age distribution of non-orphans under five, to determine mean differences in ages in months.

Measuring the nutritional status of orphans

Datasets utilized

To study the nutritional status of orphans in relation to non-orphans, DHS and MICS II datasets were examined. The C-SAFE/WFP and UNICEF datasets were not used in this analysis. C-SAFE/WFP data was not used because anthropometric measurements were not taken in the survey. UNICEF data on the other hand, did include anthropometry but the data was sub-national and thus not comparable to either the MICS II or DHS surveys. Analysis was completed using both SPSS 11.0 and STATA 8.0 statistical software.

[1] Children on the Brink: a joint report of orphan estimates and a framework for action , UNICEF/UNAIDS/USAID. 2004
Children on the Brink: a joint report of orphan estimates and program strategies. UNICEF/UNAIDS/USAID, 2002.

Use of regression coefficients

The initial strategy to assess the nutritional status of orphans using a large number of datasets involved the use of linear regression. A dummy category was created using the paternal orphans since this was the orphan category with the largest sample size. Paternal orphans and age were regressed on WAZ for children under 18 months of age and for children 18-59 months of age. Residuals were saved in order to compare across countries. However, it was then decided that it would make more sense to adjust for age and to use general linear models (GLM) to analyze the datasets.

Adjusting for the different age distribution of orphans

Further descriptive analysis followed to determine the how much effect age adjustment had on the mean z-scores of orphans. First, mean weight for age z-scores were calculated for orphans and non-orphans in a few datasets using simple comparison of means tests, unadjusted for age. Then to determine the difference between unadjusted and age adjusted mean z-scores, general linear models were used in the same datasets to adjust the mean weight for age z-scores for the differing age distribution of orphans, using age as a covariate.

For both of these analyses, children under five were examined in two age groups: children 0-17 months of age and children 18-59 months of age. Dividing the sample of children in this way utilized the natural shape of a growth curve (1-the near linearity seen in the steady decline in the first year and a half of life and 2- the near linearity seen in the steady improvement/leveling off of growth in the 18-59 months following) and enabled the growth data to be fit to linear models, thus making it unnecessary to transform the data or to use logit modeling. This facilitated both the analysis and the interpretation of results. Dividing the sample of children according to these age categories was necessary to fit the assumption of linearity under the general linear model test. For comparison purposes, these same age groups were examined separately for the unadjusted comparison of means tests.

Analysis with General Linear Models (GLM)

After determining the significance of age adjustment, general linear models were used to calculate the age adjusted mean weight-for-age, height-for-age, and weight-for-height z-scores for orphans and non-orphans in each of the DHS and MICS II surveys. This first set of general linear models (GLMs) simply examined 2 categories: orphans and non-orphans. The next set of GLMs examined 4 categories of children: non-orphans, maternal orphans, paternal orphans, and double orphans. A maternal orphan was defined as a child whose mother was dead but whose father was alive. Paternal orphans were defined as children whose father was dead but whose mother was alive. Double orphans were children whose mother and father were dead. This set of GLMs was completed for each of the DHS and MICS II surveys. Both sets of analysis were completed for children 0-17 months of age and children 18-59 months of age.

Combining the non-orphan children into one category assumed that these children have similar characteristics; however, as is sometimes the case, these children may be fostered in households without their parents. In order to determine if it was the death of the parent or the absence of the parent that was affecting a child's nutritional status, it was necessary to divide the children into 9 categories. The data allowed for this re-categorization by including information on whether the children sampled lived in the same household as their mother and father. From this information (coupled with the orphan variables), the following categories were created:

1. Mother dead, father alive but not in household
2. Mother dead, father alive and in household
3. Father dead, mother alive but not in household
4. Father dead, mother alive and in household
5. Both alive, both in household
6. Both alive, mother in household, father not in household
7. Both alive, father in household, mother not in household
8. Both alive, neither in household
9. Both dead

Once these categories were created, one set of GLMs were completed for children 0-17 and children 18-59 months of age on each dataset to examine mean weight for age z-scores for each of these categories. These analyses allowed comparison of nutritional status (among the categories above) within countries but not between countries. To examine differences between countries, standardization of the datasets was required.

With nutritional status of countries (defined by mean population weight for age z-scores and prevalence) differing substantially, mean WAZ residuals were determined to be the best way to standardize the datasets. Residuals were calculated by subtracting the age adjusted mean weight-for-age z-score for all 9 categories in each country from the mean z-score for the entire country in question (again using the 0-17 months and 18-59 month age groups). The mean residual for each category of children (0-17 months of age and 18-59 months of age) in each survey were calculated. For surveys from Sub-Saharan Africa, mean residuals for children in all 9 categories were then grouped according to the region in which their country was located geographically. This grouping was completed under the assumption that countries closer to one another would be culturally and socially similar to one another, and thus similar trends would be expected.

With countries grouped according to region, mean residuals for each orphan/non orphan category could then be compared with one another to determine if similar trends in nutritional status were being seen within regions (either in the southern, eastern, and/or western regions of Africa). Weighted mean residuals for all orphan/non orphan categories were then computed for each region to see if there were similar trends between regions.

The method was equivalent to merging the datasets; however, merging the datasets would still have required internal standardizations, thus giving no advantage and creating an unwieldy dataset.

Stratification by selected variables

This standardization process was repeated using these same 9 orphan/non orphan categories using only DHS datasets to check to see if the results were confounded by urban/rural status, sex of head of household, and a proxy for socioeconomic status, floor type. Only three countries, one per region, were selected to be analyzed by the socioeconomic status proxy. In each case, separate tables were compiled. Any noticeable trends in these stratified analyses were examined in relation to the un-stratified table to determine if there was confounding. If substantial confounding was seen, MICS II datasets would be stratified according to the same variables.

The nutritional status of children in institutions

The UNICEF surveys that collected information on children in both households and institutions were assessed to determine if the nutritional status of children in institutions differed substantially from children in households. The children measured in the institutional survey were both orphans and non-orphans. Comparison of means tests were completed to compare the mean WAZ of children in institutions with the: 1) mean WAZ of the total household child population, 2) mean WAZ of the household orphan population, and 3) the mean WAZ with the total household non-orphan population. This analysis could only be completed on these datasets since none of the DHS, MICS II, or C-SAFE/WFP data collected information on children living in institutions.

Useful indicators for monitoring the nutritional state of orphans

Anthropometry of children 5-8 years of age

To determine the usefulness of measuring anthropometry on children above five years of age, the UNICEF surveys in Kingston and Blantyre were examined. The MICS II and DHS surveys were not used in this analysis because they collected anthropometric data only on children below the age of five. The C-SAFE/WFP datasets (as stated previously) did not collect any anthropometric data.

Descriptive statistics were used to assess the usefulness of anthropometric data on children in this age range. Comparison of means tests stratified by the age groups 0-2 years, 3-5 years, and 6-8 years were completed, using weight-for-age, height-for-age, and weight-for-height z-scores as the outcome variables and toilet type, having electricity, flooring materials, and orphan status (non orphan, maternal, paternal, double) as the independent variables. The associations between the independent variables selected (with the exception of orphan status) and anthropometric indicators in children below the age of five have been well established. The comparison of means tests were completed on both UNICEF surveys to determine if the expected relationships in children under five years of age existed in these datasets and persisted in children 6-8 years of age.

Validation of food security instrument and status of household food security

UNICEF surveys in Blantyre and Kingston collected information on household food security status using a qualitative, perception-based food security questionnaire, modeled after the 30-day US Food Security Core Module produced by the US Food Security Measurement Project. Both surveys were intended to serve as pilot tests for this questionnaire, allowing its effectiveness to be measured in areas that not only differed geographically and culturally but also in terms of health indicators such as nutritional status and HIV prevalence. These two UNICEF surveys were used primarily for this analysis, however, since the Malawi C-SAFE/WFP surveys included questions similar to those in the UNICEF survey, they were also examined.

The questionnaire included in the UNICEF surveys has a yes/no answer format and it consisted of eight, perception-based questions. It is intended to capture the more severe cases of food insecurity, often accompanied by hunger.

The food security module included in the UNICEF questionnaire had a hierarchical order to the questions. The first three questions were asked to all households, while the fourth question was asked only if the respondent answered affirmatively to one of the previous three. The fifth, sixth, seventh, and eight question were asked only to households who have reported having a child 0-17 years of age. The full questionnaire and the specific methodology by which food security status was determined can be found in Annex 1-1c.

Since this type of questionnaire had not been used previously in either country, the effectiveness of the food security measure had to be determined. First, to examine the internal validity of the module, a series of simple t-tests were completed. The outcome variable was the total number of affirmative responses and the independent variables were the individual questions, each tested separately from one another. This test was intended to provide a quick check that respondents answering "yes" to a question in the food security scale had a significantly higher (>1.0) mean total score than respondents answering "no" to the same question. Different combinations of such t-tests conforming to the hierarchical nature of the questionnaire were performed. The different sets t-test performed are summarized in Table 2 below:

TABLE 2: Sets of T-tests Performed for Purposes of Validating the Food Security Scale

T-tests	Number of t-tests	Questions tested (Independent variables)	Total (Dependent variable)
Set 1	3	1,2, 3	1+2+3
Set 2	4	1,2,3,4	1+2+3+4
Set 3	4	5,6,7,8	5+6+7+8
Set 4	8	1,2,3,4,5,6,7,8	1+2+3+4+5+6+7+8

To further examine the internal validity of the questionnaire, reliability estimates were calculated. Using STATA, Cronbach's alpha tests were run and alpha values were computed. In addition, the correlations between the individual items (questions) in the scale were also examined to determine if removing certain items might help increase the reliability of the scale. Cronbach's alpha tests were completed in sets identical to the sets

created for the t-tests. Thus, Cronbach's alphas and item correlations were obtained for set 1, 2, 3, and 4 in Table 2.

Once the internal validity of the food security questionnaire was established, a comparison of means tests were completed examining food security status in relation to SES, sanitation, vulnerability, and anthropometric indicators. The results were examined to determine if the expected patterns emerged: if poor, nutritionally deficient, areas tended to be more food insecure than other better off communities. The specific independent variables examined for this analysis were toilet type, electricity (yes/no), WAZ, and orphan status.

Additionally, the C-SAFE/WFP Community Health Surveys within Malawi used three of the same coping mechanism/hunger questions that were used in the UNICEF surveys. This allowed comparisons to be drawn between the two. To compare C-SAFE/WFP and UNICEF results, the responses from the C-SAFE/WFP surveys for each food security question had to be collapsed from "Frequently, Seldom, and Never" into a dichotomous "Yes or No" variable with "Frequently" and "Seldom" comprising "Yes" and "Never" comprising "No". Responses to the questions that were similar in both surveys were compared using cross tabulations.

Childhood vulnerability in relation to household food security

Food security of orphans and of households with orphans

The two UNICEF surveys (Kingston and Blantyre) and the 2 rounds of CHS C-SAFE/WFP surveys (in Zambia, Zimbabwe, and Malawi) were used to examine the food security status of households with orphans in relation to the food security status of households without orphans. The responses from the C-SAFE/WFP surveys for Zimbabwe and Zambia were recoded in the same way that the Malawi C-SAFE/WFP surveys were for the purposes of external validation (see above). In both sets of analysis, cross tabulations were completed to compare the food security status of orphan and non-orphan households

Food security status of households with chronically ill individuals

Childhood vulnerability in relation to food security was examined using both UNICEF surveys and the 2 rounds of CHS C-SAFE/WFP data. The aim of this analysis was to compare the food security status of households containing "vulnerable" children with the food security status of households not containing "vulnerable" children. For the purposes of this analysis, "vulnerable" children were defined as children living in a household with a chronically ill individual. Descriptive analysis (comparing responses to all like questions) was completed using cross tabulations. Again, the responses to the C-SAFE/WFP food security questions were recoded into a dichotomous-Yes/No- variable to make the answers more comparable to the UNICEF surveys. The independent variable examined was households with chronically ill individual-Yes/No. Chi square tests were completed on all substantial differences seen.

Results

Preliminary descriptive analysis

Percentage of childhood population that are rphans: Observed in Relation to Expected

The aim here was to determine whether a large percentage of the orphan population was being missed in the sampling frames of the DHS and MICS II surveys. The first step in this process was to determine if the number of orphans sampled was in line with the expected orphan population as reported by *Children on the Brink 2002*. This was determined by comparing the expected percentage of the child population that is orphaned (*Children on the Brink*) with the percentage of the child population that is orphaned in each of the MICS II and DHS surveys.

As Tables 3 and 4 indicate, the observed number of orphans as a percentage of the child population are similar, in most cases, to extrapolated, predicted percentages provided by Children on the Brink 2002. While the observed percentage of the child population orphaned tended to be lower then the expected percentages, it only differs by an average of only 3.3%. DHS (as opposed to MICS II) tended to more consistently under sample orphans (according to the expected percentages). Rwanda was the only case in which orphans appeared to be over sampled in both DHS and MICS II surveys. In all, despite the slight deviations, the household surveys do not appear to be missing many orphans. This suggests that the results are likely to be representative of orphans nationwide, allowing any findings and conclusions to be generalized.

Similar descriptive analysis was not completed on the UNICEF and C-SAFE/WFP surveys due to the fact that they were designed to sample only specific communities. Since there is little data available on the number of orphans in these particular communities, proper sources for comparison could not be found. Consequently, such an analysis was not useful.

TABLE 3: MICS II Datasets: Observed Percentage of Childhood Orphans in Sample Population in Relation to the Expected Percentage of Childhood Orphans

Country	Year	Percent of Total Childhood population: Observed Orphans*	Expected percentage of the population**
Angola	2000	10.8	10.7
Burundi	2000	19.2	16.6
CAR	2000	10.4	15.1
Chad	2000	6.6	11.0
Comoros	2000	4.5	*
Equatorial Guinea	2000	8.7	9.2
Gambia	2000	5.6	8.8
Guinea Bissau	2000	7.5	11.2
Lesotho	2000	15.7	17.0

Niger	2000	4.8	10.1
Rwanda	2000	22.0	17.5
Senegal	2000	6.1	9.4
Sierra Leone	2000	12.9	14.7
Sudan-North	2000	4.1	9.4[+]
Sudan-South	2000	16.4	9.4[+]
Swaziland	2000	11.6	15.2
Zambia	2000	15.1	17.6
Total			

Sources: *Multiple Indicator Cluster Survey
**Children on the Brink, UNICEF/UNAIDS/USAID, 2002
[+]Data from one nationwide survey- did not differentiate North from South

TABLE 4: DHS Datasets: Observed Percentage of Childhood Orphans in Sample Population in Relation to the Expected Percentage of Childhood Orphans

Country	Year	Percent of Total population of Observed Orphans*	Expected percentage of the population**
Benin	2001	6.4	9.6
Ethiopia	2000	12.3	13.2
Ghana	2003	6.7	10.0
Kenya	2003	11.0	11.0
Malawi	2000	11.8	17.5
Mali	2001	5.5	11.2
Namibia	2000	10.5	12.4
Nigeria	2003	6.9	10.0
Rwanda	2000	27.2	17.5
Tanzania	1999	8.2	12.0
Uganda	2000/01	13.4	14.6
Zambia	2001	14.8	17.6
Zimbabwe	1999	14.3	17.6
Total			

Sources: *Demographic and Health Survey
**Children on the Brink, UNICEF/UNAIDS/USAID, 2002

Age Distribution of Orphans: Observed in Relation to Expected

After ensuring that DHS and MICS II surveys were not excluding a high percentage of the orphan population, the next step was to compare the observed age distribution of orphans under 15 in these datasets with the predicted age distribution suggested by Children on the Brink 2004. Figures 1 and 2 show the pooled averages for the DHS and MICS II surveys. Examination of the age distribution provided by Children on the Brink 2004 (See Figure 3) reveals that these pooled averages are very similar to the expected distribution. This finding coupled with the previous one provides evidence that the

observed orphan populations could be largely representative of orphan populations as a whole in the respective nations.

Figure 1.

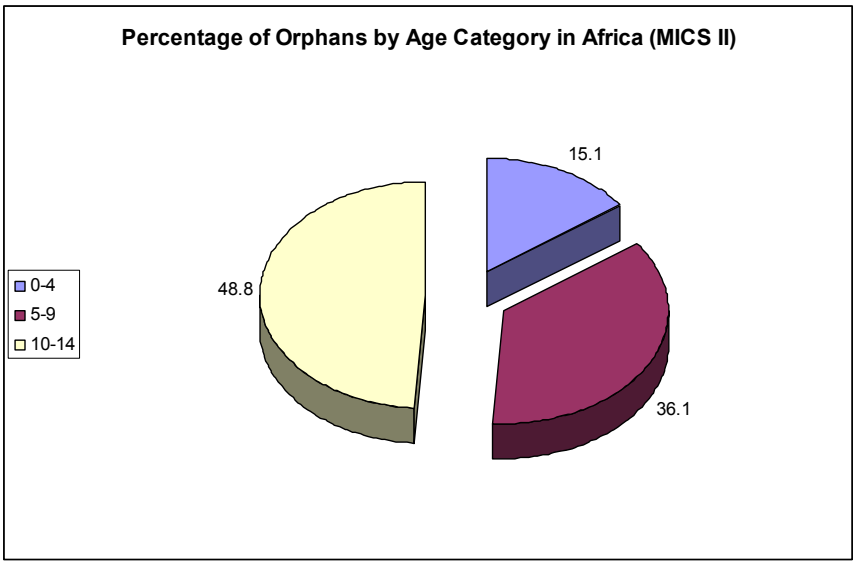


Figure 2.

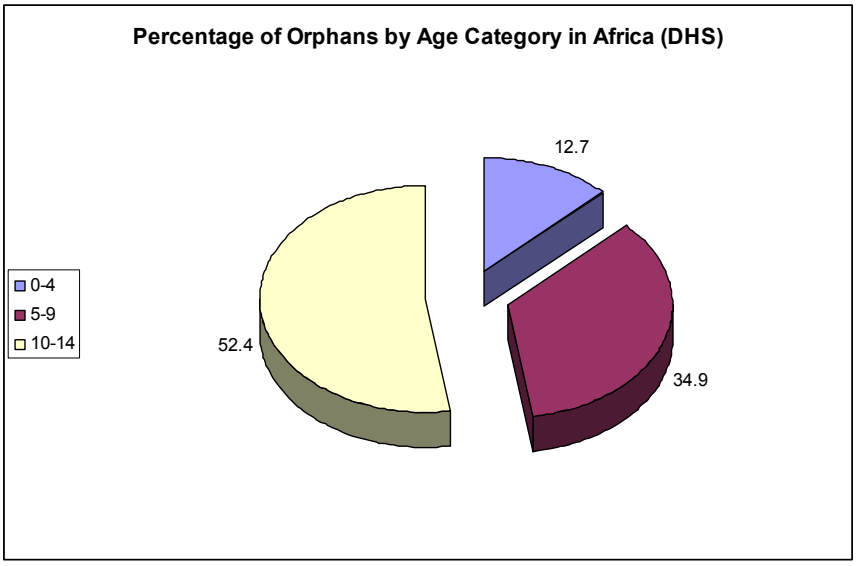
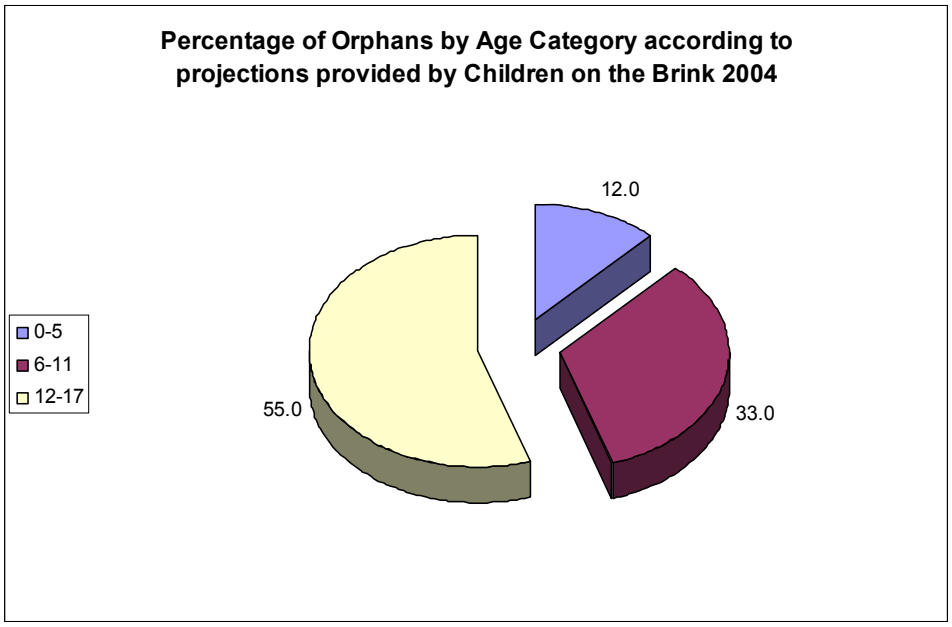


Figure 3



Under five age distribution of orphans and non orphans

The secondary objective of the preliminary descriptive analysis was to determine if orphans 0-5 years of age are older (on average) than non-orphans in the same age group and whether such an age discrepancy should be taken into account when examining nutritional status. Annex 2 contains the mean age by orphan status for each DHS and MICS II dataset and provides the total, weighted age by orphan status. As this data indicates, age in months by orphan status follows the expected pattern: Double orphans having a mean age of 39.9, maternal orphans having a mean age of 37.4, paternal orphans having a mean age of 34.2, and finally non orphans having a mean age of 28.1.

With mean ages clearly differing by orphan status, it was necessary to examine the effect of these differences on mean anthropometric z-scores. In order to do so, both unadjusted comparison of means tests and age adjusted General Linear Models (GLMs) were completed, with WAZ being the dependent variable and orphan status being the independent variable (and in the case of the GLMs, age in months being the covariate). As stated in the methodology, for statistical purposes, the adjusted and unadjusted comparison of means was completed on two groups of children, 0-17 month old children and 18-59 month old children. Unadjusted comparison of means tests and GLMs were completed on each of the MICS II and DHS datasets, however, the results were similar enough between countries that a subset of each region could adequately illustrate the general effect of age adjustment upon mean WAZ. Tables 5 and 6 provide these summary results.

According to these tables, age adjusted GLMs did provide results that differed from the unadjusted comparison of means tests. The difference, however, is quite small, on the

order of 0.11 for children under the age of 18 months (though the sample sizes for orphans were quite small) and 0.01 for children between 18 and 59 months of age. Age adjustment also often diluted the differences between orphans and non-orphans and only in one or two cases did it change the sign of the difference. Despite this relatively small effect, however, there is still the possibility that differences in age distributions (if pronounced) could mask true differences between the categories when examined in relation to other variables. This possibility alone is a good reason to continue to use age adjusted means.

TABLE 5: MICS Mean Z-scores by Country and age adjusted mean z-scores by country (0-17 Months)

Country	Unadjusted Mean WAZ (N)			Age Adjusted Mean WAZ (N)		
	Non Orphan	Orphan	Difference	Non Orphan	Orphan	Difference
Zambia	-1.24 (782)	-1.34 (31)	-0.10	-1.24 (782)	-1.31 (31)	-0.07
Tanzania	-0.94 (869)	-2.30 (10)	-1.35	-0.94 (869)	-2.03 (10)	-1.09
Ethiopia	-1.21 (2575)	-1.31 (42)	-0.10	-1.21 (2575)	-1.37 (42)	-0.16
Central Africa Republic	-0.61 (4463)	-0.66 (122)	-0.05	-0.61 (4463)	-0.59 (122)	+0.02
Niger	-1.01 (1467)	-0.91 (9)	+.10	-1.01 (1467)	-1.04 (9)	-0.03

TABLE 6: MICS Mean Z-scores by Country and age adjusted mean z-scores by country (18-59 Months)

Country	Unadjusted Mean WAZ (N)			Age Adjusted Mean WAZ (N)		
	Non Orphan	Orphan	Difference	Non Orphan	Orphan	Difference
Zambia	-1.19 (3202)	-1.32 (169)	-0.13	-1.19 (3202)	-1.33 (169)	-0.14
Tanzania	-1.40 (1854)	-1.24 (52)	+0.16	-1.40 (1854)	-1.26 (52)	+0.14
Ethiopia	-1.89 (6227)	-1.85 (297)	+0.04	-1.89 (6227)	-1.86 (297)	+0.03
Central Africa Republic	-1.26 (8112)	-1.27 (412)	-0.01	-1.26 (8112)	-1.27 (412)	-0.01
Niger	-1.71 (3056)	-1.49 (66)	+0.22	-1.71 (3056)	-1.55 (66)	+0.21

Nutritional status of orphans and non orphans in households

Age adjusted z-scores

The results comparing age adjusted mean z-scores for non-orphans, maternal orphans, paternal orphans, and double orphans on 17 MICS II and 13 DHS datasets are shown in Annex 2b. Examined closely, in children 0-17 months of age, no patterns emerge across countries or regions that would indicate any one of these orphan categories is consistently more susceptible to growth failure than any other category. In children 18-59 months of age, the same results are seen despite having more robust sample sizes in each category. An analysis of unadjusted mean z-scores predictably did not clarify which, if any, orphan categories are more vulnerable than the rest.

Linear regression analysis examining the nutritional status of paternal orphans (chosen because this category had the largest sample sizes) in relation to non-orphans also did not show any clear patterns. The coefficients obtained in this analysis are shown in Annex 3. The regression was completed for children in the 0-17 month age category and 18-59 month age category.

With no clear patterns emerging among the common orphan categories, it was necessary to determine whether orphan hood as a risk factor was being masked by other variables, particularly absence of parents from the household. This required that the orphan categories be further delineated to gain a better understanding of the household composition. Annex 4 show the new orphan and non-orphan categories created and the mean age-adjusted weight for age z-scores for each of these new categories for the MICS II and DHS surveys. These results, however, again showed no clear patterns and the sample sizes in the orphans categories were even smaller making it difficult to draw any conclusions from the data. The next step was to pool the data from the MICS II and DHS surveys by calculating the internal differences, by dataset, between the mean age adjusted weight for age z-scores for each of the 9 new orphan category and the total age adjusted mean z-score. The results are shown in Annex 4b. Weighted, regional estimates and weighted, total estimates (using the internally standardized WAZ differences) are reported in Tables 7 and 8 for both MICS II and DHS surveys. It should be noted that, for the most part, the countries surveyed by DHS in each region differ from the countries surveyed by MICS II. Thus, the results in Tables 7 and 8 should be complementary but not necessarily identical to one another.

TABLE 7: Internally Standardized Regional Mean Difference in WAZ

	Mother Dead		Father Dead		Both Alive				Both Dead
Children 0-17 Months	**Father not in HH**	**Father in HH**	**Mother not in HH**	**Mother in HH**	**Both in HH**	**Father not in HH**	**Mother not in HH**	**Neither in HH**	
MICS II									
Southern Africa	-0.340 (10)	0.378 (7)	0.499 (5)	-0.196 (160)	0.005 (3053)	-0.004 (1156)	-0.239 (12)	0.137 (68)	-0.695 (3)
West Africa	-0.593 (12)	0.008 (9)	-0.681 (7)	0.047 (121)	-0.024 (6405)	0.026 (1637)	1.114 (15)	0.524 (65)	0.469 (14)
Eastern Africa	-0.651 (9)	0.147 (8)	1.477 (3)	0.208 (165)	-0.017 (8164)	0.127 (746)	0.146 (11)	0.270 (33)	0.310 (6)
DHS									
Southern Africa	-0.299 (8)	0.366 (1)	0.979 (1)	-0.024 (97)	0.020 (4199)	-0.077 (1794)	-0.090 (11)	0.715 (76)	0.663 (2)
West Africa	-1.601 (1)	0.144 (2)	1.376 (3)	0.108 (72)	-0.011 (6190)	0.019 (1240)	0.178 (13)	0.222 (27)	1.710 (1)
Eastern Africa	-0.828 (19)	-0.717 (10)	0.011 (3)	-0.282 (156)	0.0178 (7133)	0.022 (1732)	0.190 (10)	0.696 (46)	0.195 (7)

TABLE 8: Internally Standardized Regional Mean Difference in WAZ

Children 18-59 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	**Father in HH**	**Mother not in HH**	**Mother in HH**	**Both in HH**	**Father not in HH**	**Mother not in HH**	**Neither in HH**	
MICS II									
Southern Africa	-0.125 (30)	0.143 (46)	-0.130 (96)	-0.003 (517)	0.010 (7565)	-0.071 (2267)	0.109 (148)	0.10 (740)	-0.059 (60)
West Africa	0.116 (61)	0.025 (50)	0.135 (90)	0.117 (339)	-0.019 (12548)	0.062 (2592)	0.102 (223)	-0.001 (1127)	0.144 (62)
Eastern Africa	0.059 (39)	-0.053 (64)	0.055 (33)	-0.056 (580)	-0.005 (16388)	0.063 (1623)	-0.067 (58)	-0.058 (251)	0.270 (40)
DHS									
Southern Africa	-0.012 (89)	0.169 (43)	0.008 (104)	-0.034 (404)	0.026 (8367)	-0.098 (2983)	0.174 (145)	0.046 (1286)	0.126 (53)
West Africa	-0.281 (37)	0.422 (35)	-0.269 (31)	0.173 (252)	-0.014 (11226)	0.016 (1923)	0.037 (244)	0.105 (593)	0.207 (16)
Eastern Africa	-0.044 (91)	0.045 (110)	0.322 (87)	-0.032 (880)	-0.002 (14302)	-0.039 (3104)	0.176 (227)	0.105 (860)	-0.106 (73)

Internally standardized results

MICS II: Children 0-17 Months of Age

The MICS datasets covered a wider geographical area than the DHS, and countries in southern, west, central and eastern Africa were analyzed. As was the case with the DHS surveys, all maternal orphan categories, one of the paternal orphan categories, and the double orphan category lacked the sample sizes to draw any conclusions. Thus, only one orphan category, father dead and mother in the household, had sufficient sample size to compare it with the other categories. A difference of at least 0.10WAZ was considered significant for this section.

In southern Africa, paternal orphans with the mother in the household were 0.20 WAZ below the population mean. Children whose parents are alive but neither in the household had mean z-scores 0.14 higher than the population mean. There were no other differences from the mean in the other categories. In West Africa, only 4 categories had large enough sample sizes to draw any conclusions. The only category where we see a difference from the mean was again where both parents were alive but neither was in the household. Children in this category had an average 0.52 WAZ higher than the population mean. In east Africa, paternal orphans with the mother in the household had an average WAZ that was 0.21 higher than the population mean. Other categories were we see better than the mean scores were in the father alive but absent (0.13 WAZ higher) and in the category with both parents alive but neither in the household (0.27 WAZ higher). In central Africa, paternal orphans with the mother in the household had an average 0.14 WAZ lower than the population mean. Children with both parents alive but neither in the household, as in the other regions, are better-off than the other categories, with an average WAZ 0.34 higher than the population mean.

Children 18-59 Months of Age

In this age group, the sample sizes were larger than in the younger age group. However, some of the sample sizes remained small and therefore any results should be viewed with this in mind. In the MICS, as in the DHS, the same trends were not seen in each region. In southern Africa, children whose mothers are dead and live in a household without their father fare worse than the general child population. They have a mean WAZ 0.13 lower, translating to a difference in underweight prevalence of 4-6%. In contrast, if the mother is dead and the father is in the household, these children have an average WAZ that is 0.14 higher than the mean. Children whose fathers are dead have a lower mean WAZ than the general population, if the mother is not in the household (0.13 WAZ lower). The only other category where we see a difference was where both parents were alive but the mother was not in the household. Here, the children had mean WAZ that were 0.11 higher than the mean. In West Africa, differences were found in 5 categories. Among maternal orphans with the father not in the household, children had average WAZ 0.12 higher than the mean. Paternal orphans with the mother not in the household also had average WAZ that was higher than the mean (0.13 higher). Paternal orphans with the mother in the household also had higher than the mean z-scores (0.12 higher). Double orphans in the region also had mean WAZ that were 0.14 higher than the mean. Among

the non-orphans, differences were only found among children with mothers not in the household, they had an average WAZ that was 0.10 higher than the mean. In east Africa, there was only a difference in one category, the double orphans. Children in this category had an average 0.27 WAZ higher than the population mean. In central Africa, the only differences were found in both the maternal orphan categories. In both cases, with the father present or absent, maternal orphans had higher than the mean WAZ (0.13 higher if the father was not in the household and 0.20 higher if the father was in the household).

DHS: Children 0-17 Months of Age

Table 7 and 8 shows the results of the internally standardized values using 12 DHS datasets. Sample size is a problem in this age range, and it makes it difficult to be able to draw any conclusions in some of the categories. As can be seen, the following categories had too low of a sample to be included: a) mother dead, father alive and not in the household, b) mother dead, father alive in the household, c) father dead, mother alive and not in the household, d) mother and father alive, mother not in household, and e) both parents dead.

Southern Africa

Overall for this region, there were no major differences in the categories that were examined. The only category where we see a significant difference was in the category where both parents were alive but not in the household. On average, children on these households had an average mean WAZ 0.71 above the mean of the population as a whole. This translates to a decrease in prevalence of underweight children of about 10-15% in this category.

A further step of analysis taken was to stratify the data into by type of place of residence (urban/rural) and the sex of the head of household (male/female) to see if the results were confounded by these specific variables (see Tables 9-12). Annexes 4c and 4d show the age adjusted means and internally standardized values for each country and region. The pattern for type of place of residence was similar to what was seen in the unstratified analyses, with the only differences seen in the category where the parents were alive but not in the household. The majority of these children were found in the rural areas, but both urban and rural children had average WAZ above the population mean. The same can be said for the pattern for sex of the household head with one exception. There were differences in the category for paternal orphans with the mother in the household. The children in the male-headed households (MHH) were on average 0.64WAZ *below* the mean of the population, while children in female-headed households (FHH) were on average 0.24 WAZ *higher* than the mean of the population.

West Africa

In the overall analysis, there were no differences except for the category of paternal orphans with the mother in the household and where the parents are alive but neither is in the household. In the former, the children had an average mean WAZ 0.11 higher than

the population mean, and in the latter, children had an average mean WAZ 0.22 higher than the population mean.

When stratified, we see similar overall patterns, with some key exceptions. In the paternal orphan category with the mother in the household, the orphans in urban areas have 0.45 higher average WAZ than the population mean, while there is no difference for the paternal orphans in the rural areas. In the category with both parents alive but not in the household, the urban children have 0.22 higher WAZ than the mean, while the rural children are 0.11 below the mean. Paternal orphans in MHH have 0.16 higher mean WAZ, while there is no difference in the children in FHH. Among the category where the parents are alive but not in the household, children in MHH have a 0.41 higher mean WAZ, while children in FHH have a 0.29 lower mean WAZ.

East Africa

The only significant differences that we see in the overall comparison are in the paternal orphan category and the parents alive but neither in the household category. The paternal orphans are 0.28 WAZ below the population mean, and the children with parents alive but not in the household have a 0.70 WAZ higher than the population mean.

Paternal orphans in both urban and rural areas had lower WAZ scores, but the children in urban areas were worse-off and had 0.75 WAZ lower than the population mean. Children whose parents were alive but not in the household had higher WAZ scores in rural and urban areas, but the magnitude was higher in rural areas were children there had 0.80 higher WAZ than the population mean. Paternal orphans in FHH were slightly worse-off than those in MHH. Children whose parents are alive but not in the household were slightly better-off on MHH, although both MHH and FHH had higher mean WAZ that the population.

Children 18-59 months

The sample sizes are much bigger in this age range and most categories can be included for interpretation.

Southern Africa

Overall, differences can be found in 3 of the categories. Maternal orphans with the father in the household had a higher WAZ by 0.17 than the population mean. Children whose mother and father were alive, but the mother was absent from the household also had higher mean WAZ by 0.17. Double orphans in this region also fared better than the population mean (0.13 above the mean).

When stratified by type of place of residence, several key findings should be highlighted. Maternal orphans with the father not in the household fare better in urban areas. Paternal orphans with the mother not in the household were much better off in urban areas (0.54 WAZ above the population mean). Children with the father alive and not in the household had 0.12 WAZ below the population mean in rural areas, while there was no

difference from the mean for those in urban areas. Children with the mother alive but not in the household had a 0.30 WAZ above the mean in urban areas. There were not too many differences by sex of the head of household except in two categories. Maternal orphans with the father not in the household were better off in MHH (0.12 WAZ higher versus 0.10 lower in FHH). Children with both parents alive but the mother not in the household were better off in FHH (0.34 WAZ higher than population mean) than MHH (0.14 WAZ higher than the population mean).

West Africa

In this region, maternal and paternal orphans fare worse if the remaining parent is not in the household. Maternal orphans with the father not in the household have 0.28 WAZ lower than the population mean, and paternal orphans with the mother not in the household have 0.27 WAZ lower than the population mean. In contrast, maternal orphans with the father in the household had 0.42 WAZ higher than the population mean, and paternal orphans with the mother in the household had .17 WAZ higher than the population mean. Children with both parents alive but not in the household had a 0.10 WAZ higher than the population mean.

Maternal orphans with the father not in the household were worse off in rural areas (0.40 WAZ lower than the population mean), but better off in rural areas if the father is in the household (0.58 WAZ higher than the population mean). Paternal orphans with the mother in the household fare slightly better in urban areas than in rural areas. Children with both parents alive but not in the household have higher mean WAZ in urban areas. In terms of the sex of the head of household, some interesting findings include: maternal orphans with the father not in the household do worse-off in MHH (0.44 WAZ below the mean compared to 0.08 WAZ for FHH); there is not a difference in who heads the household for paternal orphans with the mother not in the household; paternal orphans with the mother in the household do much better in MHH (0.32 WAZ higher than the mean compared to 0.0088 higher than the mean for FHH); and that for children whose parents are alive but neither are in the household, children in FHH have 0.13 WAZ higher than the mean but there is no difference for children in MHH.

East Africa

This region yielded some interesting findings in relation to the presence of the mother and it's effect on WAZ. Paternal orphans with the mother not in the household had 0.32 WAZ higher than the mean. Similarly, if the mother was alive but not in the household translated into the children having 0.18 WAZ higher than the mean. Children whose parents are alive but not in the household had 0.11 WAZ higher than the mean, while double orphans had .11 WAZ lower than the population mean.

Maternal orphans with the father in the household are better off in urban areas (0.33 WA higher than the mean). There was no difference between urban and rural areas for paternal orphans with the mother not in the household. Children whose father was not in the household were worse off in urban areas, while children whose mother was not in the household were better off in urban areas. Double orphans were much worse off in urban

areas (0.44 WAZ lower than the means), but this sample size is small and care should be taken when interpreting this. Maternal orphans with the father not in the household were worse off in MHH (average WAZ was 0.26 lower than the mean). Paternal orphans with the mother not in the household fared better in MHH (average WAZ was 0.35 higher than the mean), while in FHH, the average WAZ was 0.19 lower than the mean. Paternal orphans with the mother in the household still fared better in MHH, and the average WAZ in FHH was 0.19 below the population mean. Interestingly, children in the reference category (where both parents are alive and in the household) fared slightly better in FHH. Children with the mother not in the household were better off in FHH (average WAZ was 0.36 higher than the population mean). While double orphans were below the population mean in both categories, they were worse off in FHH (0.32 WAZ lower than the average).

Three countries, Zambia, Nigeria, and Kenya, were selected for stratification by the socioeconomic proxy variable, floor type. The variable was dichotomized into dirt floor versus others (which included tile, cement, etc). In the less than 18 months of age group in Zambia, the only differences that we see are in the paternal orphans with the mother in the household (-0.16 WAZ below the mean) and where the parents are both are alive, but the father is not in the household (-0.10 WAZ below the mean) with a dirt floor. The sample sizes for Nigeria were too small for most categories for this age group, and there were no differences in the categories that had sufficient sample size. The same was true for Kenya in this age group.

For children 18-59 months in Zambia, there were too few maternal orphans in the sample to make any definitive conclusions. There were no differences in the paternal orphan categories. The only differences were in the category where the father was absent, children who lived in households with a dirt floor had an average WAZ that was 0.14 below the mean. Children who did not live with their parents had had higher mean WAZ than the population mean regardless of floor type. In Nigeria, paternal orphans have higher WAZ regardless of floor type (0.33 higher for dirt floor and 0.40 higher for other types of floor). Again, children whose parents are alive but not in the household also have higher than the mean WAZ, 0.29 higher for dirt floor and 0.34 higher for other types of floor. In Kenya, paternal orphans with the mother in the household with floors other than dirt had a higher WAZ than the mean (0.41 WAZ higher)

TABLE 9: Internally Standardized Regional Mean Difference in WAZ (Male/Female)

	Mother Dead		Father Dead		Both Alive				Both Dead
Children 0-17 Months	**Father not in HH**	**Father in HH**	**Mother not in HH**	**Mother in HH**	**Both in HH**	**Father not in HH**	**Mother not in HH**	**Neither in HH**	
Male									
Southern Africa	0.395 (4)	0.364 (1)	0.981 (1)	-0.644 (26)	0.011 (3975)	-0.094 (672)	-0.082 (8)	0.602 (45)	2.204 (1)
West Africa	-1.579 (1)	0.138 (2)	2.853 (2)	0.156 (29)	-0.006 (6137)	0.015 (524)	0.160 (12)	0.411 (18)	--
Eastern Africa	-1.141 (13)	-0.446 (10)	-0.280 (3)	0.119 (39)	0.003 (6883)	-0.003 (579)	-0.152 (7)	0.695 (26)	0.259 (4)
Female									
Southern Africa	-0.956 (4)	--	--	0.240 (71)	-0.021 (224)	-0.031 (1122)	-0.066 (3)	0.721 (31)	-1.270 (1)
West Africa	--	--	-1.524 (43)	0.089 (53)	0.010 (716)	-0.018 (1)	0.229 (1)	-0.285 (9)	3.517 (1)
Eastern Africa	-0.094 (6)	--	--	0.289 (117)	-0.174 (250)	0.056 (1153)	0.953 (3)	0.483 (20)	0.153 (3)

TABLE 10: Internally Standardized Regional Mean Difference in WAZ (Male/Female)

	Mother Dead		Father Dead		Both Alive				Both Dead
Children 18-59 Months	**Father not in HH**	**Father in HH**	**Mother not in HH**	**Mother in HH**	**Both in HH**	**Father not in HH**	**Mother not in HH**	**Neither in HH**	
Male									
Southern Africa	-0.099 (46)	3.026 (42)	-0.039 (51)	0.009 (90)	0.062 (8044)	-0.040 (1087)	0.341 (122)	0.093 (677)	0.151 (32)
West Africa	-0.439 (26)	0.412 (33)	-0.679 (43)	0.316 (88)	-0.000 (11125)	-0.10 (640)	0.047 (235)	0.045 (380)	0.611 (9)
Eastern Africa	-0.261 (47)	-0.011 (107)	0.346 (40)	0.030 (129)	-0.104 (13824)	-0.113 (830)	0.057 (204)	0.004 (464)	-0.135 (34)
Female									
Southern Africa	-0.099 (43)	3.026 (26)	-0.039 (53)	0.009 (314)	0.062 (322)	-0.040 (1895)	0.341 (23)	0.093 (609)	0.151 (21)
West Africa	-0.077 (11)	0.774 (2)	-0.142 (40)	0.009 (164)	-0.030 (2847)	-0.007 (1283)	-0.020 (9)	0.134 (213)	-0.378 (7)
Eastern Africa	0.019 (44)	-0.789 (3)	0.187 (47)	-0.108 (751)	-0.076 (478)	-0.196 (2274)	0.364 (23)	0.042 (396)	-0.319 (39)

TABLE 11: Internally Standardized Regional Mean Difference in WAZ (Type of residence)

	Mother Dead		Father Dead		Both Alive				Both Dead
Children 0-17 Months	**Father not in HH**	**Father in HH**	**Mother not in HH**	**Mother in HH**	**Both in HH**	**Father not in HH**	**Mother not in HH**	**Neither in HH**	
Urban									
Southern Africa	0.606 (1)	--	--	-0.084 (31)	0.020 (977)	-0.054 (422)	-0.447 (7)	0.625 (21)	-1.437 (1)
West Africa	--	1.192 (1)	2.430 (1)	0.456 (16)	-0.001 (1565)	-0.062 (447)	1.681 (3)	0.313 (15)	2.875 (1)
Eastern Africa	-0.778 (2)	-0.677 (2)	0.416 (1)	-0.748 (36)	0.038 (1409)	-0.053 (454)	-0.2701 (2)	0.329 (17)	0.836 (3)
Rural									
Southern Africa	-0.332 (7)	0.427 (1)	1.035 (1)	-0.035 (66)	0.015 (3222)	-0.070 (1372)	0.113 (4)	0.676 (55)	2.323 (1)
West Africa	0.722 (1)	-0.990 (1)	0.741 (2)	0.017 (56)	-0.004 (4625)	0.012 (793)	-0.237 (10)	-0.106 (12)	--
Eastern Africa	-0.764 (17)	-0.748 (8)	-0.309 (2)	-0.158 (120)	0.126 (5724)	0.067 (1278)	0.301 (8)	0.804 (29)	-0.499 (4)

TABLE 12: Internally Standardized Regional Mean Difference in WAZ (Type of Residence)

	Mother Dead		Father Dead		Both Alive				Both Dead
Children 18-59 Months	**Father not in HH**	**Father in HH**	**Mother not in HH**	**Mother in HH**	**Both in HH**	**Father not in HH**	**Mother not in HH**	**Neither in HH**	
Urban									
Southern Africa	0.135 (23)	0.185 (14)	0.542 (26)	-0.036 (104)	-0.017 (2014)	0.036 (608)	0.303 (55)	-0.088 (240)	0.355 (18)
West Africa	-0.181 (14)	-0.202 (5)	-0.502 (11)	0.294 (80)	-0.002 (2921)	-0.041 (700)	-0.2022 (70)	0.153 (213)	0.482 (6)
Eastern Africa	-0.094 (18)	0.329 (27)	0.318 (21)	-0.090 (200)	0.023 (2807)	-0.114 (761)	0.361 (59)	-0.024 (218)	-0.438 (15)
Rural									
Southern Africa	-0.070 (66)	0.118 (29)	-0.164 (78)	-0.042 (300)	0.030 (6353)	-0.117 (2375)	0.036 (90)	0.108 (1046)	-0.047 (35)
West Africa	-0.400 (23)	0.575 (30)	-0.150 (20)	0.100 (172)	-0.009 (8305)	-0.001 (1223)	0.136 (174)	0.040 (380)	0.038 (10)
Eastern Africa	-0.021 (73)	-0.079 (83)	0.316 (66)	-0.030 (680)	0.003 (11495)	-0.037 (2343)	0.085 (168)	0.076 (642)	-0.004 (58)

Nutritional status of children in institutions in relation to children in households

Mean z-scores of orphans residing in institutions in Blantyre and Kingston are shown in relation to the mean z-scores of the overall household child population and specifically orphans and non-orphans in the households (Tables 13 and 14).

Blantyre survey

Examination of these results shows that children in institutions, whether orphans or non-orphans, have lower weight for age, height for age, and weight for heights z-scores than do children residing in households. Weight for age and height for age differ the most, on the order of ~0.1 to 0.15 z-scores. This association persists when children in households are stratified into orphan and non-orphan categories, though the nutritional status of orphans in households appears more similar to that of children in institutions than does the nutritional status of non-orphans in households. Overall, these results indicate that children in institutions have lower mean anthropometric z-scores than do children that live in households regardless of their orphan status.

Kingston survey

The results from children in institutions in Kingston are similar to those seen in Blantyre, though the associations appear stronger in Kingston. According to these results, children in institutions are much worse off then children residing in households. This is the case whether weight-for-age, height-for-age, or weight-for-height z-scores are examined. The mean weight-for-age and height-for-age z-scores are 0.5-0.6 z-scores lower than the mean for children living in households. Weight-for-height z-scores are 0.35 z-scores lower. This association persists when children in institutions are compared with orphans and non -orphans in households (though the sample size of orphans is quite small). In summary, these findings in Kingston indicate that there are major discrepancies between the nutritional status of children in institutions and the nutritional status of children in households. In fact, these findings might indicate the need to more closely examine the children in these institutions.

TABLE 13: Mean Z-scores of Orphans in Institutions in Relation to Children (both Orphan and Non Orphan in Households), Blantyre, Malawi.

Child Category	WAZ	Underweight Prevalence	HAZ	Stunting Prevalence	WHZ	Wasting Prevalence
Children in Institutions (Orphans and Non Orphans)						
0-4	-1.10 (98)	25.5 (98)	-1.99 (97)	56.7 (97)	0.12 (97)	2.1 (97)
5-8	-1.35 (47)	31.9 (47)	-1.62 (41)	41.5 (41)	-0.11 (47)	0.0 (47)
Total	-1.17 (145)	27.6 (145)	-1.88 (138)	52.2 (138)	0.05 (144)	1.4 (144)
Household Child Population						
0-4	-1.03 (220)	25.9 (220)	-1.85 (204)	50.5 (204)	0.24 (212)	2.4 (212)
5-8	-1.18 (144)	18.8 (144)	-1.53 (142)	32.4 (142)	-0.20 (145)	2.1 (145)
Total	-1.09 (364)	23.0 (364)	-1.72 (346)	43.1 (346)	0.06 (357)	2.2 (357)
Household						

Orphans						
0-4	-1.19 (15)	26.7 (15)	-1.63 (14)	57.1 (14)	-0.02 (15)	0.0 (15)
5-8	-1.23 (27)	22.2 (27)	-1.65 (27)	33.3 (27)	-0.19 (27)	0.0 (27)
Total	-1.21 (42)	23.8 (42)	-1.64 (41)	41.5 (41)	-0.13 (42)	0.0 (42)
Household Non Orphans						
0-4	-1.02 (203)	26.1 (203)	-1.86 (188)	50.0 (188)	0.26 (195)	2.6 (195)
5-8	-1.17 (117)	18.0 (117)	-1.51 (115)	32.2 (115)	-0.20 (118)	2.5 (118)
Total	-1.07 (320)	23.1 (320)	-1.72 (303)	43.2 (303)	0.08 (313)	2.6 (313)

TABLE 14: Mean Z-scores of Orphans in Institutions in Relation to Children (both Orphan and Non Orphan in Households), Kingston, Jamaica

Child Category	WAZ	Underweight Prevalence	HAZ	Stunting Prevalence	WHZ	Wasting Prevalence
Children in Institutions (Orphans and Non Orphans)						
0-4	-0.65 (56)	16.1 (56)	-0.56 (55)	21.8 (55)	-0.25 (56)	7.1 (56)
5-8	-0.38 (89)	6.7 (89)	-0.26 (89)	9.0 (89)	-0.32 (89)	4.5 (89)
Total	-0.49 (145)	10.3 (145)	-0.38 (144)	13.9 (144)	-0.29 (145)	5.5 (145)
Household Child Population						
0-4	-0.01 (142)	7.8 (142)	0.10 (136)	11.0 (136)	-0.07 (135)	4.4 (135)
5-8	0.20 (115)	5.2 (115)	0.23 (114)	4.4 (114)	-0.06 (110)	9.1 (110)
Total	0.09 (257)	6.6 (257	0.16 (250)	8.0 (250)	-0.06 (245)	6.5 (245)
Household Orphans						
0-4	-0.51 (9)	0.0 (9)	-0.11 (9)	11.1 (9)	-0.56 (9)	0.0 (9)
5-8	0.23 (4)	0.0 (4)	-0.00 (5)	0.0 (5)	0.18 (4)	0.0 (4)
Total	-0.28 (13)	0.0 (13)	-0.07 (14)	7.1 (14)	-0.33 (13)	0.0 (13)
Household Non Orphans						
0-4	-0.03 (131)	8.4 (131)	0.11 (125)	11.2 (125)	-0.03 (124)	4.8 (124)
5-8	0.23 (106)	5.7 (106)	0.25 (104)	4.8 (104)	-0.03 (101)	9.9 (101)
Total	0.12 (237)	7.2 (237)	0.18 (229)	8.3 (229)	-0.03 (225)	7.1 (225)

Indicators measuring the health and nutritional status of orphans

The most common indicators used to measure the health and nutritional status of children are weight for age, height for age, and weight for height z-scores. Using these indicators to measure orphans, however, is problematic for one specific reason. First, anthropometric indicators have only been gathered on a continuous, large scale basis for children under five years of age. However, only 12-15% (See Annex 2) of childhood orphans are in this particular age category. This would exclude ~75% of the orphan population. This causes many of the sample size problems that are seen in any large scale analysis using anthropometric indicators of orphan status.

Anthropometry in children 5-8 years of age

Possible ways of addressing this were examined. First, the possibility of extending the anthropometric measurement of children to up to age 9 (this would capture ~50% of orphans) was examined using the UNICEF surveys. While the CDC has recommended that weight-for-age z-scores be used if anthropometry is gathered on older, prepubescent children, the usefulness of such measures from a monitoring and evaluation and programmatic perspective has not been studied extensively. The UNICEF surveys, by gathering such information on older children, allowed such a question to be examined. The analysis involved simply examining associations between sanitation and SES variables with known associations to underweight (i.e. toilet type, flooring, roofing, etc.) to determine if the associations seen in children below five persist in older children. The results of this analysis are shown in Tables 15-20 below.

Blantyre survey

In the 0-2 and 3-5 age groups, the expected associations are seen in the Blantyre survey when anthropometry is examined in relation to toilet type, electricity, and flooring materials. Low weight-for-age, height-for-age, and weight-for-height z-scores are seen in the groups of children having traditional pit latrines, earth/dung floors, and no electricity. In children 6-8 years of age, these associations do not persist regardless of the anthropometric indicator. In fact, in some cases, the associations switch, meaning that children with better SES and sanitation characteristics have lower z-scores than children in the poorer cohort (as defined by these indicators). With the anthropometric indicators for children 6-8 years of age not showing any association with these variables, when associations have been seen repeatedly with younger children, indicates that these outcomes would not be useful from either a monitoring and evaluation or a programmatic perspective. This coupled with the inability to determine any clear cut differences between orphans and non-orphans in the Table 15-17 or in the pooled analysis of DHS and MICS II surveys may indicate that it may be better to examine another variable when trying to understand differences in health and well being in orphans and non orphans.

TABLE 15: WAZ by Age Category in Blantyre, Malawi.

	Toilet		Electricity		Flooring Materials		Orphan Status			
Age Group	**Flush/ ventilated**	**Traditional pit latrine**	**Yes**	**No**	**Cement/ Ceramic Tiles**	**Earth/Dung**	**Non**	**Maternal**	**Paternal**	**Double**
0-2	-0.012 (108)	-1.26 (20)	-0.67 (50)	-1.32 (78)	-0.79 (94)	-1.82 (34)	-1.08 (121)	--	-1.21 (5)	0.24 (1)
3-5	-0.43 (28)	-1.18 (97)	-0.74 (53)	-1.26 (71)	-0.74 (71)	-1.40 (30)	-0.96 (114)	-1.61 (1)	-1.04 (6)	-1.54 (4)
6-8	-1.32 (24)	-1.20 (86)	-1.33 (46)	-1.16 (64)	-1.22 (26)	-1.23 (84)	-1.22 (85)	-1.33 (6)	-1.23 (15)	-1.20 (4)
Total	-0.61 (72)	-1.22 (291)	-0.90 (149)	-1.25 (213)	-0.96 (273)	-1.51 (90)	-1.07 (320)	-1.37 (7)	-1.18 (26)	-1.19 (9)

TABLE 16: WHZ by Age Category in Blantyre, Malawi.

	Toilet		Electricity		Flooring Materials		Orphan Status			
Age Group	**Flush/ ventilated**	**Traditional pit latrine**	**Yes**	**No**	**Cement/ Ceramic Tiles**	**Earth/Dung**	**Non**	**Maternal**	**Paternal**	**Double**
0-2	0.45 (21)	0.27 (102)	0.47 (51)	0.17 (72)	0.50 (89)	-0.24 (34)	0.28 (116)	--	0.37 (5)	1.05 (1)
3-5	0.28 (27)	-0.02 (95)	0.0004 (51)	0.03 (70)	0.04 (93)	0.05 (29)	0.10 (111)	0.81 (1)	-0.56 (6)	-0.20 (4)
6-8	-0.35 (24)	-0.16 (87)	-0.25 (47)	-0.17 (64)	-0.26 (85)	-0.007 (26)	-0.20 (86)	-0.26 (6)	-0.11 (15)	-0.40 (4)
Total	0.12 (72)	0.04 (284)	0.08 (149)	0.02 (206)	0.10 (267)	-0.08 (89)	0.08 (313)	-0.10 (7)	-0.12 (26)	-0.15 (9)

TABLE 17: HAZ by Age Category in Blantyre, Malawi

	Toilet		Electricity		Flooring Materials		Orphan Status			
Age Group	**Flush/ ventilated**	**Traditional pit latrine**	**Yes**	**No**	**Cement/ Ceramic Tiles**	**Earth/Dung**	**Non**	**Maternal**	**Paternal**	**Double**
0-2	-0.65 (19)	-2.12 (98)	-1.40 (46)	-2.20 (71)	-1.62 (84)	-2.56 (33)	-1.85 (110)	--	-2.53 (5)	-0.95 (1)
3-5	-1.16 (27)	-1.86 (93)	-1.29 (51)	-2.04 (68)	-1.45 (91)	-2.49 (29)	-1.74 (110)	-3.84 (1)	-0.83 (6)	-1.17 (3)
6-8	-1.54 (23)	-1.57 (85)	-1.68 (45)	-1.49 (63)	-1.49 (82)	-1.80 (26)	-1.54 (83)	-1.78 (6)	-1.72 (15)	-1.25 (4)
Total	-1.15 (69)	-1.87 (276)	-1.45 (142)	-1.92 (202)	-1.52 (257)	-2.31 (88)	-1.72 (303)	-2.07 (7)	-1.67 (26)	-1.18 (8)

Kingston survey

While the patterns seen for children under five in the Blantyre results are not as clearly seen in the Kingston results (Tables 18-20), it is important to point out that Jamaica is now beginning to experience an increase in the problem of obesity. This illustrates another potentially important problem with the use of anthropometry as "the" international indicator in measuring differences in orphans and non-orphans. While a nutritional indicator such as weight for age z-scores *might* be effective in a developing country context, it is clearly less effective in an emerging country context. This would not allow comparisons to be drawn between the situations of orphans in Africa to the situation of orphans in emerging countries in Latin America.

TABLE 18: WAZ by Age Category in Kingston, Jamaica.

	Toilet		Electricity	
Age Group	**Flush/ ventilated**	**Traditional pit latrine**	**Yes**	**No**
0-2	0.11 (48)	-0.12 (8)	0.06 (74)	-1.28 (2)
3-5	0.10 (63)	0.06 (10)	0.04 (95)	0.14 (2)
6-8	0.14 (46)	0.30 (13)	0.21 (77)	0.67 (2)
Total	0.11 (157)	0.11 (31)	0.10 (246)	-0.16 (6)

TABLE 19: WHZ by Age Category in Kingston, Jamaica.

	Toilet		Electricity	
Age Group	**Flush/ ventilated**	**Traditional pit latrine**	**Yes**	**No**
0-2	-0.07 (45)	0.69 (6)	0.03 (71)	--
3-5	-0.13 (60)	-0.10 (10)	-0.07 (93)	-0.69 (2)
6-8	-0.27 (43)	0.15 (11)	-0.13 (72)	0.08 (2)
Total	-0.15 (148)	0.18 (27)	-0.06 (236)	-0.31 (4)

TABLE 20: HAZ by Age Category in Kingston, Jamaica.

	Toilet		Electricity	
Age Group	**Flush/ ventilated**	**Traditional pit latrine**	**Yes**	**No**
0-2	0.25 (44)	-0.43 (7)	0.06 (73)	--
3-5	0.21 (59)	0.28 (10)	0.19 (92)	1.16 (2)
6-8	0.19 (45)	0.11 (12)	0.21 (76)	0.75 (2)
Total	0.21 (148)	0.03 (29)	0.16 (241)	0.96 (4)

The Use of School Enrollment Indicator

The possibility of using another variable such as a more comprehensive "wellness" indicator was examined briefly in Table 21 below. This use of current school enrollment status may provide a more powerful (measures a larger percentage of orphans), more comprehensive, and more comparable measure of health and well-being. The results of school enrollment status by orphan category are shown in Table 21.

TABLE 21: Percent of Children Currently Enrolled School in Kenya by Age Group and Orphan Status

	Non orphan	Maternal Orphan	Paternal Orphan	Double Orphan
4-8 years	79	69	80	82
9-12 years	90	86	86	90
13-17 years	85	75	81	77
Total	84	78	83	84

There are going to be problems with using any indicator, however. The problem with using school enrollment status, in particular, is that many children below 5 years of age are not enrolled in school simply because they are too young.

Validation of food security instrument

Food security is a potentially important variable in the measurement of orphans and non-orphans. The difficulty that arises in the measurement of food security is determining exactly what defines food security and what variables can be used to measure it. The UNICEF studies in Blantyre and Kingston also included as a pilot study, a specific type of food security questionnaire that measures perceptions of food security and hunger. This module was included in the surveys to determine if it would be an appropriate survey tool to use on future large scale studies aimed at understanding the differences between orphans and non-orphans. Determining the usefulness this module (as discussed in the methodology) required testing both the internal and external validity of the survey.

Internal validity of the food security instrument

The first step, conducting a series of t-tests, aimed at determining whether a household that answered yes to any particular question was more likely to have answered yes to a larger number of the questions. Results are shown in Annex 5.

These findings indicate that the items in the questionnaire were answered consistently. Answering questions consistently in this context means that respondents answering no to most of the questions early in the scale were unlikely to answer yes to questions at the end of the scale. An item would have to be removed from the scale if the total number of yes answers (the outcome variable) in a household that answered "Yes" to (i.e.) question 2 exceeded by less than 1.0 the total number of yes answers from a household that answered "No" to question 2. As these Tables indicate, this was not the case with any of the items examined in either country, regardless of which scale was examined.

While the summary analysis above provides evidence of the internally validity of this questionnaire, a more sophisticated analysis was necessary. Consequently, Cronbach alpha reliability estimates were calculated. These results are shown in Annex 4b.The total alphas from the Cronbach reliability estimations provide further indication that these sets of scales are reliable and internally valid. A total Cronbach's alpha for any scale in either country below 0.70 indicates that the scale has to be reconfigured, taking out the problematic items and adding more reliable items. The total alpha for each scale was 0.80 or above, indicating that each scale is reliable and that no items need to be removed from the scale (Annex 5b). The "alpha if item removed from scale" column provides the total

alpha for the scale if that particular item were removed from the scale. This provides an indication of which questions are the weak links in the scales. An examination of scale 4, for either country, indicates that the first three questions are the weakest links in the scale; however, due to the size of the total alpha, none of them should be removed from the scale. In conclusion, the t-tests and Cronbach alphas analysis determined that the instrument was valid.

Household food security

Associations between the food security instrument and poverty, nutrition, and orphan hood indicators

The usefulness of this survey was examined using comparison of means tests examining the relationship between food insecurity, defined by this module, and sanitation, SES, anthropometric, and vulnerability variables within both UNICEF surveys in Blantyre and Kingston. This descriptive analysis was meant to be a simple check to determine if this questionnaire was capable of measuring changes in health and wealth indicators. The results of this comparative analysis for both surveys are shown in Tables 22-28.

TABLE 22: Household Food Security in relation Mean Height for Age, Weight for Age, and Weight for Height Z-scores, Blantyre, Malawi.

Food Security Category	WAZ	Underweight Prevalence	HAZ	Stunting Prevalence	WHZ	Wasting Prevalence
Food Secure	-0.93 (148)	21.0 (148)	-1.40 (140)	35.0 (140)	0.03 (145)	2.8 (145)
Food Insecure without Hunger	-1.13 (110)	23.6 (110)	-1.80 (107)	45.8 (107)	-0.06 (108)	2.8 (108)
Food Insecure with Adult Hunger	-1.21 (33)	27.3 (33)	-2.13 (32)	56.3 (32)	0.15 (32)	3.1 (32)
Food Insecure with Child Hunger	-1.29 (64)	23.4 (64)	-2.09 (58)	51.7 (58)	0.34 (63)	0.0 (63)
Total	-1.08 (355)	22.8 (355)	-1.72 (337)	43.3 (337)	0.07 (348)	2.3 (348)

TABLE 23: Household Food Security in relation Mean Height for Age, Weight for Age, and Weight for Height Z-scores, Kingston, Jamaica.

Food Security Category	WAZ	Underweight Prevalence	HAZ	Stunting Prevalence	WHZ	Wasting Prevalence
Food Secure	0.12 (119)	5.0 (119)	0.23 (118)	5.9 (118)	0.04 (114)	7.0 (114)
Food Insecure without Hunger	-0.25 (67)	9.0 (67)	-0.03 (67)	11.9 (67)	-0.21 (65)	4.6 (65)
Food Insecure with Adult Hunger	-0.21 (27)	11.1 (27)	0.23 (27)	11.1 (27)	-0.46 (27)	14.8 (27)
Food Insecure with Child Hunger	0.37 (36)	5.6 (36)	-0.01 (32)	6.3 (32)	0.11 (31)	0.0 (31)
Total	0.02 (249)	6.8 (249)	0.13 (244)	8.2 (244)	-0.07 (237)	6.3 (237)

Blantyre and Kingston survey

Anthropometry

As Table 22 indicates, there does appear to be an association between food security status and weight–for-age and height-for-age z-scores in Blantyre. Children within households that are classified as being food insecure and having child hunger have on average a mean WAZ 0.36 lower than the mean WAZ for children in households considered food secure. Likewise, the mean HAZ differs between these two groups of children by 0.69, with the HAZ in children within households labeled food insecure with child hunger being lower than children in food secure households.

The expected associations though are not seen when weight-for-height z-scores are examined in relation to the food security indicators or if the prevalence of any of the anthropometric indicators, underweight, stunting, or wasting is examined as opposed to the z-scores. The fact that the prevalence variables do not show an association might be due to one of two factors: (1) variation that resulted from having to devise z-scores without having proper birth dates (but rather age in years), (2) high standard deviations due to small sample sizes within each of the food security categories. The lack of an association with WHZ is also not surprising due to the fact that wasting is not a very big problem in Blantyre. While these findings are contrary to the findings above, the strength of the associations seen above provide good evidence that the food security questionnaire is associated with WAZ and HAZ.

The anthropometric data from Kingston, unlike the anthropometric data from Blantyre (Table 23), does not show any association with food security as is measured by this module. This is not entirely unexpected in Kingston, given the fact that there is so little underweight, stunting and wasting.

Orphan status

Tables 24 and 26 indicate there is an association between food security as defined by this module and orphan status in Blantyre. Most telling, as Table 24 indicates, a much larger percentage of orphans, of any type, live in households that are classified as food insecure with child hunger. This table indicates that 39.3% and 28.6% of paternal and double orphans respectively, live in households that are classified as food insecure with child hunger as compared to only 14.9% of non-orphans. Additionally, as Table 26 indicates, 49.1% of all households with more than one orphan are classified according to this food security measurement as food insecure with child hunger compared with only 15.2% of non-orphan households. Finally, Table 27 provides further evidence of this association, indicating that food insecure households are more likely to contain orphans. In this case, 37.9% of households classified as food insecure with child hunger have an orphan whereas only 17.1 of food secure households have an orphan.

The food security results in Kingston are slightly associated with orphan status; however, the association is not as strong as the one seen in Malawi. It does appear, from Table 25,

that paternal orphans the most strongly associated with poor food security status with 16.1% of paternal orphans living in households classified as food insecure with child hunger as opposed to 11% of non orphans living in households with this classification.

TABLE 24: Orphan Status Examined in Relation to Food Security Status, Blantyre, Malawi.

Orphan Status	% Food Insecure with/without Hunger	% Food Insecure with Adult and Child Hunger	% Food Insecure with Child Hunger
Non Orphan	54.4	26.4	14.9
Maternal Orphan	63.3	20.0	20.0
Paternal Orphan	68.5	46.0	39.3
Double Orphan	61.9	42.9	28.6

TABLE 25: Orphan Status Examined in Relation to Food Security Status, Kingston, Jamaica.

Orphan Status	% Food Insecure with/without Hunger	% Food Insecure with Adult and Child Hunger	% Food Insecure with Child Hunger
Non Orphan	46.9	22.4	11.5
Maternal Orphan	53.8	7.7	7.7
Paternal Orphan	51.4	29.7	16.2
Double Orphan	50.0	0.0	0.0

TABLE 26: Orphan Status Examined in Relation to Food Security Status, Blantyre, Malawi.

Orphan Status	% Food Insecure with/without Hunger	% Food Insecure with Adult and/or Child Hunger	% Food Insecure with Child Hunger
No Orphan in HH	54.1 (183)	25.1 (183)	13.1 (183)
Maternal Orphan in HH	53.3 (15)	0.0 (15)	0.0 (15)
Paternal Orphan in HH	38.9 (18)	16.7 (18)	5.6 (18)
Double Orphan in HH	37.5 (16)	12.5 (16)	6.3 (16)
More than one orphan in HH	78.0 (41)	48.8 (41)	39.0 (41)

Sanitation and socioeconomic variables

Table 27 indicates that there are strong associations between food insecurity and sanitation and SES variables in Blantyre. Households defined as poorer by these sanitation and SES variables are more likely to be food insecure. In fact, 93.7 and 82.6% of households classified as food insecure with child hunger do not have flush/ventilated toilets or electricity respectively compared with 63.1 and 39.1% of households that are classified as food secure.

In Kingston, as Table 28 indicates, there were also strong associations between food insecurity and sanitation and SES variables. A much larger percentage (30%) of households classified as being food insecure with child hunger had traditional pit latrines as opposed to flush or ventilated toilets, whereas only 7% of food secure households had traditional pit latrines. Likewise, 4.8% of households classified as food insecure with child hunger did not have electricity compared with just 0.05% of households that are classified as food secure being without electricity. However, this variable of SES was problematic in this setting as the overwhelming majority of households included in this

survey had electricity, and there wasn't enough variation. This brings up the point that it is necessary to use different variables of SES for countries like Jamaica that are in transition. This is particularly true for an urban area. Future research should incorporate the use of different indicators to measure SES.

TABLE 27: Household Food Security Status in relation to Sanitation, SES, and Vulnerability Indicators, Blantyre, Malawi.

Food Security Category	% with Traditional Pit Latrines	% without Electricity	% with Orphans in Household
Food Secure	63.1 (325)	39.1 (325)	17.1 (321)
Food Insecure without Hunger	87.8 (205)	58.5 (205)	20.1 (204)
Food Insecure with Adult Hunger	80.3 (81)	56.8 (81)	15.2 (79)
Food Insecure with Child Hunger	93.7 (142)	82.6 (138)	37.9 (140)

TABLE 28: Household Food Security Status in relation to Sanitation, SES, and Vulnerability Indicators, Kingston, Jamaica.

Food Security Category	% with Traditional Pit Latrines	% without Electricity	% with Orphans in Household
Food Secure	7.0 (271)	0.5 (387)	6.6 (377)
Food Insecure without Hunger	16.8 (113)	2.8 (177)	8.4 (178)
Food Insecure with Adult Hunger	17.5 (57)	0.0 (80)	6.5 (77)
Food Insecure with Child Hunger	30.0 (80)	4.8 (83)	8.4 (83)

In conclusion, these food security indicators appear to be sensitive to changes in sanitation, SES, anthropometric, and orphan status variables, with all associations being in the expected direction. This is an indication that this questionnaire is able to measure certain aspects of poverty. If these associations were not seen, then there would be concern that this questionnaire was not able to accurately sensitive to changes in health and wealth status.

Association between the food security questions in the C-SAFE/WFP and UNICEF surveys

In addition, results from similar food security questions from two Community Health Surveys conducted by C-SAFE/WFP in Malawi were examined for comparison purposes, to determine if both sets of questions were showing similar trends. While the questions in the C-SAFE/WFP and UNICEF surveys differed in terms of the exact wording (C-SAFE/WFP asked about the actions of household members whereas UNICEF asked about the actions of the respondent directly), it was decided to compare the responses since the same actions/coping strategies were under investigation. The results of this comparison are shown in Tables 29-31.

Table 29: C-SAFE/WFP Data: Food Security vs Vulnerability Categories

Coping Strategy	Malawi CHS 1		Malawi CHS 2		Blantyre Survey (UNICEF)	
	Households with an Orphan		Households with an Orphan		Households with an Orphan	
	Yes	No	Yes	No	Yes	No

Reduce the number of meals per day						
Yes	71.8% (165)	73.9% (301)	80.5% (289)	81.3% (353)	61.3% (103)	44.3% (262)
No	28.3% (65)	26.0% (106)	19.5% (70)	18.7% (81)	38.7% (65)	55.5% (328)
Skip Entire Days Without Eating						
Yes	31.9% (73)	32.2% (130)	32.3% (116)	40.3% (178)	54.5% (61)	46.1% (149)
No	68.1% (156)	67.8% (378)	67.7% (243)	59.7% (259)	45.5% (52)	53.9% (174)
Restrict Consumption by Adults						
Yes	38.1% (85)	34.4% (121)	56.3% (202)	45.2% (196)	66.1% (111)	46.7% (276)
No	61.7% (137)	65.6% (231)	43.7% (157)	54.8% (238)	33.9% (57)	53.1% (314)

In the Blantyre, UNICEF survey, responses to skipping/restricting meal questions did differ between orphans and non-orphan households. As Table # indicates, similar questions asked by C-SAFE/WFP did not illicit the same differences in orphan and non orphan households. The reason for this difference is unclear, though it may be related to the different wording and formats of the questionnaires or to differences in the populations surveyed, as neither survey was nationally representative. In any case, this quick comparison is not showing similar trends within these two surveys.

Vulnerability in relation to food security status

The focus of this study to this point has been to understand the differences in the relationship between orphans and non-orphans, however, non orphaned children in households also remain vulnerable to food insecurity and malnutrition due to high levels of HIV and other infectious diseases throughout much of Africa. Mindful of this, this study also cursorily examined "vulnerable" children. For purposes of this analysis, vulnerable children were defined as children living in households that contain at least one chronically ill individual. In this analysis, the prevalence of food insecurity was examined in households that contained vulnerable children and household that did not. Two rounds of Community Health Surveys in Malawi, Zimbabwe and Zambia conducted by C-SAFE/WFP and the two UNICEF surveys in Blantyre and Kingston were used in this analysis. The results of this analysis are shown in Tables 30 and 31. Food security and oprhan status was also examined using the C-SAFE/WFP data. These results are shown in Annexes 6 and 6b.

TABLE 30: Food Security/Hunger Indicators in Relation to 2 Categories of Vulnerable Children, UNICEF Blantyre, Malawi Survey.

Coping Strategy	Blantyre Survey (UNICEF)		Blantyre Survey (UNICEF)	
	Households with Chronically Ill		Households with an Orphan	
	Yes	No	Yes	No
Reduce the number of meals per day				
Yes	50% (8)	17.6% (6)	61.3% (103)	44.3% (262)
No	50% (8)	82.4% (28)	38.7% (65)	55.5% (328)
Skip Entire Days Without Eating				
Yes	81.3% (13)	51.7% (30)	54.5% (61)	46.0% (149)
No	18.8% (3)	48.3% (28)	45.5% (52)	54% (174)
Restrict Consumption by Adults				
Yes	100% (16)	50% (29)	66.1% (111)	46.7% (276)
No	0% (0)	50% (29)	33.9% (57)	53.1% (314)

TABLE 31: Prevalence of Household Member Skipping Entire Days without Eating Examined in Relation to Presence of Chronically Ill Individual in a Household.

	CHS 1		CHS 2	
	Chronically ill		Chronically ill	
	With	Without	With	Without
Malawi	53.9 (61)	27.3 (142)	34.0 (66)	37.5 (225)
Zambia	65.5 (93)	53.3 (403)	53.9 (162)	54.1 (318)
Zimbabwe	37.3 (76)	27.7 (180)	15.6 (33)	14.8 (95)

Comparison of C-SAFE/WFP and UNICEF data regarding food security/hunger indicators provided one very useful finding. The food security/hunger indicators in both the UNICEF and the C-SAFE/WFP surveys showed a relationship between household food insecurity and households with chronically ill individuals, at least in round 1 of the CHS surveys. UNICEF data also showed a relationship between household food insecurity and orphan-hood. C-SAFE/WFP data did not show a similar relationship.

Conclusions and recommendations

This report covered many areas relating to the nutritional and food security status of orphans and vulnerable children in sub-Saharan Africa. The main findings of this report include:

- The proportion of projected orphans is similar to the proportion that were surveyed in the DHS and MICS surveys.
- Expected age distribution of orphans is similar to the age distribution observed from the surveys.
- Orphan children were not worse off in terms of anthropometry than other children, after adjusting for age differences, and taking into account the

presence of surviving parents in the household. This relationship held after stratifying for place of residence and sex of the head of household.

- Children whose parents were alive, but neither in the household (children being fostered) were consistently better-off in terms of anthropometry than other children.
- Children in institutions in Blantyre and Kingston were worse-off nutritionally than children residing in households. This difference is most convincing in Kingston.
- Anthropometric indicators for children 6-8 years of age did not associate with SES and sanitation variables as they do for children under the age of 5.
- The food security instrument was found to be internally valid, using Cronbach alpha reliability testing, and responses from the questionnaire also appeared to correlate well (i.e. be sensitive to) poverty indicators.
- There were clear associations between underweight and stunting in children and food security status of households in Blantyre.
- A much larger percentage of orphans live in households that are classified as food insecure with child hunger.
- 40% of households with more than one orphan were classified as food insecure with child hunger
- Households with chronically sick members were also found to be more food insecure

Based on these results, the following recommendations are made on how to conduct future monitoring and surveillance of vulnerable children:

- For surveillance, WAZ does not appear to be the most appropriate variable to monitor changes in the nutritional and food security status of orphans. Instead, this analysis indicated that food security indicators might be more appropriate. Further research should focus on the use of food security indicators to capture differences.
- For further analysis, it would be useful to examine the nutritional status of children who live in households with more than one orphan, as these were the households that were found to be most food insecure.
- Households with more than one orphan should be targeted for intervention.
- In the limited sample analyzed, anthropometry for children over the age of 5 was not useful, and may not be useful for programmatic and monitoring purposes.
- Look beyond the household structure for vulnerable children, i.e. street children and children in institutions.
- The Jamaica example illustrated the need to use country-specific indicators for SES.
- The food security instrument tested in Blantyre and Kingston appears to be useful and should be applied in other settings.
- More research needs to be conducted in defining the categories of children who are vulnerable, orphan versus non-orphan don't capture the variability in which children can be affected by HIV/AIDS. Looking at children who live in

households with a chronically ill member and children who live in households hosting orphans is a start and should be explored further.

Annex 1: Food Security Questionnaire Used in UNICEF surveys in Blantyre, Malawi and Kingston, Jamaica

1. In the last 30 days did you ever cut the size of your meals or skip meals because there was not enough food or money to buy food?	Yes-- 1 No-- 2 Don't know-- 8
2. In the last 30 days did you ever eat less than you felt you should because there was not enough food or money to buy food?	Yes-- 1 No-- 2 Don't know-- 8
3. In the last 30 days were you very hungry but did not eat because there was not enough food or money to buy food?	Yes-- 1 No-- 2 Don't know-- 8
Check 1, 2, and 3. If at least one "yes" response go to 4.	
4. In the last 30 days did you ever not eat for the whole day because there was not enough food or money to buy food?	Yes-- 1 No-- 2 Don't know-- 8
If at least one child age 0-17 living in the household go to 5.	
5. In the last 30 days did you ever cut the size of your child(ren)'s meals because there was not enough food or money to buy food?	Yes-- 1 No-- 2 Don't know-- 8
6. In the last 30 days did the child(ren) living in your household ever skip meals because there was not enough food or money to buy food?	Yes-- 1 No-- 2 Don't know-- 8
7. In the last 30 days was/were the child(ren) living in your household ever hungry but there was not enough food or money to buy food?	Yes-- 1 No-- 2 Don't know-- 8
8. In the last 30 days did the child(ren) living in your household ever not eat for a whole day because there was not enough food or money to buy food?	Yes-- 1 No-- 2 Don't know-- 8

Annex 1b: Methodology for Classifying Households without Children according to their Food Security Status

Asked to all households	No children in household	No children in household	No children in household
1. 2. 3.	All negative answers	At least 1 affirmative response	At least 1 affirmative response
4.	Not asked	No	Yes
(Only for households with children)			
5.	Not asked	Not asked	Not asked
6.	Not asked	Not asked	Not asked
7.	Not asked	Not asked	Not asked
8.	Not asked	Not asked	Not asked
Food Security Status	Food secure	Food insecure without hunger	Food Insecure with adult hunger

Annex 1c: Methodology for Classifying Households with Children according to their Food Security Status

Asked to all households	Children in household	Children in household	Children in household	Children in households
1. 2. 3.	No affirmative responses	No affirmative responses	No affirmative responses	At least 1 affirmative response
4.	Not asked	Not asked	Not asked	Yes
(Only for households with children)				
5.	No affirmative responses	No affirmative responses	At least 1 affirmative response	At least 1 affirmative response
6.				
7.				
8.	No	Yes	No	Yes
Food Security Status	Food secure	Food Insecure with child hunger	Food Insecure without hunger	Food secure with adult and child hunger

Annex 2: Age (in months) of Children Examined in Relation to Orphan Status (Source: DHS and MICS Surveys)

Country	Non Orphan	Maternal Orphan	Paternal Orphan	Double Orphan
Angola	27.68 (5336)	31.84 (38)	33.49 (234)	44.25 (16)
Benin	28.88 (5145)	37.36 (25)	35.80 (83)	42.00 (2)
Burundi	27.33 (3024)	37.90 (50)	35.41 (201)	40.91 (11)
CAR	26.73 (13636)	35.27 (91)	32.15 (452)	38.84 (44)
Chad	28.66 (5231)	38.77 (30)	35.38 (121)	41.00 (2)
Comoros	29.30 (4368)	30.07 (14)	35.17 (84)	38.26 (27)
Ethiopia	29.31 (9872)	39.60 (119)	36.13 (270)	40.81 (21)
Equatorial Guinea	27.27 (2697)	31.53 (19)	29.21 (121)	36.10 (21)
Gambia	26.46 (3360)	29.46 (13)	30.36 (67)	35.78 (9)
Ghana	29.19 (3809)	40.73 (22)	35.06 (72)	52.00 (1)
Guinea Bissau	27.97 (5657)	35.57 (23)	32.34 (125)	26.38 (24)
Kenya	28.26 (5442)	38.59 (41)	34.67 (199)	41.70 (29)
Lesotho	27.99 (3368)	40.77 (22)	31.39 (266)	40.61 (18)
Malawi	27.26 (10698)	40.29 (73)	35.09 (299)	44.72 (32)
Mali	28.04 (11894)	40.23 (44)	33.33 (203)	39.00 (15)
Namibia	28.85 (4087)	39.79 (34)	35.23 (131)	42.11 (9)
Niger	28.48 (4940)	40.34 (29)	38.63 (52)	33.0 (2)
Nigeria	27.54 (5524)	39.23 (30)	33.54 (82)	43.38 (8)
Rwanda MICS	26.89 (2792)	37.30 (30)	34.90 (277)	44.59 (22)
Rwanda DHS	27.76 (6518)	37.56 (98)	37.23 (586)	40.09 (54)
Senegal	28.72 (8713)	37.14 (44)	36.66 (152)	43.00 (13)
Sierra Leon	28.46 (2430)	30.00 (19)	31.02 (121)	34.38 (26)
Sudan-North	27.93 (22636)	36.19 (74)	32.23 (301)	35.00 (9)
Sudan-South	26.57 (1201)	34.38 (8)	27.88 (130)	38.58 (12)
Swaziland	28.93 (3070)	37.2 (20)	30.58 (160)	35.55 (22)
Tanzania	28.26 (3043)	35.56 (18)	38.43 (49)	49.50 (4)
Uganda	28.20 (6798)	40.45 (55)	38.86 (208)	43.93 (28)
Zambia-MICS	28.29 (5730)	34.12 (43)	33.27 (231)	36.44 (18)
Zambia-DHS	28.28 (6293)	38.70 (66)	36.13 (248)	44.70 (23)
Zimbabwe	29.17 (3571)	34.78 (36)	34.21 (169)	45.50 (18)
Total	**28.1 (180883)**	**37.4 (1228)**	**34.2 (5694)**	**39.9 (540)**

Annex 2b: Age Adjusted Mean WAZ, WHZ, HAZ by Types of Orphans and Non Orphans

MICS II Surveys: Children 0-17 months of Age

Country	WAZ				WHZ				HAZ			
	Non orphan	Maternal Orphan	Paternal Orphan	Double Orphan	Non orphan	Maternal Orphan	Paternal Orphan	Double Orphan	Non Orphan	Maternal Orphan	Paternal Orphan	Double Orphan
Angola	-1.07 (1632)	-0.75 (10)	-1.20 (42)	--	-0.33 (1569)	-0.01 (9)	-0.21 (42)	--	-1.14 (1531)	-1.14 (11)	-1.71 (39)	--
Burundi	-1.62 (579)	-1.43 (2)	-0.86 (18)	-4.12 (1)	-0.62 (586)	-1.84 (2)	-0.53 (20)	-1.50 (1)	-1.67 (556)	-0.23 (2)	-1.17 (19)	-4.06 (1)
CAR	-0.61 (4463)	-0.73 (16)	-0.54 (102)	-1.25 (4)	0.037 (4258)	-0.37 (16)	0.067 (93)	-1.28 (3)	-0.89 (4147)	-1.23 (16)	-1.04 (95)	-1.04 (3)
Chad	-0.69 (1568)	-2.00 (2)	-0.85 (22)	--	-0.72 (1581)	-0.83 (2)	-0.99 (22)	--	-0.31 (1559)	-2.04 (2)	-0.33 (23)	--
Comoros	-0.65 (1155)	0.40 (3)	-0.43 (11)	0.80 (4)	0.34 (869)	0.83 (2)	-0.075 (9)	0.54 (3)	-1.13 (798)	-2.05 (3)	-0.55 (9)	-1.19 (2)
Equatorial Guinea	-0.43 (734)	-1.47 (2)	-0.73 (30)	-0.99 (2)	-0.064 (644)	-0.28 (3)	-0.48 (27)	-0.68 (2)	-0.73 (668)	-1.50 (2)	-0.075 (28)	-1.01 (2)
Gambia	-0.55 (861)	-0.85 (3)	-0.73 (12)	-0.99 (2)	-0.45 (893)	-0.56 (3)	-0.38 (14)	-1.33 (2)	-0.41 (820)	-0.57 (3)	-0.47 (11)	-0.44 (3)
Guinea Bissau	-0.78 (1800)	-1.80 (4)	-0.93 (24)	-0.45 (8)	-0.32 (1751)	-2.52 (4)	-0.63 (24)	-0.057 (7)	-0.76 (1709)	-2.21 (4)	-0.87 (22)	-0.45 (8)
Lesotho	-0.42 (976)	-2.72 (1)	-0.70 (60)	--	0.58 (774)	-1.63 (2)	0.45 (48)	--	-1.20 (767)	-0.26 (1)	-1.09 (47)	--
Niger	-1.01 (1467)	-1.53 (4)	-0.65 (5)	--	-0.88 (1468)	-1.37 (4)	-1.05 (5)	-3.13 (1)	-0.55 (1443)	-0.78 (4)	0.16 (5)	-1.25 (1)
Rwanda	-0.92 (953)	-0.099 (4)	-1.11 (46)	--	-0.10 (926)	-0.084 (4)	-0.26 (47)	--	-1.18 (930)	0.14 (4)	-1.28 (40)	--
Senegal	-0.69 (2650)	-0.84 (7)	-0.48 (28)	--	-0.44 (2632)	0.016 (7)	-0.62 (28)	--	-0.57 (2593)	-0.62 (6)	-0.043 (29)	--
Sierra Leone	-0.91 (614)	2.43 (1)	-0.59 (29)	2.09 (2)	-0.62 (603)	-1.22 (1)	-0.98 (28)	0.24 (2)	-0.47 (558)	--	0.64 (26)	0.13 (1)
Sudan-	-1.08	-1.85	-0.99	-2.52	-0.56	-1.32	-0.80	-2.18	-0.79	-1.42	-0.74	-1.72

North	(5966)	(7)	(65)	(1)	(5895)	(5)	(67)	(1)	(5590)	(5)	(63)	(1)
Sudan-South	-1.06 (325)	-0.47 (1)	-0.73 (28)	--	-0.55 (249)	0.097 (1)	-0.48 (21)	--	-0.87 (224)	-1.94 (1)	-066 (17)	--
Swaziland	-0.11 (906)	-1.81 (2)	-0.20 (37)	-1.37 (2)	0.80 (865)	-0.70 (2)	0.61 (38)	0.92 (3)	-1.08 (872)	-2.12 (2)	-1.07 (34)	-1.28 (3)
Zambia	-1.24 (782)	-0.82 (4)	-1.40 (26)	-0.83 (1)	-0.10 (789)	0.31 (4)	0.46 (26)	1.92 (1)	-1.50 (729)	-0.59 (3)	-2.16 (23)	-3.32 (1)

DHS Surveys: Children 0-17 Months of Age

Country	**WAZ**				**WHZ**				**HAZ**			
	Non orphan	**Maternal Orphan**	**Paternal Orphan**	**Double Orphan**	**Non orphan**	**Maternal Orphan**	**Paternal Orphan**	**Double Orphan**	**Non Orphan**	**Maternal Orphan**	**Paternal Orphan**	**Double Orphan**
Benin	-0.88 (1439)	-2.48 (1)	-1.15 (12)	--	-0.58 (1491)	-1.99 (2)	-0.62 (13)	--	-0.65 (1428)	-2.86 (1)	-0.93 (11)	--
Ethiopia	-1.21 (2575)	-2.04 (8)	-1.21 (34)	--	-0.67 (2659)	-1.00 (9)	-0.62 (34)	--	-1.01 (2539)	-1.72 (8)	-1.08 (34)	--
Ghana	-0.90 (1026)	--	-1.14 (10)	--	-0.56 (1034)	-1.46 (1)	-1.04 (10)	--	-0.70 (1022)	--	-0.50 (10)	--
Kenya	-0.50 (1553)	-0.08 (5)	-0.56 (30)	0.17 (2)	-0.04 (1563)	-0.62 (6)	-0.31 (31)	-0.75 (3)	-0.68 (1526)	0.99 (5)	-0.42 (30)	0.66 (2)
Malawi	-0.83 (3136)	-1.31 (2)	-0.75 (42)	1.39 (1)	-0.13 (3150)	-1.54 (2)	-0.19 (44)	-0.89 (1)	-0.99 (3033)	-0.25 (2)	-0.80 (39)	4.04 (1)
Mali	-1.01 (3470)	-0.86 (2)	-0.70 (43)	2.42 (1)	-0.67 (3552)	-1.27 (3)	-0.45 (43)	0.57 (1)	-0.80 (3425)	-0.72 (2)	-0.39 (41)	3.78 (1)
Namibia	-0.72 (1150)	-1.74 (3)	-0.84 (16)	--	-0.39 (1156)	-0.75 (3)	-0.21 (16)	--	-0.58 (1138)	-1.72 (3)	-0.97 (16)	--
Nigeria	-0.94 (1535)	--	-0.47 (10)	--	-0.42 (1573)	-0.40 (1)	-0.76 (11)	--	-0.83 (1466)	--	-0.32 (9)	--
Rwanda	-0.80 (2127)	-1.78 (52)	-1.29 (69)	-0.82 (5)	-0.21 (2150)	-0.73 (13)	-0.65 (72)	0.70 (8)	-0.91 (2099)	-1.62 (11)	-1.29 (67)	-2.19 (5)
Tanzania	-0.94 (869)	-2.87 (3)	-1.67 (7)	--	-0.18 (881)	-1.63 (3)	-0.48 (7)	--	-1.13 (864)	-2.41 (3)	-0.75 (5)	--

Uganda	-0.86 (1797)	-2.11 (2)	-1.20 (19)	--	-0.14 (1812)	-1.82 (3)	-0.17 (19)	--	-1.08 (1765)	-1.20 (2)	-1.56 (19)	--
Zambia	-0.95 (1794)	-0.47 (4)	-1.02 (40)	-2.21 (1)	-0.13 (1819)	-0.54 (4)	-0.45 (40)	0.25 (1)	-1.22 (1756)	-0.16 (4)	-0.93 (39)	--
Zimbabwe	-0.35 (826)	--	-0.91 (25)	--	-0.62 (807)	--	-1.19 (25)	--	0.06 (826)	--	-0.17 (25)	-1.77 (1)

MICS II Surveys: Children 18-59 Months of Age (Source: MICS II)

Country	**WAZ**				**WHZ**				**HAZ**			
	Non orphan	**Maternal Orphan**	**Paternal Orphan**	**Double Orphan**	**Non orphan**	**Maternal Orphan**	**Paternal Orphan**	**Double Orphan**	**Non Orphan**	**Maternal Orphan**	**Paternal Orphan**	**Double Orphan**
Angola	-1.47 (3368)	-1.26 (21)	-1.45 (175)	-1.30 (13)	-0.33 (3338)	-0.71 (23)	-0.21 (178)	-0.25 (42)	-1.70 (2945)	-1.65 (21)	-1.86 (153)	-1.47 (11)
Burundi	-1.83 (1755)	-2.15 (31)	-1.94 (145)	-1.77 (8)	-0.67 (1786)	-1.11 (38)	-0.77 (148)	-0.74 (9)	-1.98 (1561)	-2.44 (32)	-2.00 (128)	-2.04 (8)
CAR	-1.26 (8112)	-1.16 (66)	-1.29 (311)	-1.25 (35)	-0.25 (8007)	-0.23 (67)	-0.25 (307)	-0.47 (38)	-1.42 (7235)	-1.21 (60)	-1.46 (284)	-1.37 (28)
Chad	-1.29 (3304)	-0.99 (26)	-1.09 (91)	-2.06 (2)	-0.67 (3356)	-0.55 (26)	-0.45 (90)	-0.75 (2)	-1.12 (3144)	-1.00 (24)	-1.08 (85)	-2.41 (2)
Comoros	-0.82 (2507)	-0.60 (6)	-0.70 (59)	-0.60 (16)	0.026 (2197)	0.24 (5)	-0.060 (47)	0.32 (15)	-1.09 (2107)	-1.52 (7)	-1.07 (49)	-1.02 (15)
Equatorial Guinea	-0.88 (1390)	-0.31 (15)	-0.70 (74)	-0.73 (12)	0.13 (1299)	0.19 (15)	0.13 (69)	0.26 (12)	-1.44 (1191)	-0.95 (13)	-1.62 (65)	-1.28 (11)
Gambia	-1.14 (1557)	-1.43 (6)	-1.27 (31)	-0.85 (3)	-0.55 (1585)	-0.77 (6)	-0.75 (31)	-0.24 (3)	-1.03 (1513)	-1.29 (6)	-1.43 (30)	-1.13 (3)
Guinea Bissau	-1.27 (3533)	-1.36 (18)	-1.16 (91)	-1.45 (15)	-0.57 (3516)	-0.31 (16)	-0.47 (90)	-0.33 (15)	-1.21 (3341)	-1.45 (17)	-1.06 (87)	-1.94 (15)
Lesotho	-0.93 (2125)	-1.05 (18)	-1.05 (189)	-1.11 (18)	0.31 (1986)	-0.55 (18)	0.27 (180)	-0.086 (16)	-1.58 (1763)	-0.26 (16)	-1.57 (154)	-1.72 (14)
Niger	-1.71 (3056)	-1.62 (24)	-1.53 (41)	-0.53 (1)	-0.86 (3113)	-0.79 (24)	-0.87 (42)	-050 (1)	-1.62 (2884)	-1.43 (22)	-1.26 (38)	-0.23 (1)
Rwanda	-1.38 (1283)	-1.46 (13)	-1.45 (157)	-1.58 (5)	-0.28 (1473)	-0.28 (21)	-0.35 (190)	-0.22 (16)	-1.75 (1183)	-1.96 (10)	-1.75 (144)	-1.96 (5)

Senegal	-1.25 (5664)	-1.18 (34)	-1.24 (113)	-1.37 (11)	-0.61 (5539)	-0.65 (34)	-0.56 (116)	-0.66 (12)	-1.13 (5183)	-1.02 (33)	-1.17 (108)	-1.14 (10)
Sierra Leone	-1.21 (1499)	-1.26 (14)	-0.88 (79)	-0.73 (20)	-0.47 (1486)	-0.61 (15)	-0.46 (78)	-0.33 (20)	-1.13 (1368)	-1.25 (14)	-0.99 (75)	-1.02 (19)
Sudan-North	-1.83 (12265)	-1.74 (47)	-1.72 (186)	-1.69 (5)	-0.82 (12575)	-0.88 (48)	-0.68 (195)	-0.76 (5)	-1.63 (11084)	-1.31 (46)	-1.48 (160)	-0.90 (5)
Sudan-South	-1.32 (556)	-0.73 (6)	-1.54 (66)	-0.23 (6)	-0.44 (593)	-0.32 (5)	-0.79 (73)	0.18 (6)	-1.28 (502)	0.54 (5)	-0.74 (53)	-0.48 (6)
Swaziland	-0.60 (2043)	-0.44 (13)	-0.41 (37)	-0.50 (19)	0.36 (1993)	0.77 (13)	0.48 (113)	0.44 (19)	-1.26 (1964)	-0.61 (16)	-0.92 (110)	-0.96 (17)
Zambia	-1.19 (3202)	-1.27 (24)	-1.32 (135)	-1.63 (10)	0.073 (3216)	0.13 (25)	-0.12 (137)	-0.42 (10)	-1.73 (2770)	-1.92 (21)	-1.79 (119)	-2.22 (10)

DHS Surveys: Children 18-59 Months of Age

Country	**WAZ**				**WHZ**				**HAZ**			
	Non orphan	**Maternal Orphan**	**Paternal Orphan**	**Double Orphan**	**Non orphan**	**Maternal Orphan**	**Paternal Orphan**	**Double Orphan**	**Non Orphan**	**Maternal Orphan**	**Paternal Orphan**	**Double Orphan**
Benin	-1.28 (2538)	-1.54 (8)	-1.00 (42)	-0.13 (1)	-0.40 (3242)	-0.57 (17)	-0.13 (60)	-0.50 (2)	-1.55 (2468)	-1.57 (7)	-1.34 (42)	-1.23 (1)
Ethiopia	-1.89 (6227)	-1.82 (82)	-1.87 (201)	-1.79 (14)	-0.85 (6555)	-0.99 (94)	-0.91 (214)	-0.93 (18)	-1.88 (5611)	-1.63 (75)	-1.84 (185)	-1.05 (11)
Ghana	-1.22 (2272)	-1.39 (19)	-1.27 (55)	-1.07 (1)	-0.37 (2295)	-0.44 (19)	-0.59 (55)	0.22 (1)	-1.45 (2189)	-1.80 (19)	-1.23 (51)	-1.99 (1)
Kenya	-1.11 (3192)	-1.00 (26)	-1.00 (149)	-1.21 (18)	-0.35 (3263)	-0.66 (27)	-0.28 (154)	-0.64 (19)	-1.28 (3086)	-0.89 (25)	-1.17 (144)	-0.71 (16)
Malawi	-1.24 (6451)	-1.21 (58)	-1.26 (229)	-1.16 (30)	0.04 (6502)	0.09 (58)	-0.06 (233)	-0.02 (30)	-1.92 (5861)	-1.84 (48)	-1.66 (201)	-1.75 (28)
Mali	-1.52 (6227)	-1.73 (25)	-1.46 (124)	-2.27 (7)	-0.61 (6502)	-1.10 (30)	-0.46 (130)	-1.60 (8)	-1.55 (5708)	-1.31 (22)	-1.60 (113)	-1.36 (7)
Namibia	-1.26 (2514)	-1.26 (26)	-1.37 (102)	-1.26 (7)	-0.70 (2598)	-0.51 (28)	-0.73 (106)	-0.50 (8)	-1.12 (2476)	-1.33 (25)	-1.22 (99)	-1.45 (7)

Nigeria	-1.33 (2949)	-0.56 (20)	-1.01 (62)	-0.28 (7)	-0.44 (3122)	-0.02 (25)	-0.27 (64)	0.03 (7)	-1.37 (2659)	-0.67 (20)	-1.10 (59)	-0.35 (5)
Rwanda	-1.23 (3592)	-1.22 (52)	-1.28 (439)	-1.44 (30)	-0.15 (3654)	-0.05 (64)	-0.17 (458)	-0.20 (38)	-1.67 (3323)	-1.64 (45)	-1.70 (405)	-1.64 (25)
Tanzania	-1.40 (1854)	-1.32 (10)	-1.19 (38)	-1.78 (4)	-0.35 (1892)	-0.17 (12)	-0.009 (39)	-0.97 (4)	-1.77 (1759)	-1.83 (9)	-1.90 (37)	-1.79 (4)
Uganda	-1.16 (3628)	-1.43 (31)	-1.22 (140)	-1.08 (7)	-0.13 (3831)	-0.16 (41)	-0.23 (155)	-0.36 (16)	-1.63 (3435)	-2.02 (29)	-1.63 (132)	-1.27 (6)
Zambia	-1.44 (3816)	-1.34 (48)	-1.42 (177)	-1.17 (16)	-0.22 (3888)	-0.29 (52)	-0.33 (179)	-0.01 (18)	-1.90 (3465)	-1.88 (41)	-1.84 (162)	-1.37 (13)
Zimbabwe	-0.91 (1709)	--	-0.98 (74)	--	-0.16 (1744)	--	-0.21 (76)	3.00 (1)	-1.20 (1658)	--	-1.18 (72)	--
Total												

Annex 3: Regressions Models Examining the WAZ in Relation to Paternal Orphan when Controlling for Age

Includes Both DHS and MICS II Surveys

Waz by paternal vs/ non-orphans			
country	**over 18 months**		**sample size**
	age	orphan	
	coeff (t)	coeff (t)	
Lesotho	-0.00282	-0.117	pat:189
	(-1.365)	(-1.264)	non: 2125
Zambia	0.00341	-0.122	pat: 134
	(-2.051)	(-1.264)	non: 3129
	(-0.826)	(1.957)	non: 1662
Sudan (South)	0.00354	-0.179	pat: 66
	(0.808)	(-1.110)	non: 556
Rwanda	0.00325	-0.076	pat: 157
	(1.346)	(-0.812)	non: 1283
Gambia	0.004127	-0.146	pat: 31
	(1.829)	(-0.749)	non: 1557
Namibia *	0.00131	-0.110	pat: 102
	(0.749)	(-0.962)	non: 2514
Zimbabwe*	0.006383	-0.08187	pat: 74
	(3.137)	(-0.633)	non: 1709
Ghana*	0.00848	-0.0466	pat: 55
	(4.534)	(-0.311)	non: 2272
Uganda*	0.00557	-0.0628	pat: 140
	(4.11)	(-0.686)	non: 3628
Burundi	-0.00508	-0.0858	pat: 145
	-2.557	(-0.963)	non: 1755
Nigeria*	0.00809	0.327	pat:62
	(4.368)	(2.076)	non: 2949
Mali*	0.01182	0.0794	pat: 124
	(9.935)	(0.759)	non: 6227

Ethiopia*	0.00262	0.0133	pat: 201
	(2.503)	(0.180)	non: 6227
Benin*	0.0071	0.280	pat:42
	(4.282)	(1.731)	non: 2538
Kenya*	.00457	.135	pat: 149
	(2.84)	(1.41)	non: 3192
Rwanda*	0.00809	0.327	pat: 62
	(4.368)	(2.076)	non: 2949
Zambia*	0.006635	0.009092	pat: 177
	(5.116)	(0.115)	non: 3816
Swaziland	-0.0004345	0.126	pat: 114
	(-0.215)	(-1.16)	non: 2329
Sierra Leone	-0.002474	0.301	pat: 88
	(-0.826)	(1.957)	non: 1662
Equatorial Guinea	0.00517	0.175	pat: 78
	(-1.887)	(-1.181)	non: 1429
Angola	0.00422	0.021	pat: 175
	(2.718)	(0.244)	non: 3368
Comorros	0.00668	0.136	pat: 59
	(2.478)	(.632)	non: 2507
Guinnea Bissau	0.00198	0.07344	pat: 91
	(1.273)	(0.615)	non: 3533
Sudan (North)	0.004416	0.113	pat: 186
	(4.922)	(1.358)	non: 12,265
Tanzania *	0.004475	0.208	pat: 38
	(2.342)	(1.225)	non: 1854
Malawi*	0.008386	0.0130	pat: 229
	(7.760)	(0.142)	non: 6451
*DHS			

Annex 4: Age Adjusted Mean Weight for Age Z-scores by Orphan/Non-Orphan Classifications for each Country (Source: DHS and MICS II Surveys)

DHS Surveys: Children 0-17 Months of Age

Children 18-59 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	Father in HH	Mother not in HH	Mother in HH	Both in HH	Father not in HH	Mother Not in HH	Neither in HH	
Southern Africa									
Namibia	-1.726 (3)	--	--	-.840 (16)	-.659 (453)	-.814 (636)	-1.065 (9)	-.06286 (52)	--
Zambia	-0.432 (3)	-.587 (1)	.02662 (1)	-1.050 (39)	-0.931 (1409)	-1.030 (379)	--	-.0935 (6)	-2.211 (1)
Malawi	-1.302 (2)	--	--	-0.748 (42)	-0.817 (2337)	-0.894 (779)	0.207 (2)	-.00925 (18)	1.392 (1)
West Africa									
Ghana	--	--	--	-1.139 (10)	-0.932 (728)	-0.836 (290)	--	-0.804 (8)	--
Mali	--	-0.86 (2)	0.372 (3)	-0.784 (40)	-1.009 (2980)	-1.049 (476)	-1.175 (6)	-0.293 (8)	2.417 (1)
Benin	-2.477 (1)	--	--	-1.153 (12)	-0.885 (1158)	-0.829 (276)	-1.199 (2)	-1.905 (3)	--
Nigeria	--	--	--	-0.471 (10)	-0.950 (1324)	-0.876 (198)	-0.136 (5)	-0.612 (8)	--
Eastern Africa									
Uganda	-2.109 (2)	--	-1.321 (2)	-1.188 (17)	-0.865 (1406)	-0.874 (376)	--	-0.362 (15)	--
Rwanda	-1.909 (7)	-1.543 (4)	--	-1.294 (69)	-0.795 (1793)	-0.845 (322)	-0.846 (3)	-0.622 (9)	-0.816 (5)
Kenya	0.530 (4)	-2.52 (1)	0.439 (1)	-0.592 (29)	-0.504 (1105)	-0.492 (434)	-0.160 (5)	0.378 (9)	0.166 (2)
Ethiopia	-2.601 (4)	-1.485 (4)	--	-1.208 (34)	-1.232 (2189)	-1.106 (375)	-1.116 (2)	-0.0375 (9)	--
Tanzania	-3.15 (2)	-2.31 (1)	--	-1.667 (7)	-0.920 (640)	-1.007 (225)	--	-0.01467 (4)	--

DHS Surveys: Children 18-59 Months of Age

Children 18-59 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	Father in HH	Mother not in HH	Mother in HH	Both in HH	Father not in HH	Mother Not in HH	Neither in HH	
Southern Africa									
Namibia	-1.399 (20)	-.771 (6)	-1.359 (40)	-1.372 (62)	-1.243 (884)	-1.291 (942)	-1.030 (63)	-1.252 (625)	-1.256 (7)
Zambia	-1.401 (27)	-1.266 (21)	-1.415 (23)	-1.419 (154)	-1.423 (2858)	-1.56 (708)	-1.038 (46)	-1.296 (204)	-1.165 (16)
Malawi	-1.22 (42)	-1.190 (16)	-1.136 (41)	-1.287 (188)	-1.201 (4625)	-1.370 (1333)	-1.455 (36)	-1.186 (457)	-1.159 (30)
West Africa									
Ghana	-1.754 (10)	-0.996 (9)	-1.608 (8)	-1.209 (47)	-1.208 (1537)	-1.221 (548)	-1.119 (48)	-1.339 (139)	-1.067 (1)
Mali	-1.793 (14)	-1.648 (11)	-1.786 (10)	-1.435 (114)	-1.522 (5234)	-1.543 (649)	-1.325 (102)	-1.494 (242)	-2.268 (7)
Benin	-1.456 (4)	-1.621 (4)	-1.627 (4)	-0.933 (38)	-1.295 (2024)	-1.240 (389)	-1.462 (47)	-0.914 (78)	-0.127 (1)
Nigeria	-1.373 (9)	0.0949 (11)	-1.447 (9)	-0.930 (53)	-1.365 (2431)	-1.218 (337)	-1.46 (47)	-0.986 (134)	-0.282 (7)
Eastern Africa									
Uganda	-1.441 (14)	-1.425 (17)	-0.635 (20)	-1.322 (120)	-1.160 (2753)	-1.158 (634)	-0.890 (60)	-1.232 (181)	-1.082 (7)
Rwanda	-1.853 (18)	-0.885 (34)	-1.044 (36)	-1.296 (403)	-1.216 (2854)	-1.357 (571)	-1.216 (41)	-0.945 (126)	-1.441 (30)
Kenya	-0.660 (13)	-1.342 (13)	-0.655 (13)	-1.035 (136)	-1.119 (2299)	-1.094 (733)	-0.593 (30)	-1.147 (130)	-1.211 (18)
Ethiopia	-1.898 (39)	-1.748 (43)	-1.406 (14)	-1.907 (187)	-1.903 (5026)	-1.882 (848)	-1.595 (75)	-1.659 (278)	-1.790 (14)
Tanzania	-0.549 (7)	-3.108 (3)	-1.904 (4)	-1.107 (34)	-1.354 (1370)	-1.589 (318)	-2.060 (21)	-1.327 (145)	-1.782 (4)

MICS II Surveys: Children 0-17 Months of Age

Children 0-17 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	Father in HH	Mother not in HH	Mother in HH	Both in HH	Father not in HH	Mother Not in HH	Neither in HH	
Southern Africa									
Angola	-0.551 (6)	-1.053 (4)	--	-1.202 (42)	-1.074 (1306)	-1.060 (314)	-1.017 (1)	-1.076 (11)	--
Lesotho	-2.718 (1)	--	0.846 (2)	-0.750 (58)	-0.371 (694)	-0.519 (259)	-0.300 (4)	-0.712 (18)	--
Swaziland	-1.811 (2)	--	0.283 (3)	-0.239 (34)	-0.073 (420)	-0.149 (441)	-0.839 (6)	0.0793 (33)	-1.368 (2)
Zambia	-2.132 (1)	-0.388 (3)	--	-1.404 (26)	-1.25 (633)	-1.21 (142)	0.01267 (1)	-0.731 (6)	-0.826 (1)
West Africa									
Equatorial Guinea	-1.477 (2)	--	-0.334 (2)	-0.759 (28)	-0.342 (382)	-0.577 (332)	1.450 (4)	0.04859 (16)	-0.960 (2)
Gambia	0.669 (1)	-1.610 (2)	-1.683 (3)	-0.402 (9)	-0.588 (749)	-0.321 (105)	--	-0.0367 (5)	-0.987 (2)
Guinea Bissau	-2.629 (2)	-.961 (2)	--	-0.932 (24)	-0.808 (1460)	-0.667 (324)	-0.198 (2)	-0.408 (14)	-0.451 (8)
Niger	-2.243 (2)	-.826 (2)	--	-.651 (5)	-1.015 (1359)	-.904 (104)	--	-1.122 (4)	--
Senegal	-1.520 (4)	0.06589 (3)	--	-0.483 (28)	-0.718 (1969)	-0.631 (656)	0.657 (6)	0.332 (17)	--
Sierra Leone	2.427 (1)	--	-1.635 (2)	-0.507 (27)	-0.891 (486)	-0.990 (116)	-0.892 (3)	-0.666 (9)	2.089 (2)
Eastern Africa									
Burundi	--	-1.431 (2)	--	-0.856 (18)	-1.609 (550)	-1.800 (28)	--	--	-4.122 (1)
Comorros	0.828 (2)	-0.450 (1)	--	-0.428 (11)	-0.681 (1012)	-0.441 (106)	-1.044 (5)	-0.302 (24)	0.802 (4)
Rwanda	-0.108 (3)	-0.0827 (1)	--	-1.113 (46)	-0.906 (825)	-1.045 (124)	-0.997 (2)	--	--
Sudan-north	-2.671 (4)	-0.760 (3)	1.459 (1)	-1.027 (64)	-1.090 (5498)	-0.971 (447)	-0.224 (4)	-0.851 (5)	-2.516 (1)
Sudan-south	--	-0.484 (1)	-0.0833 (2)	-0.775 (26)	-1.123 (279)	-0.670 (41)	--	-1.187 (4)	--
Central Africa									
CAR	-0.384 (9)	-1.166 (7)	0.247 (4)	-0.573 (3)	-0.623 (3630)	-0.569 (794)	-0.02515 (11)	-0.257 (28)	-1.253 (4)
Chad	-2.653 (1)	-1.338 (1)	--	-0.852 (22)	-0.688 (1335)	-0.720 (228)	1.790 (2)	-0.445 (3)	--

MICS II Surveys: Children 18-59 Months of Age

Children 18-59 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	Father in HH	Mother not in HH	Mother in HH	Both in HH	Father not in HH	Mother Not in HH	Neither in HH	
Southern Africa									
Angola	-1.04 (7)	-1.365 (14)	-1.370 (18)	-1.462 (157)	-1.447 (2625)	-1.578 (583)	-1.421 (35)	-1.441 (125)	-1.302 (13)
Lesotho	-1.405 (7)	-0.817 (11)	-1.083 (32)	-1.045 (157)	-0.955 (1426)	-0.921 (430)	-1.014 (28)	-0.804 (239)	-1.106 (18)
Swaziland	-0.277 (5)	-0.536 (8)	-0.619 (24)	-0.354 (90)	-0.641 (927)	-0.603 (785)	-0.276 (55)	-0.492 (269)	-0.499 (19)
Zambia	-1.656 (11)	-0.936 (13)	-1.6 (22)	-1.261 (113)	-1.163 (2587)	-1.387 (469)	-1.209 (30)	-1.075 (116)	-1.631 (10)
West Africa									
Equatorial Guinea	-0.439 (10)	-0.0626(5)	-0.518 (10)	-0.725 (64)	-0.865 (731)	-0.813 (477)	-0.712 (19)	-1.140 (161)	-0.736 (12)
Gambia	-1.323 (4)	-1.649 (2)	-1.348 (15)	-1.195 (16)	-1.133 (1325)	-1.065 (161)	-1.522 (14)	-1.321 (56)	-0.851 (3)
Guinea Bissau	-1.416 (12)	-1.225 (6)	-0.849 (16)	-1.221 (75)	-1.307 (2761)	-1.168 (468)	-1.039 (51)	-1.132 (251)	-1.452 (15)
Niger	-1.607 (15)	-1.647 (9)	-1.804 (9)	-1.456 (32)	-1.705 (2653)	-1.625 (175)	-1.927 (32)	-1.798 (195)	-.530 (1)
Senegal	-0.867 (17)	-1.488 (17)	-1.182 (23)	-1.249 (90)	-1.273 (3938)	-1.200 (1114)	-1.000 (56)	-1.125 (353)	-1.365 (11)
Sierra Leone	-2.046 (3)	-1.049 (11)	-0.932 (17)	-0.863 (62)	-1.225 (1140)	-1.130 (197)	-1.061 (51)	-1.239 (111)	-0.726 (20)
Eastern Africa									
Burundi	-2.677 (5)	-2.049 (26)	-1.102 (6)	-1.970 (139)	-1.836 (1600)	-1.778 (116)	-2.179 (9)	-1.744 (26)	-1.770 (8)
Comorros	-2.022 (3)	0.830 (3)	-1.401 (7)	-0.606 (52)	-0.817 (2044)	-0.799 (318)	-0.833 (18)	-1.017 (118)	-0.601 (16)
Rwanda	-2.267 (4)	-1.098 (9)	-0.924 (8)	-1.480 (149)	-1.362 (1098)	-1.504 (146)	-1.513 (8)	-1.338 (29)	-1.579 (5)
Sudan-north	-1.330 (27)	-2.303 (20)	-1.755 (8)	-1.713 (178)	-1.842 (11175)	-1.735 (968)	-1.833 (23)	-1.801 (72)	-1.691 (5)
Sudan-south	--	-0.734 (6)	-2.096 (4)	-1.509 (62)	-1.331 (471)	-1.245 (75)	--	-1.320 (6)	-0.231 (6)
Central Africa									
Central Africa rep	-1.204 (44)	-1.077 (22)	-1.337 (44)	-1.287 (267)	-1.25 (6432)	-1.276 (1160)	-1.282 (196)	-1.357 (324)	-1.252 (35)
Chad	-0.943 (15)	-1.047 (11)	-1.046 (15)	-1.096 (76)	-1.309 (2772)	-1.199 (394)	-0.831 (32)	-1.217 (106)	-2.060 (2)

Annex 4b: Internally Standardized (Differences in Mean WAZ) by Orphan/Non-Orphan Classification for each Country (Source: DHS and MICS II)

MICS II Surveys: Children 0-17 Months of Age

Children 18-59 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	Father in HH	Mother not in HH	Mother in HH	Both in HH	Father not in HH	Mother Not in HH	Neither in HH	
Southern Africa									
Angola	0.5245	0.0225	--	-0.1265	0.0015	0.0155	0.0585	-0.0005	--
	6	4	--	42	1306	314	1	11	--
Lesotho	-2.2725	--	1.2915	-0.3045	0.0745	-0.0735	0.1455	-0.2665	--
	1	--	2	58	694	259	4	18	--
Swaziland	-1.6924	--	0.4016	-0.1204	0.04559	-0.0304	-0.7204	0.1979	-1.2494
	2		3	34	420	441	6	33	2
Zambia	-0.8923	0.8517	--	-0.1643	-0.0103	0.0297	1.25237	0.5087	0.4137
	1	3	--	26	633	142	1	6	1
West Africa									
Equatorial Guinea	-1.0385	--	0.1045	-0.3205	0.0965	-0.1385	1.8885	0.48709	-0.5215
	2		2	28	382	332	4	16	2
Gambia	1.2024	-1.0766	-1.1496	0.1314	-0.0546	0.2124	--	0.4967	-0.4536
	1	2	3	9	749	105	--	5	2
Guinea Bissau	-1.8534	-0.1854	--	-0.1564	-0.0324	0.1086	0.5776	0.3676	0.3246
	2	2	--	24	1460	324	2	14	8
Niger	-1.2454	0.1716	--	0.3466	-0.0174	0.0936	--	-0.1244	--
	2	2	--	5	1359	104	--	4	--
Senegal	-0.8354	0.75049	--	0.2016	-0.0334	0.0536	1.3416	1.0166	--
	4	3	--	28	1969	656	6	17	--
Sierra Leone	3.298	--	-0.764	0.364	-0.02	-0.119	-0.0146	0.205	2.96
	1	--	2	27	486	116	3	9	2
Eastern Africa									

Burundi	--	0.1644	--	0.7364	-0.0136	-0.2046	--	--	-2.5235
	--	2	--	18	550	28	--	--	1
Comorros	1.4804	0.2024	--	0.2244	-0.0286	0.2114	-0.3916	0.3504	1.4544
	2	1	--	11	1012	106	5	24	4
Rwanda	-0.8175	-0.8428	--	0.1875	-0.0195	0.1195	0.0715	--	--
	3	1	--	46	825	124	2	--	--
Sudan-north	-1.5917	0.3130	2.5383	0.0523	-0.0107	0.1083	0.8553	0.2283	-1.4367
	4	3	1	64	5498	447	4	5	1
Sudan-south	--	0.5463	0.9470	0.2553	-0.0927	0.3603	--	-0.1567	--
	--	1	2	26	279	41	--	4	--
Central Africa									
Central Africa rep	0.2261	-0.5554	0.8576	0.0376	-0.0124	0.0416	0.585	0.3521	-0.6424
	9	7	4	3	3630	794	11	28	4
Chad	-1.9605	-0.6455	--	-0.1595	0.0045	-0.0275	2.4825	0.2475	--
	1	1	--	22	1335	228	2	3	--

MICS II Surveys: Children 18-59 Months of Age

Children 18-59 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	Father in HH	Mother not in HH	Mother in HH	Both in HH	Father not in HH	Mother Not in HH	Neither in HH	
Southern Africa									
Angola	0.427	0.1027	0.0977	0.0057	0.0207	-0.1103	0.0467	0.0267	0.1657
	7	14	18	157	2625	583	35	125	13
Lesotho	-.4611	0.1269	-0.1391	-0.1011	-0.0111	0.0229	-0.0701	0.1399	-0.1621
	7	11	32	157	1426	430	28	230	18
Swaziland	0.3037	0.0447	-0.0383	0.2267	-0.0603	-0.0223	0.3047	0.0887	0.0817
	5	8	24	90	927	785	55	269	19
Zambia	-0.4584	0.2616	-0.4024	-0.0634	0.0346	-0.1894	-0.0114	0.1226	-0.4334

	11	13	22	113	2587	469	30	116	10
West Africa									
Equatorial Guinea	0.4221	0.79847	0.3431	0.1361	0.0039	0.0481	0.1491	-0.2789	0.1251
	10	5	10	64	731	477	19	161	12
Gambia	-0.1796	-0.5056	-0.2046	-0.0516	0.0104	0.0784	-0.3786	-0.1776	0.2924
	4	2	15	16	1325	161	14	56	3
Guinea Bissau	-0.1457	0.0453	0.4213	0.0496	-0.0367	0.1023	0.2313	0.1383	-0.1817
	12	6	16	75	2761	468	51	251	15
Niger	0.0952	0.0552	-0.1018	0.2462	-0.0028	0.0772	-0.2248	-0.0958	1.1722
	15	9	9	32	2653	175	32	195	1
Senegal	0.3784	-0.2426	0.0634	-0.0036	-0.0276	0.0454	0.2454	0.1204	-0.1196
	17	17	23	90	3938	1114	56	353	11
Sierra Leone	-0.8503	0.1467	0.2637	0.3327	-0.0293	0.0657	0.1347	-0.0433	0.4697
	3	11	17	62	1140	197	51	111	20
Eastern Africa									
Burundi	-0.8258	-0.1978	0.7492	-0.1188	0.0152	0.0732	-0.3278	0.1072	0.0812
	5	26	6	139	1600	116	9	26	8
Comorros	-1.1829	1.6691	-0.5619	-0.2331	0.00221	0.0401	0.0061	-0.1779	0.2381
	3	3	7	52	2044	318	18	118	16
Rwanda	-0.879	0.29	0.464	-0.092	0.026	-0.1163	-0.1253	0.05	-0.191
	4	9	8	149	1098	146	8	29	5
Sudan-north	0.50	-0.473	0.075	0.117	-0.012	0.095	-0.003	0.029	0.139
	27	20	8	178	11175	968	23	72	5
Sudan-south	--	0.595	-0.767	-0.180	-0.0018	0.0842	--	0.0092	1.098
	--	6	4	62	471	75	--	6	6
Central Africa									
Central Africa rep	0.057	0.184	-0.076	-0.026	0.011	0.015	-0.021	-0.096	0.009
	44	22	44	267	6432	1160	196	324	35
Chad	0.338	0.234	0.235	0.185	-0.028	0.082	0.45	0.064	-0.779
	15	11	15	76	2772	394	32	106	2

DHS Surveys: Children 0-17 Months of Age

Children 18-59 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	Father in HH	Mother not in HH	Mother in HH	Both in HH	Father not in HH	Mother Not in HH	Neither in HH	
Southern Africa									
Namibia	-1.0008	--	--	-0.1148	0.06619	-0.0888	-0.3398	0.66234	--
	n=3	--	--	n=16	n=453	n=636	n=9	n=52	--
Zambia	0.5208	0.3658	0.97942	-0.0972	0.0217	-0.0772	--	0.8593	--
	n=3	n=1	n=1	n=39	n=1409	n=379	--	n=6	--
Malawi	-0.4754	--	--	0.0786	0.0096	-0.0674	1.0336	0.81735	0.6632
	n=2	--	--	n=42	n=2337	n=779	n=2	n=18	n=2
West Africa									
Ghana	--	--	--	-0.2317	-0.0247	0.0713	--	0.1033	--
	--	--	--	n=10	n=728	n=290	--	n=8	--
Mali	--	0.1436	1.3756	0.2196	-0.00539	-0.0453	-0.1714	0.7106	--
	--	n=2	n=3	n=40	n=2980	n=476	N=6	n=8	--
Benin	-1.601	--	--	-0.277	-0.009	0.047	-0.323	-1.029	3.4206
	n=1	--	--	n=12	n=1158	n=276	n=2	n=3	n=1
Nigeria	--	--	--	0.4623	-0.01669	0.0573	0.7973	0.3213	--
	--	--	--	n=10	n=1324	n=198	n=5	n=8	--
Eastern Africa									
Uganda	-1.2403	--	-0.4523	-0.3193	0.0037	-0.00529	--	0.5067	--
	n=2		n=2	n=17	n=1406	n=376	--	n=15	--
Rwanda	-1.085	-0.719	--	-0.47	0.0289	-0.021	-0.022	0.202	0.0080
	n=7	n=4	--	n=69	n=1793	n=322	n=3	n=9	n=5
Kenya	1.0272	-2.0228	0.9362	-0.0948	-0.0068	0.00519	0.3372	0.8752	.6632
	n=4	n=1	n=1	n=29	n=1105	n=434	n=5	n=9	2
Ethiopia	-1.344	-0.228	--	0.0489	0.0249	0.151	0.141	1.2195	--
	n=4	n=4	--	n=34	n=2189	n=375	n=2	n=9	--
Tanzania	-2.1942	-1.3542	--	-0.7112	0.03579	-0.0511	--	0.94113	--
	n=2	n=1	--	n=7	n=640	n=225	--	n=4	--

DHS Surveys: Children 18-59 Months of Age

Children 18-59 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	Father in HH	Mother not in HH	Mother in HH	Both in HH	Father not in HH	Mother Not in HH	Neither in HH	
Southern Africa									
Namibia	-.1345	0.4935	-0.0945	-0.1075	0.0215	-0.0265	0.2345	0.0125	0.0085
	n=20	n=6	n=40	n=62	n=884	n=942	n=63	n=625	n=7
Zambia	0.034	0.169	0.02	0.016	0.012	-0.125	0.397	0.139	0.27
	n=27	n=21	n=23	n=154	n=2858	n=708	n=46	n=204	n=16
Malawi	0.0167	0.0467	0.1007	-0.0503	0.0357	-0.1333	-0.2183	0.0507	0.0777
	n=42	n=16	n=41	n=188	n=4625	n=1333	n=36	n=457	n=30
West Africa									
Ghana	-0.534	0.224	-0.388	0.0110	0.0120	-0.0010	0.1010	-0.1190	0.1530
	n=10	n=9	n=8	n=47	n=1537	n=548	n=48	n=139	n=1
Mali	-0.2747	-0.1297	-0.2677	0.0832	-0.0037	-0.0246	0.1933	0.0243	-0.7497
	n=14	n=11	n=10	n=114	n=5234	n=649	n=102	n=242	n=7
Benin	-0.1829	-0.3479	-0.3539	0.3401	-0.0219	0.0330	-0.1889	0.3591	1.1461
	n=4	n=4	n=4	n=38	n=2024	n=389	n=47	n=78	n=1
Nigeria	-0.0535	1.4144	-0.1275	0.3895	-0.0455	0.1015	-0.1405	0.3335	1.0375
	n=9	n=11	n=9	n=53	n=2431	n=337	n=47	n=134	n=7
Eastern Africa									
Uganda	-0.2775	-0.2615	0.5285	-0.1585	0.0035	0.0055	0.2735	-0.0685	0.08149
	n=14	n=17	n=20	n=120	n=2753	n=634	n=60	n=181	n=7
Rwanda	-0.6158	0.3522	0.1932	-0.0588	0.0212	-0.1198	0.021	0.2922	-0.2038
	n=18	n=34	n=36	n=403	n=2854	n=571	n=41	n=126	n=30
Kenya	0.4462	-0.2358	0.4512	0.0712	-0.0127	0.0122	0.5132	-0.04079	-0.1048
	n=13	n=13	n=13	n=136	n=2299	n=733	n=30	n=130	n=18
Ethiopia	-0.01909	0.1309	0.4729	-0.0281	-0.0241	-0.0030	0.2839	0.2199	0.0889
	n=39	n=43	n=14	n=187	n=5026	n=848	n=75	n=278	n=14
Tanzania	0.8472	-1.7118	-0.5078	0.2892	0.0422	-0.1928	-0.6638	0.0692	-0.3858
	n=7	n=3	n=4	n=34	n=1370	n=318	n=21	n=145	n=4

Annex 4c: Internally Standardized (Differences in Mean WAZ) Stratified by Urban/Rural Status Examined in Relation to Orphan/Non-Orphan Classifications for each Country (Source: DHS)

DHS Surveys: Children 0-17 Months of Age

Children 0-17 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	Father in HH	Mother not in HH	Mother in HH	Both in HH	Father not in HH	Mother Not in HH	Neither in HH	
Southern Africa									
Namibia									
Urban	--	--	--	0.2322	0.1482	-0.1118	-0.5618	0.3402	--
	--	--	--	n=7	n=178	n=203	n=6	n=14	--
Rural	-0.848	--	--	-0.462	-0.013	-0.0620	-0.3220	0.8350	--
	n=3	--	--	n=9	n=275	n=433	n=3	n=38	--
Zambia									
Urban	0.6057	--	--	-0.1683	0.0187	-0.0733	--	1.1707	-1.4373
	n=1	--	--	n=15	n=328	n=105	--	n=2	n=1
Rural	0.468	0.427	1.035	-0.112	0.028	-0.0919	--	-0.582	--
	n=2	N=1	n=1	n=24	n=1081	n=274	--	n=4	--
Malawi									
Urban	--	--	--	-0.1876	-0.0286	0.0684	0.2424	1.2054	--
	--	--	--	n=9	n=471	n=114	n=1	n=5	--
Rural	-0.3566	--	--	0.1384	0.0114	-0.0656	1.4184	0.5974	2.3234
	n=2	--	--	n=33	n=1866	n=665	n=1	n=13	n=1
West Africa									
Ghana									
Urban	--	--	--	0.0856	-0.0364	0.0456	--	0.1576	--
	--	--	--	n=1	n=167	n=113	--	n=6	--
Rural	--	--	--	-0.2032	0.0018	0.0208	--	-0.7492	--
	--	--	--	n=9	n=561	n=177	--	n=2	--
Mali									
Urban	--	1.1916	2.4296	0.2626	0.0196	-0.1944	--	0.5946	2.8746

	--	n=1	n=1	n=10	n=594	n=139	--	n=3	n=1
Rural	--	-0.9906	0.7414	0.1884	-0.0026	-0.0366	-0.0586	0.6684	--
	--	n=1	n=2	n=30	n=2386	n=337	n=6	n=5	--
Benin									
Urban	--	--	--	0.4142	-0.0138	0.0162	--	--	--
	--	--	--	n=3	n=343	n=107	--	--	--
Rural	0.7216	--	--	-0.5013	0.0007	0.0267	-0.2003	-0.9353	--
	N=1	--	--	n=9	n=815	n=169	n=2	n=3	--
Nigeria									
Urban	--	--	--	1.6682	-0.0058	-0.0858	1.6812	0.3272	--
	--	--	--	n=2	n=461	n=88	n=3	n=6	--
Rural	--	--	--	0.2033	-0.0157	0.1273	-0.8067	-0.1517	--
	--	--	--	n=8	n=863	n=110	n=2	n=2	--
Eastern Africa									
Uganda									
Urban	--	--	0.4160	-0.9670	-0.0191	0.0739	--	0.7349	--
	--	--	n=1	n=1	n=313	n=105	--	n=4	--
Rural	-1.1011	--	-1.6651	-0.1631	0.6509	0.2399	--	0.3929	--
	n=2	--	n=1	n=16	n=1093	n=271	--	n=11	--
Rwanda									
Urban	--	0.3690	--	-0.9680	0.0700	-0.1480	-0.8450	0.7710	0.1330
	--	n=1	--	n=17	n=369	n=82	n=1	n=1	n=2
Rural	-0.9434	-1.1244	--	-0.3334	0.0256	-0.0164	0.2746	0.2246	-0.2784
	n=7	n=3	--	n=52	n=1424	n=240	n=2	n=8	n=3
Kenya									
Urban	1.5923	--	--	-0.4027	-0.0027	-0.0087	0.3033	0.1363	2.2433
	n=1	--	--	n=9	n=281	n=102	n=1	n=5	n=1
Rural	0.8347	-1.8963	1.0467	0.0117	-0.0113	0.0167	0.3577	1.5437	-1.1623
	n=3	N=1	N=1	n=20	n=824	n=332	n=4	n=4	n=1
Ethiopia									
Urban	--	--	--	-0.6532	0.0318	-0.0072	--	-0.0692	--
	--	--	--	n=9	n=302	n=91	--	n=4	--

Rural	-1.2953	-0.1803	--	0.1887	-0.0163	0.0717	0.2147	1.9457	--
	n=4	N=4	--	n=25	n=1887	n=284	n=2	n=5	--
Tanzania									
Urban	-3.1474	-1.7224	--	--	0.1706	-0.2454	--	0.4936	--
	n=1	N=1	--	--	n=144	n=74	--	n=3	--
Rural	-1.5010	--	--	-0.5630	0.0250	-0.0130	--	1.2820	--
	n=1	--	--	n=7	n=496	n=151	--	n=1	--

DHS Surveys: Children 18-59 Months of Age

Children 18-59 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	Father in HH	Mother not in HH	Mother in HH	Both in HH	Father not in HH	Mother Not in HH	Neither in HH	
Southern Africa									
Namibia									
Urban	0.0196	-0.6424	0.6606	0.1846	0.0646	0.0186	0.1906	-0.2644	-0.1414
	n=5	n=2	n=6	n=20	n=345	n=274	n=21	n=119	n=3
Rural	-0.1591	1.0279	-0.1591	-0.2551	-0.0631	-0.0441	0.2449	0.1309	-0.0091
	n=15	n=4	n=34	n=42	n=539	n=668	n=42	n=506	n=4
Zambia									
Urban	0.3432	-0.0278	1.1732	-0.0198	-0.0458	-0.0048	0.4712	0.0862	0.7072
	n=9	n=5	n=9	n=44	n=724	n=177	n=23	n=59	n=7
Rural	-0.1476	0.2384	-0.7756	0.0224	0.0344	-0.1616	0.1824	0.1514	-0.1486
	n=18	n=16	n=14	n=110	n=2134	n=531	n=23	n=145	n=9
Malawi									
Urban	-0.0098	0.5732	-0.0388	-0.1638	-0.0248	0.1112	0.1662	0.0852	0.2342
	n=9	n=7	n=11	n=40	n=945	n=157	n=11	n=62	n=8
Rural	0.0135	-0.4995	0.1165	-0.0295	0.0415	-0.1375	-0.4515	0.0625	-0.0115
	n=33	n=9	n=30	n=148	n=3680	n=1176	n=25	n=395	n=22
West Africa									

Ghana									
Urban	-0.4969	-1.4229	-0.7449	0.2691	0.0601	-0.0629	0.0811	-0.0639	-0.0679
	n=5	n=1	n=5	n=10	n=356	n=207	n=11	n=47	n=1
Rural	-0.7183	0.4987	-0.1403	-0.0313	0.0177	-0.0213	0.1277	-0.1753	--
	n=5	n=8	n=3	n=37	n=1181	n=341	n=37	n=92	--
Mali									
Urban	-0.4306	-0.1456	--	0.2954	0.0064	-0.0966	-0.0456	0.1084	-0.1786
	n=4	n=2	--	n=29	n=1062	n=191	n=19	n=59	n=1
Rural	-0.2641	-0.1141	-0.1431	-0.0191	0.0039	-0.0601	0.2659	-0.0311	-0.7951
	n=10	n=9	n=10	n=85	n=4172	n=458	n=83	n=183	n=6
Benin									
Urban	0.7380	--	-1.0010	-0.1870	-0.0380	0.1240	-0.2520	0.3900	--
	n=1	--	n=2	n=9	n=609	n=148	n=21	n=34	--
Rural	-0.4623	-0.2593	0.1627	0.5357	-0.0083	-0.0523	-0.2063	0.2727	1.2607
	n=3	n=4	n=2	n=29	n=1415	n=241	n=26	n=44	n=1
Nigeria									
Urban	0.2343	0.3513	0.0523	0.4353	-0.0117	-0.1027	-0.4677	0.2193	0.7843
	n=4	n=2	n=4	n=32	n=894	n=154	n=19	n=73	n=4
Rural	-0.3139	1.7031	-0.2949	0.2121	-0.0589	0.2521	0.0771	0.4081	1.2951
	n=5	n=9	n=5	n=21	n=1537	n=183	n=28	n=61	n=3
Eastern Africa									
Uganda									
Urban	-0.1870	-0.0780	0.3110	-0.5000	0.0600	-0.0860	0.3170	-0.2070	-0.4630
	n=2	n=4	n=8	n=24	n=538	n=173	n=18	n=56	n=3
Rural	-0.2636	-0.3256	0.5704	-0.0676	-0.0016	0.0144	0.2144	-0.0516	0.3574
	n=12	n=13	n=12	n=96	n=2215	n=461	n=42	n=125	n=4
Rwanda									
Urban	-0.3050	1.1300	0.0870	-0.1780	0.0170	-0.1510	0.8120	0.4430	-0.3940
	n=3	n=10	n=5	n=84	n=651	n=130	n=8	n=27	n=6
Rural	-0.6397	-0.0377	0.2623	-0.0197	0.0203	-0.1127	-0.1537	0.1843	-0.1467
	n=15	n=24	n=31	n=319	n=2203	n=441	n=33	n=99	n=24
Kenya									

Urban	0.1600	-0.4220	-0.0740	0.0030	-0.0220	0.0980	0.6160	-0.1210	-0.2020
	n=4	n=5	n=4	n=31	n=584	n=146	n=10	n=18	n=3
Rural	0.5293	-0.2257	0.6383	0.0943	-0.0197	0.0113	0.3953	0.0183	-0.0537
	n=9	n=8	n=9	n=105	n=1715	n=587	n=20	n=112	n=15
Ethiopia									
Urban	0.0499	-0.0011	1.1589	0.0269	0.0109	-0.1801	0.4929	0.2229	0.2879
	n=6	n=8	n=3	n=50	n=703	n=215	n=14	n=71	n=1
Rural	-0.0158	0.1522	0.2472	-0.1408	-0.0048	-0.0218	0.2212	0.1382	0.1462
	n=33	n=35	n=11	n=137	n=4323	n=633	n=61	n=207	n=13
Tanzania									
Urban	-0.4449	--	0.5791	0.6791	0.0761	-0.2849	-0.4419	0.0151	-1.2459
	n=3	--	n=1	n=11	n=331	n=97	n=9	n=46	n=2
Rural	1.7553	-1.6427	-0.8627	0.0813	0.0403	-0.1697	-0.9207	0.0663	0.3713
	n=4	n=3	n=3	n=23	n=1039	n=221	n=12	n=99	n=2

Annex 4d: Internally Standardized (Differences in Mean WAZ) Stratified by Male/Female Headed Households Examined in Relation to Orphan/Non-Orphan Classification for each Country (Source: DHS)

DHS Surveys: Children 0-17 Months of Age

Children 0-17 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	Father in HH	Mother not in HH	Mother in HH	Both in HH	Father not in HH	Mother Not in HH	Neither in HH	
Southern Africa									
Namibia									
male	0.0574	--	--	-0.7456	0.0504	-0.1636	-0.2016	0.7044	--
	n=1	--	--	n=2	n=388	n=226	n=7	n=29	--
female	-1.5014	--	--	-0.0094	0.0566	-0.0314	-0.7814	0.6056	--
	n=2	--	--	n=14	n=65	n=410	n=2	n=23	--
Zambia									
male	0.5074	0.3644	0.9814	-0.4696	0.0154	-0.0876	--	-0.4096	--
	n=3	n=1	n=1	n=13	n=1337	n=194	--	n=3	--
female	--	--	--	0.1220	-0.0030	-0.0170	--	0.4870	-1.2700
	--	--	--	n=26	n=72	n=185	--	n=3	n=1
Malawi									
male	--	--	--	-0.8311	0.0019	-0.0351	0.7519	0.6059	2.2039
	--	--	--	n=11	n=2250	n=252	n=1	n=13	n=1
female	-0.4095	--	--	0.4515	-0.0925	-0.0365	1.3655	1.3925	--
	n=2	--	--	n=31	N=87	n=527	n=1	n=5	--
West Africa									
Ghana									
male	--	--	--	-0.5988	0.0002	0.0392	--	-0.1048	--
	--	--	--	n=2	N=718	n=79	--	n=5	--
female	--	--	--	-0.1591	0.5789	-0.0251	--	0.2599	--
	--	--	--	n=8	N=10	n=211	--	n=3	--
Mali									
male	--	0.1381	2.8531	0.3591	-0.0109	0.0281	-0.1779	0.6641	--

	--	N=2	n=2	n=15	n=2972	n=224	n=6	n=7	--
female	--	--	-1.5240	0.2040	-0.0320	-0.0550	--	1.0630	3.5170
	--	--	n=1	n=25	n=8	n=252	--	n=1	n=1
Benin									
male	-1.5791	--	--	-0.3801	0.0079	-0.0581	-0.3051	--	--
	n=1	--	--	n=6	n=1139	n=128	n=2	--	--
female	--	--	--	-0.2876	-0.1346	0.0314	--	-1.1486	--
	--	--	--	n=6	n=19	n=148	--	n=3	--
Nigeria									
male	--	--	--	0.4375	-0.0115	0.0645	0.9005	0.5445	--
	--	--	--	n=6	n=1308	n=93	n=4	n=6	--
female	--	--	--	0.4277	-0.1523	0.0147	0.2287	-0.4823	--
	--	--	--	n=4	n=16	n=105	n=1	n=2	--
Eastern Africa									
Uganda									
male	-1.2473	--	-0.4403	0.4213	0.0037	-0.0133	--	0.5937	--
	n=2	--	n=2	N=4	n=1350	n=121	--	n=9	--
female	--	--	--	0.2535	-0.1825	0.0375	--	0.3765	--
	--	--	--	n=13	n=56	n=255	--	n=6	--
Rwanda									
male	-0.6890	-0.7500	--	-0.0440	0.0000	0.0700	0.1090	0.3160	0.7610
	n=3	n=4	--	n=10	n=1770	n=52	n=2	n=3	n=3
female	-1.2136	--	--	0.4286	0.2264	0.0974	-0.2036	0.1954	-1.0286
	n=4	--	--	n=59	n=23	n=270	n=1	n=6	n=2
Kenya									
male	-0.1618	0.9642	0.0422	0.4018	0.0112	-0.0028	-0.4938	-0.1408	-1.2458
	n=2	n=1	n=1	n=9	n=1054	n=135	n=3	n=3	n=1
female	2.1449	--	--	-0.0049	-0.2441	-0.0091	1.5319	0.6949	2.5149
	n=2	--	--	n=20	n=51	n=299	n=2	n=6	n=1
Ethiopia									
male	-1.3881	-0.2721	--	-0.3569	-0.0081	0.0679	0.0999	1.3139	--
	n=4	n=4	--	n=13	n=2103	n=144	n=2	n=7	--

female	--	--	--	0.2198	-0.2998	0.1262	--	1.0282	--
	--	--	--	n=21	n=86	n=231	--	n=2	--
Tanzania									
male	-2.1977	-1.3377	--	1.4697	0.0373	-0.1057	--	0.7493	--
	n=2	n=1	--	n=3	n=606	n=127	--	n=4	--
female	--	--	--	0.1661	-0.0101	0.0249	--	--	--
	--	--	--	n=4	n=34	n=98	--	--	--

DHS Surveys: Children 18-59 Months of Age

Children 18-59 Months	Mother Dead		Father Dead		Both Alive				Both Dead
	Father not in HH	Father in HH	Mother not in HH	Mother in HH	Both in HH	Father not in HH	Mother Not in HH	Neither in HH	
Southern Africa									
Namibia									
male	-0.0714	-0.0185	0.1145	-0.2205	0.0265	-0.1025	0.1975	0.0145	-0.1825
	n=8	n=5	n=12	n=16	n=788	n=332	n=51	n=288	n=4
female	-0.1400	3.0260	-0.2210	-0.0630	0.1650	-0.0120	0.4130	0.0040	0.3440
	n=12	n=1	n=28	n=46	n=95	n=609	n=12	n=337	n=3
Zambia									
male	0.2361	0.1591	0.2951	-0.0219	0.0131	-0.1919	0.3041	0.0641	0.1601
	n=17	n=21	n=15	n=46	n=2773	n=338	n=40	n=115	n=10
female	-0.2639		-0.4769	0.0621	-0.1319	-0.0559	0.9401	0.2641	0.5071
	n=10		n=8	n=108	n=85	n=370	n=6	n=89	n=6
Malawi									
male	0.1089	0.0179	-0.1151	0.3159	0.0049	-0.0851	-0.1781	0.0139	0.2209
	n=21	n=16	n=24	n=28	n=4483	n=417	n=31	n=274	n=18
female	0.0021		0.4661	-0.0059	0.1091	-0.0529	-0.5499	0.1721	-0.0759
	n=21		n=17	n=160	n=142	n=916	n=5	n=183	n=12
West Africa									

Ghana									
male	-0.8969	0.2311	-0.9029	0.4971	0.0221	-0.1659	0.1631	-0.2649	
	n=6	n=9	n=28	n=13	n=1512	n=126	n=45	n=69	
female	-0.0102		-0.2172	-0.1972	-0.2962	0.0368	-0.7382	0.0088	0.1018
	n=4		n=6	n=34	n=25	n=422	n=3	n=70	n=1
Mali									
male	-0.3642	-0.1062	0.0098	0.2878	-0.0042	-0.0122	0.1908	-0.0572	-0.4702
	n=13	n=10	n=5	n=45	n=5214	n=227	n=102	n=182	n=4
female	0.8874	-0.3486	-0.5226	-0.0306	-0.2126	-0.0126		0.2854	-1.1036
	n=1	n=1	n=5	n=69	n=20	n=422		n=60	n=3
Benin									
male	0.2465	-0.3085	-0.8705	0.2325	0.0025	-0.0955	-0.2425	0.4675	
	n=3	n=4	n=3	n=12	n=1997	n=156	n=44	n=39	
female	-1.7059		1.1314	0.2481	-0.0269	-0.0589	0.8761	0.1211	1.1567
	n=1		n=1	n=26	n=2773	n=233	n=3	n=39	n=1
Nigeria									
male	-0.5079	1.3821	-0.1929	0.3131	-0.0079	-0.1929	-0.1149	0.3071	1.4751
	n=4	n=10	n=7	n=18	n=2402	n=131	n=44	n=90	n=5
female	0.0020	1.8960	-0.1030	0.1090	0.0100	-0.0280	-0.1980	0.1360	-0.2980
	n=5	n=1	n=28	n=35	n=29	n=206	n=3	n=44	n=2
Eastern Africa									
Uganda									
male	-0.7013	-0.2233	0.4867	-0.0693	-0.0013	0.0077	0.2727	-0.0753	-0.1903
	n=4	n=16	n=8	n=20	n=2639	n=183	n=56	n=87	n=2
female	-0.0875	-0.9635	0.5895	-0.1495	-0.0105	0.0225	0.2125	-0.0455	0.2305
	n=10	n=1	n=12	n=100	n=114	n=451	n=4	n=94	n=5
Rwanda									
male	-1.0340	0.3790	0.5310	0.3140	-0.0160	0.0650	-0.0350	0.4590	-0.0390
	n=8	n=32	n=13	n=42	n=2813	n=78	n=40	n=55	n=12
female	-0.2008	-0.7018	0.0932	0.0072	0.1042	-0.0468	0.7312	0.2482	-0.2228
	n=10	n=2	n=23	n=361	n=41	n=493	n=1	n=71	n=18
Kenya									

male	-0.0678	-0.8358	-0.5098	-0.7128	-0.6118	-0.5048	-0.1178	-0.6758	-0.7828
	n=6	n=13	n=6	n=16	n=2231	n=153	n=24	n=66	n=7
female	-0.2631		0.1339	-0.5331	-0.8051	-0.6361	0.0039	-0.6331	-0.6911
	n=7		n=7	n=120	n=68	n=580	n=6	n=64	n=11
Ethiopia									
male	-0.1051	0.1459	0.6209	0.0389	-0.0111	-0.0081	0.2249	0.1309	0.1799
	n=25	n=43	n=12	n=42	n=4838	n=260	n=64	n=169	n=12
female	0.0979		-0.3521	-0.0981	0.0249	-0.0581	0.6309	0.3359	-0.3981
	n=14		n=2	n=145	n=188	n=588	n=11	n=109	n=2
Tanzania									
male	0.4645	-1.7205	-1.3315	0.2075	0.0245	-0.1345	-0.6895	0.0655	-0.4045
	n=4	n=3	n=1	n=9	n=1303	n=156	n=20	n=87	n=1
female	1.3910		-0.2250	0.3760	0.1570	-0.1770	-0.1780	0.1220	-0.3960
	n=3		n=3	n=25	n=67	n=162	n=1	n=58	n=3

Annex 4e. Translation of Differences in Mean Z-scores to Difference in Underweight Prevalence

Difference in Z-scores	~Differences in Underweight Prevalence
-0.8	+20
-0.6	+15
-0.4	+10
-0.2	+5
0	0
0.2	-5
0.4	-10
0.6	-15
0.8	-20

Annex 5: Food Security Internal Reliability Tests: Differences between total "Yes" answers between households that answered "Yes" to questions in the Food security module in Blantyre, Malawi and Kingston, Jamaica.

Blantyre Survey

	Total "Yes" Answers		
	Yes	**No**	**Difference**
(Scale 1)			
Question 1	2.63	0.21	2.42
Question 2	2.61	0.15	2.46
Question 3	2.77	0.44	2.33
(Scale 2)			
Question 1	3.11	1.50	1.61
Question 2	3.08	1.21	1.87
Question 3	3.35	1.70	1.65
Question 4	3.84	2.10	1.74
(Scale 3)			
Question 5	2.87	0.32	2.55
Question 6	3.30	0.70	2.60
Question 7	3.06	0.46	2.60
Question 8	3.79	1.08	2.71
(Scale 4)			
Question 1	5.03	2.67	2.36
Question 2	5.08	1.68	3.40
Question 3	5.70	2.28	3.42
Question 4	6.19	2.45	3.74
Question 5	6.72	3.09	3.63
Question 6	6.44	2.69	3.75
Question 7	6.63	3.16	3.47
Question 8	6.44	3.60	2.84

Kingston Survey

	Total "Yes" Answers		
	Yes	**No**	**Difference**
(Scale 1)			
Question 1	2.67	0.10	2.57
Question 2	2.63	0.05	2.58
Question 3	2.88	0.41	0.41
(Scale 2)			
Question 1	3.09	0.12	2.97
Question 2	3.07	0.08	2.99

Question 3	3.40	0.45	2.95
Question 4	3.67	0.86	2.81
(Scale 3)			
Question 5	2.93	0.17	2.76
Question 6	3.18	0.48	2.70
Question 7	3.25	0.80	2.45
Question 8	3.93	1.38	2.55
(Scale 4)			
Question 1	5.19	3.11	2.08
Question 2	5.15	2.84	2.31
Question 3	5.81	3.19	2.62
Question 4	6.27	4.07	2.20
Question 5	6.16	2.79	3.37
Question 6	6.56	3.03	3.53
Question 7	6.54	3.23	3.31
Question 8	7.54	4.19	3.35

Annex 5b: Food Security Internal Reliability Tests: Cronbach Alpha Reliability Estimation

Blantyre Survey

	Item-Test Correlation	Alpha if item removed from scale	Total Alpha for scale
(Scale 1)			
Question 1	0.91	0.80	0.88
Question 2	0.92	0.77	
Question 3	0.85	0.89	
(Scale 2)			
Question 1	0.87	0.83	0.87
Question 2	0.89	0.81	
Question 3	0.86	0.83	
Question 4	0.77	0.88	
(Scale 3)			
Question 5	0.80	0.79	0.83
Question 6	0.83	0.77	
Question 7	0.83	0.77	
Question 8	0.78	0.80	
(Scale 4)			
Question 1	0.79	0.86	0.87
Question 2	0.83	0.85	
Question 3	0.85	0.83	
Question 4	0.77	0.83	
Question 5	0.77	0.86	
Question 6	0.76	0.86	
Question 7	0.79	0.86	
Question 8	0.73	0.86	

Kingston Survey

	Item-Test Correlation	Alpha if item removed from scale	Total Alpha for scale
(Scale 1)			
Question 1	0.94	0.82	0.91
Question 2	0.95	0.87	
Question 3	0.86	0.71	
(Scale 2)			
Question 1	0.91	0.80	0.88
Question 2	0.92	0.80	
Question 3	0.86	0.84	
Question 4	0.70	0.91	

(Scale 3)			
Question 5	0.84	0.77	0.83
Question 6	0.86	0.75	
Question 7	0.85	0.76	
Question 8	0.70	0.85	
(Scale 4)			
Question 1	0.85	0.82	0.85
Question 2	0.86	0.82	
Question 3	0.82	0.80	
Question 4	0.67	0.82	
Question 5	0.74	0.84	
Question 6	0.82	0.83	
Question 7	0.78	0.84	
Question 8	0.69	0.84	

Annex 6: Food Security/Hunger Status of Orphan/Non-orphan Children in Malawi, Zambia, and Zimbabwe. (Source: C-SAFE/WFP Community Health Surveys)

Coping Strategy	Malawi CHS 1		Malawi CHS 2	
	Households with an Orphan		Households with an Orphan	
	Yes	No	Yes	No
Reduce the number of meals per day				
Frequently	39.6% (91)	40.5% (165)	46.2% (166)	44.7% (194)
Seldom	32.2% (74)	33.4% (136)	34.3% (123)	36.6% (159)
Never	28.3% (65)	26.0% (106)	19.5% (70)	18.7% (81)
Skip Entire Days Without Eating				
Frequently	5.7% (13)	4.2% (17)	6.4% (23)	4.4% (19)
Seldom	26.2% (60)	28.0% (113)	25.9% (93)	35.9% (156)
Never	68.1% (156)	67.8% (378)	67.7% (243)	59.7% (259)
Restrict Consumption by Adults				
Frequently	12.2% (27)	9.4% (33)	20.6% (74)	14.1% (61)
Seldom	26.1% (58)	25.0% (88)	35.7% (128)	31.1% (135)
Never	61.7% (137)	65.6% (231)	43.7% (157)	54.8% (238)

Coping Strategy	Zambia CHS 1		Zambia CHS 2	
	Households with an Orphan		Households with an Orphan	
	Yes	No	Yes	No
Reduce the number of meals per day				
Frequently	52.9% (173)	51.6% (294)	44.9% (155)	40.3% (219)
Seldom	30% (98)	31.1% (177)	37.7% (130)	38.5% (209)
Never	17.1% (56)	17.4% (99)	17.4% (60)	21.2% (115)
Skip Entire Days Without Eating				
Frequently	12.5% (41)	15.3% (87)	10.7% (37)	10.3% (56)
Seldom	41.3% (135)	40.9% (233)	44.3% (153)	43.1% (234)
Never	46.2% (151)	43.9% (250)	44.9% (155)	46.6% (253)
Restrict Consumption by Adults				
Frequently	33.3% (109)	26.3% (150)	33.3% (115)	28.5% (155)

Seldom	40.4% (132)	35.6% (203)	41.7% (144)	36.1% (196)
Never	26.3% (86)	38.1% (217)	24.9% (86)	35.4% (192)

Coping Strategy	**Zimbabwe CHS 1**		**Zimbabwe CHS 2**	
	Households with an Orphan		**Households with an Orphan**	
	Yes	**No**	**Yes**	**No**
Reduce the number of meals per day				
Frequently	65.2% (229)	62.0% (311)	35.6% (134)	35.6% (170)
Seldom	25.1% (88)	26.1% (131)	42.8% (161)	38.5% (184)
Never	9.7% (34)	12.0% (60)	21.5% (81)	25.9% (124)
Skip Entire Days Without Eating				
Frequently	4.0% (14)	2.4% (12)	1.3% (5)	2.1% (10)
Seldom	26.8% (94)	27.1% (136)	11.2% (42)	14.9% (71)
Never	69.2% (243)	70.5% (354)	87.5% (329)	83.1% (397)
Restrict Consumption by Adults				
Frequently	19.0% (66)	28.7% (143)	8.2% (31)	10.9% (52)
Seldom	35.1% (122)	29.3% (146)	27.4% (103)	22.0% (105)
Never	46.0% (160)	42.1% (210)	64.4% (242)	67.2% (429)

Annex 6b: Food Security/Hunger Status of Orphan/Non-orphan Children in Malawi, Zambia, and Zimbabwe. (Source: C-SAFE/WFP Community Health Surveys)

Coping Strategy	**Malawi CHS 1**		**Malawi CHS 2**	
	Households with Chronically Ill		**Households with Chronically Ill**	
	Yes	**No**	**Yes**	**No**
Reduce the number of meals per day				
Frequently	46.1% (53)	38.9% (203)	46.4% (90)	45.1% (270)
Seldom	29.6% (34)	33.7% (176)	33.0% (64)	36.4% (218)
Never	24.3% (28)	27.4% (143)	20.6 (40)	18.5% (111)
Skip Entire Days Without Eating				
Frequently	8.8% (10)	3.8% (20)	3.6% (7)	5.8% (35)

Seldom	45.1% (51)	23.5% (122)	30.4% (59)	31.7% (190)
Never	46.0% (52)	72.7% (378)	66.0% (128)	62.4% (374)
Restrict Consumption by Adults				
Frequently	20.2% (21)	8.3% (39)	17.0% (33)	17.0% (102)
Seldom	34.6% (36)	23.4% (110)	38.1% (74)	31.6% (189)
Never	12.8% (47)	68.3% (321)	44.8% (87)	51.4% (308)

Coping Strategy	**Zambia CHS 1**		**Zambia CHS 2**	
	Households with Chronically Ill		**Households with Chronically Ill**	
	Yes	**No**	**Yes**	**No**
Reduce the number of meals per day				
Frequently	70.4% (100)	48.6% (367)	48.2% (145)	39.0% (229)
Seldom	18.3% (26)	33.0% (249)	33.9% (102)	40.4% (237)
Never	11.3% (16)	18.4% (139)	17.9% (54)	20.6% (121)
Skip Entire Days Without Eating				
Frequently	17.6% (25)	13.6% (103)	10.0% (30)	10.7% (63)
Seldom	47.9% (68)	39.7% (300)	43.9% (132)	43.4% (255)
Never	34.5% (49)	46.6% (352)	46.2% (139)	45.8% (269)
Restrict Consumption by Adults				
Frequently	35.9% (51)	27.5% (208)	30.6% (92)	30.3% (178)
Seldom	35.9% (51)	37.6% (284)	36.9% (111)	39.0% (229)
Never	28.2% (40)	34.8% (263)	32.6% (98)	30.7% (180)

Coping Strategy	**Zimbabwe CHS 1**		**Zimbabwe CHS 2**	
	Households with Chronically Ill		**Households with Chronically Ill**	
	Yes	**No**	**Yes**	**No**
Reduce the number of meals per day				
Frequently	67.6% (138)	61.9% (402)	35.5% (75)	35.6% (229)
Seldom	26.5% (54)	25.4% (165)	41.7% (88)	40.0% (257)
Never	5.9% (12)	12.6% (82)	22.7% (48)	24.4% (157)
Skip Entire Days Without Eating				

Frequently	2.9% (6)	3.1% (20)	1.4% (3)	1.9% (12)
Seldom	34.3% (70)	24.7% (160)	14.2% (30)	12.9% (83)
Never	62.7% (128)	72.3% (469)	84.4% (178)	85.2% (548)
Restrict Consumption by Adults				
Frequently	26.7% (54)	24.0% (155)	12.3% (26)	8.9% (57)
Seldom	31.2% (63)	31.8% (205)	24.2% (51)	24.4% (157)
Never	42.1% (85)	44.2% (285)	63.5% (134)	66.7% (429)