

A Whole Village Project Sector Report: **Food Security and Nutrition**

Key Findings from WVP Data

The Whole Village Project collects data on food security and nutrition using household surveys and focus groups of men, women, village leaders and farmers.

The magnitude of food insecurity: More than half of the 3,123 villagers surveyed worried about food in the month of interview (Fig. 2).

Hunger: More than 25% of households faced moderate to severe hunger (Table 1).

Availability of Food: Most households cultivate some land and own some form of livestock, but face significant losses due to weather, disease and insufficient access to agricultural inputs or livestock vaccinations (Figs. 14, 17 & 19).

Nutrition: Rural Tanzanians have limited access to a variety of foods (Fig. 12). The average household score on a measure of healthy food diversity (Pg. 7) is 0.2 on a 0 to 1 scale (Table 3)..

Children under age five: The share of children with stunted growth in WVP villages is nearly 40% (Table 5).

Drought: The picture of food insecurity captured by WVP data thus far is influenced by the catastrophic drought that afflicted much of East Africa in 2009. Continued data collection is imperative to understand the degree and sources of structural food insecurity.

The Whole Village Project

The Whole Village Project (WVP) is an interdisciplinary partnership between Savannas Forever Tanzania (SFTZ) and the University of Minnesota. The WVP collects quantitative and qualitative data on public health, nutrition, education, agriculture, wildlife, environmental conservation and food security in 55 villages in rural northern Tanzania. The scope of the data allows for a comprehensive picture of rural life and can help identify gaps in development assistance and national policies.

The WVP analyzes the data and uses a participatory planning model to communicate it back to villagers, local officials and donors. WVP data are also provided to researchers and groups evaluating economic, health, conservation and other development interventions.

Data collection began in 2009 and will continue with biannual visits to each of the 55 WVP villages pending funding. Ongoing data collection is essential to accurately evaluate the effectiveness of policy and development interventions over time. Additional funds to support future data collection and analysis are currently being sought. The WVP also partners with the National Institutes of Medical Research and the Tanzania Wildlife Research Institute.

Background

There are three dimensions to food security: adequate economic access to food, adequate availability – or physical access - to food, and appropriate consumption of food for proper nutrition. Beyond the physical consequences of hunger such as weakened immune systems and stunted child development, food insecurity has broader economic consequences. Less food insecure populations are associated with better quality of life and greater longevity. There is evidence that better nourished children have greater education outcomes and earn higher wages in the future. Food insecurity can also have macroeconomic implications. Household level food insecurity can retard economic growth by disincentivizing capital investment and trapping resources in food production that might be more effectively deployed elsewhere in the economy.

Tanzania remains vulnerable to food price fluctuations, in part due to a high degree of variability in food production. Tanzanian farmers struggle with variable rains, limited use of agricultural technology, and uneven access to input and output markets making domestic food security uncertain. Foreign exchange limitations constrain the ability for imports to mitigate this problem.

A Whole Village Project Sector Report: **Food Security and Nutrition**

Food Insecurity in Rural Northern Tanzania

Food insecurity is a multidimensional phenomenon. A food secure household is certain of its economic and physical means to access adequate food and consume a nutritious diet. To gauge the degree of food insecurity, Whole Village Project (WVP) household survey questions are designed to obtain information on the quantity and quality of food consumed as well as the degree of uncertainty about food security. WVP data on agriculture, health and general economic well-being provides essential context.

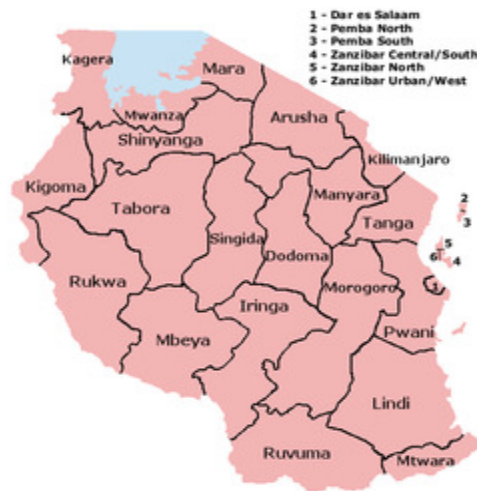


WVP Field staff share findings with villagers

Food security and hunger are an everyday concern in the 49 villages where the WVP has collected data. More than 55% of households worried about simply getting enough food in the four weeks prior to being surveyed. In five of the 49 villages for which data has been collected and processed to date, more than 20% of the respondents reported going to bed hungry often in the past four weeks.

Figures 2 and 3 display the share of the population worried about having enough food the share that reported going to bed hungry often in the four weeks prior to the survey in each of the seven regions of Tanzania covered by the WVP. (See Figure 1). With regional averages of no less than 30% and up to nearly 70% of

Figure 1: The regions of Tanzania



Source: Wikipedia

Figure 2: Worried about having enough food in past month By Region

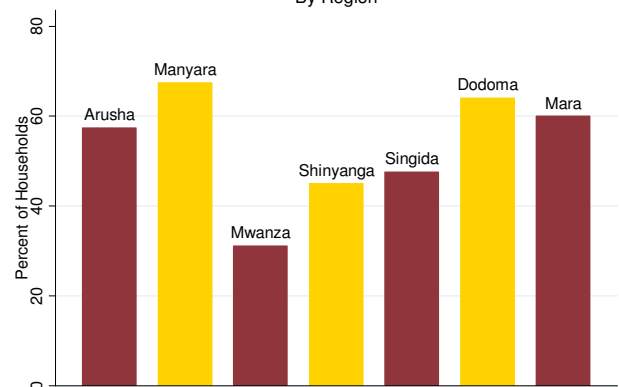
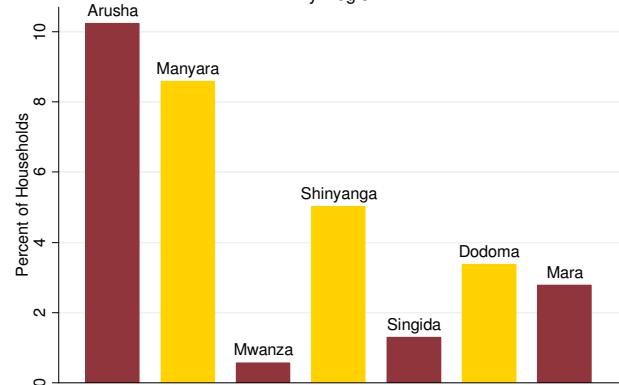


Figure 3: Went to bed hungry often in past month By Region

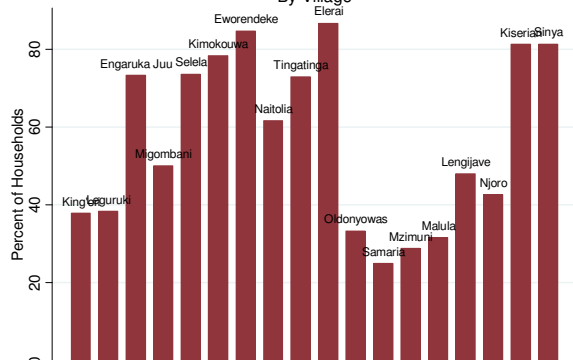


A Whole Village Project Sector Report: **Food Security and Nutrition**

households worried about food security, it is clear that villagers face a great deal of uncertainty about their ability to feed themselves and their families.

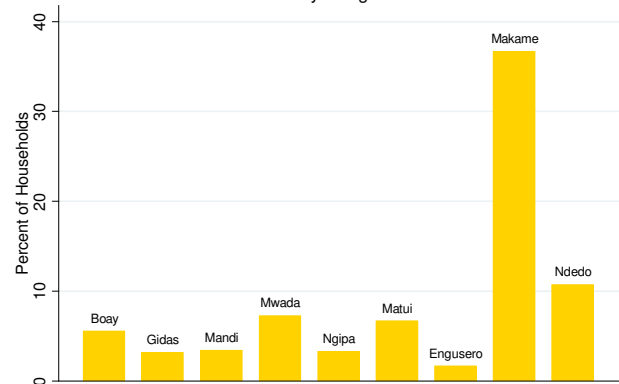
These regional averages disguise variation across WVP villages. On average, 57% of households in the Arusha region are worried about having enough food, but the share of households worried about having enough food ranges from 25% in the village of Samaria to an astonishing 87% in Elerai (Figure 4). Similarly, the relatively high share of the population that went to bed hungry often in the Manyara region hides the fact that while nearly 40% of households in the village of Makame went to bed hungry often in the four weeks prior to the survey, fewer than 10% of households faced that degree of hunger in seven of the eight other villages in the region.

Figure 4: Worried about enough food, Arusha Region
By Village



Data collected in focus groups and interviews in WVP villages provide context to the information from household surveys. In separate focus groups, men, women and village leaders were asked to identify the three biggest problems facing their village. Several focus groups reported serious food shortages facing their community and the problem is widespread. All three focus groups in the village of King'ori in Arusha region reported a shortage of food as the top problem facing the village. In Matui (Manyara region) and Kiserian (Arusha region) village leaders and women ranked it in the top

Figure 5: Went to bed hungry often, Manyara Region
By Village



three village problems. At least one focus group placed it in the top three in ten other villages in four other regions.

The picture of food insecurity captured by WVP data thus far is influenced by the catastrophic drought that afflicted much of East Africa in 2009. Many villages were still reeling from the

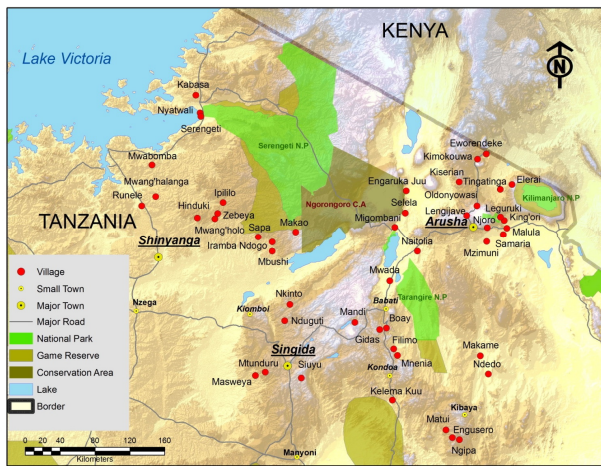


Masai woman reports survey results to villagers

effects of that drought when the surveys were taken. All of Northern Tanzania was affected by this drought, but WVP villages near the Kenyan border were disproportionately affected, particularly those like Kiserian, Eworendeke, Elerai, Kimokouwa, and Tingatinga in the Arusha region and Ndedo and Makame in Manyara where more than 30% of households are

A Whole Village Project Sector Report: Food Security and Nutrition

Figure 6: Map of Sample Villages



pastoralists. Figures 7 and 8 illustrate the degree of uncertainty households in these villages face with respect to their food security. Roughly 80% of the population in pastoralist villages was worried about having enough food. Going to bed hungry is also a more common experience for these villagers, particularly in Eworendeke, Elerai and Makame. The potential influence of short-term events like the drought on WVP data underlines the importance of continued data collection. Repeated surveys of WVP villages over time will allow researchers and program evaluators to distinguish between the effects of the drought and structural factors driving food insecurity.

Figure 7: Worried about enough food, Pastoralist Villages By Village

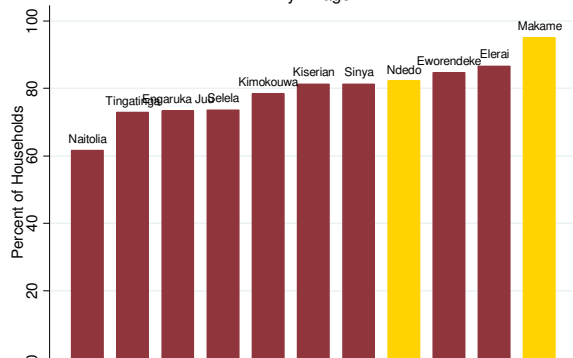
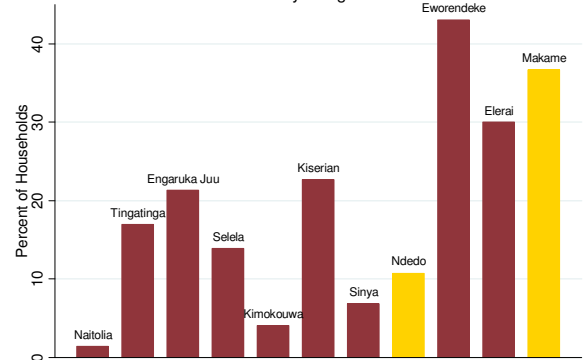


Figure 8: Went to bed hungry often, Pastoralist Villages By Village



WVP survey responses can be used to evaluate hunger and food insecurity using the series of questions that comprise the household food insecurity and access scale¹. The frequency with which a household reports 1) going to bed hungry, 2) having no food in the house, and 3) going a day and night without food in the four weeks prior to being surveyed is used as the basis for the Household Hunger Scale (HHS)². The Household Hunger Scale (HHS) ranges in value from 0 to 6. The mean HHS value for each village is reported in Table 1. A value greater than one indicates the presence of moderate to severe hunger. The hunger index does not capture household concern about adequate access to food nor does it provide information on the quality of food consumed. These are important dimensions of food insecurity. While the overall share of the population experiencing moderate to severe hunger is 28% by this measure – a far from negligible share of the population – the number of households who worry about sharing their fate is much higher. (See Figures 2 and 3.)

¹ The nine questions that comprise this section of the survey are those suggested by the Food and Nutrition Technical Assistance Project in FANTA (2007). "Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide."
² FANTA-2 (2010). "Validation of a Measure of Household Hunger for Cross-Cultural Use."

A Whole Village Project Sector Report: **Food Security and Nutrition**

Hunger in WVP villages is particularly prevalent among households headed by women, those with little education and those who earn a living

as pastoralists. This is likely a reflection of the fact that these groups tend to be among the most economically disadvantaged. Region average HHS values are uniformly higher for female-headed households (Figure 9). The disparity is particularly marked in the Manyara and Mara regions. The average household headed by a woman in Mara suffers from moderate to severe food insecurity whereas, on average, a household headed by a man does not.

Table 1: Average Hunger Index

Village	Region	Index
Makame	Manyara	3.70
Kiserian	Arusha	2.55
Ndedo	Manyara	1.90
Serengeti	Mara	1.22
Matui	Manyara	1.18
Mbushi	Shinyanga	1.10
Ngipa	Manyara	1.07
Kelema Kuu	Dodoma	1.07
Irama Ndogo	Shinyanga	0.92
Mnenia	Dodoma	0.86
Kabasa	Mara	0.85
Lengijave	Arusha	0.83
Nyatwali	Mara	0.75
Siuyu	Singida	0.73
Zebeya	Shinyanga	0.62
Mzimuni	Arusha	0.60
Hinduki	Shinyanga	0.58
Nkinto	Singida	0.57
Mwangholo	Shinyanga	0.56
Sapa	Shinyanga	0.53
Njoro	Arusha	0.52
Nduguti	Singida	0.51
Ipililo	Shinyanga	0.46
Engusero	Manyara	0.43
Malula	Arusha	0.38
Samaria	Arusha	0.37
Mwabomba	Mwanza	0.35
Oldonyowas	Arusha	0.30
Filimo	Dodoma	0.28
Mtunduru	Singida	0.25
Runele	Mwanza	0.25
Masweya	Singida	0.21
Mwanghalanga	Mwanza	0.20

Figure 9: Average Household Hunger Scale Value By Region

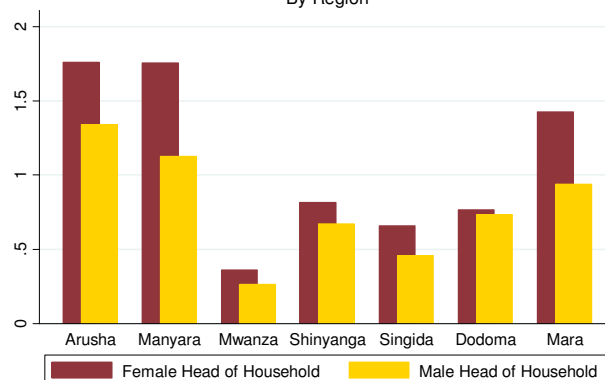


Figure 10: Average Household Hunger Scale Value By Region

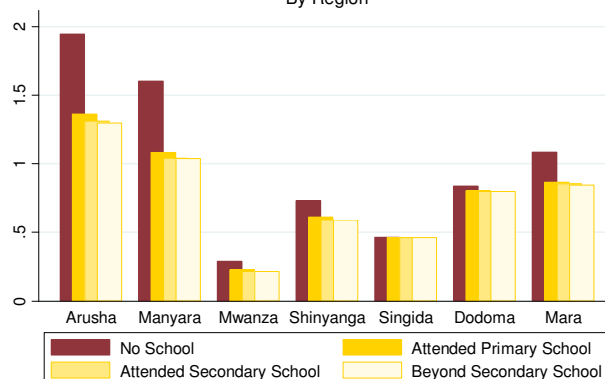


Figure 10 illustrates the greater prevalence of hunger among adults without education. The depth of hunger among households headed by individuals who have not attended any school is particularly distinct in the Arusha and Manyara regions. Figure 10 shows that the real difference

A Whole Village Project Sector Report: **Food Security and Nutrition**

in the average HHS value is between adults who reported attending any school and no school.

Figure 11 reports the regional average HHS score by primary occupation of the head of household. Pastoralist families have the highest

The scarcity of food captured by the HHS and the frequency with which households report concern about food security together describe household uncertainty of physical and economic access to food, but they leave out the third key dimension: nutrition. Diet quality is arguably

the dimension along which food insecurity is most prominent in WVP villages. One of the accepted cornerstones of a nutritious diet is variety in consumption. Dietary diversity is associated with adequate

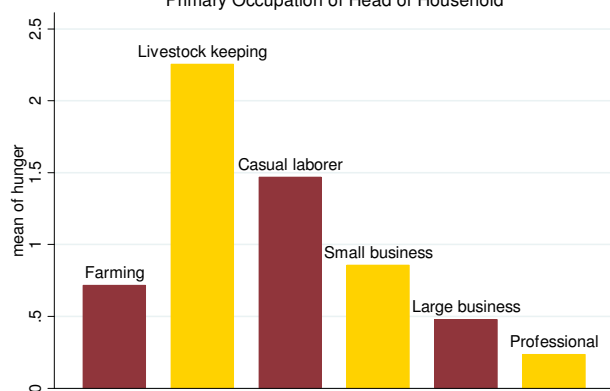
Region	Average Hunger Index	Share of Households Headed by Occupation			
		Farmer	Pastoralist	Laborer	Business/ Professional
Arusha	1.34	50%	33%	2.2%	6.9%
Manyara	1.12	74.1%	17.0%	0.2%	3.6%
Mwanza	0.27	92.8%	0.0%	0.0%	5.0%
Shinyanga	0.67	89.5%	1.9%	0.2%	3.6%
Singida	0.46	90.4%	1.0%	0.0%	6.4%
Dodoma	0.74	91.6%	0.0%	0.6%	3.9%
Mara	0.94	76.1%	0.0%	0.0%	11.1%

average HHS scores, followed at a distance by casual laborers. This result is likely intensified by the 2009 drought. Table 2 reports the share of household heads in each occupation category alongside the region average hunger index value. Notice that the Arusha and Manyara regions have both the highest share of pastoralists and the highest average HHS score, and these regions comprise the area hardest hit by the drought.

nutrition, including sufficient micronutrients like vitamin A, a lack of which can cause the membranes around organs to shrivel. The eyes are particularly vulnerable to this and thus blindness is a common consequence of vitamin A deficiency.

Most individuals in WVP villages reported eating only a few different types of food in the past week. Out of nine different food categories³, on average households reported they had eaten from only four in the week of the survey. By far the most common component of household diets in the survey population is grains. The remainder of household diets varies by region. Figure 12 reports the average number of days households ate meat protein, foods containing

Figure 11: Average Household Hunger Scale Value
Primary Occupation of Head of Household

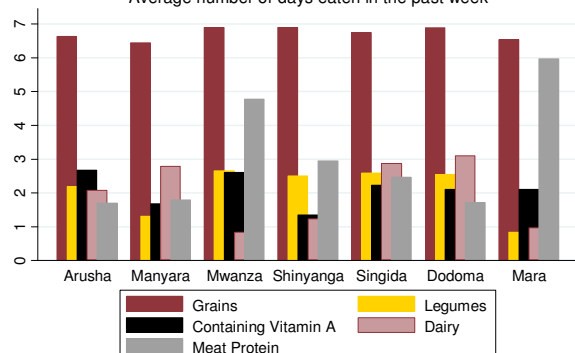


Nutrition and Diet

³ Grains, red vegetables, roots, green vegetables, mangoes/papayas, other fruits and vegetables, meat and fish, legumes and dairy.

A Whole Village Project Sector Report: Food Security and Nutrition

Figure 12: Regional Diet Composition
Average number of days eaten in the past week



While the WVP average food diversity scores are uniformly higher than 0.6, the average HFDS is much lower. Interestingly, while the Mara region has one of the higher Berry Index values, it has the lowest HFDS. Table 2 also reports the highest and lowest village average HFDS. The lowest scores come from the villages of Makame in the Manyara region and Kiserian in the Arusha region. These are both pastoralist villages and are among the poorest villages by many WVP indicators.

The average healthy food diversity score does not vary tremendously across education levels,

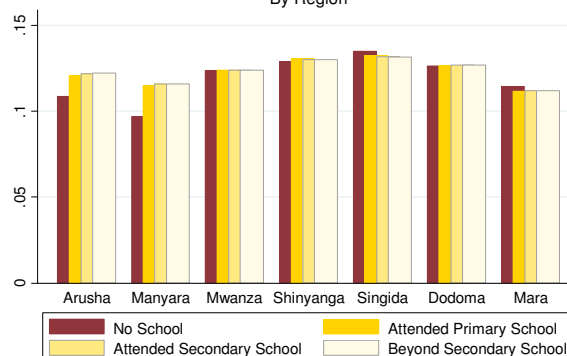
but it is interesting to see in Figure 13 that in the Singida and Mara regions, average HFDS is slightly higher for those with no school. The differences in average HFDS are statistically significant although they are small. The picture of the regional average Berry Index is similar to Figure 13,

Region	Region Average		Village Average HFDS	
	Berry Dietary Diversity Index	Healthy Food Diversity Score	Minimum	Maximum
Singida	0.776	0.132	0.129	0.137
Shinyanga	0.731	0.129	0.119	0.141
Dodoma	0.772	0.125	0.114	0.132
Mwanza	0.785	0.124	0.119	0.132
Arusha	0.658	0.122	0.067	0.166
Manyara	0.629	0.115	0.057	0.141
Mara	0.770	0.111	0.108	0.115

vitamin A, legumes and dairy in each region. As usual, Figure 12 hides tremendous variation within some regions. Table 3 reports regional averages of two household nutrition measures. The first is a simple index of dietary diversity due to Berry (1971). The second measure, the healthy food diversity score (HFDS) adjusts the Berry Index for the healthiness of each diet component⁴. The Berry index and HFDS both range from 0 to 1: Higher values of the Berry Index correspond to more diverse diets while higher values of the HFDS indicate a more healthy diet.

although average values for those with no school is uniformly lower.

Figure 13: Regional Average Healthy Food Diversity Score By Region



⁴ Drescher, L. S., Thiele, S., & Mensink, G. B. M. (2007). "A new index to measure healthy food diversity better reflects a healthy diet than traditional measures". *The Journal of Nutrition*, 137, 647-651.

A Whole Village Project Sector Report: **Food Security and Nutrition**

Table 4: Unexpected loss

Type of Shock	Share of population experiencing loss, by region					
	Arusha	Mwanza	Shinyanga	Singida	Dodoma	Mara
Loss of crops due to weather	0.52	0.38	0.56	0.32	0.48	0.48
Loss of crops due to disease/pest	0.28	0.29	0.40	0.24	0.26	0.29
Livestock died or stolen	0.41	0.29	0.28	0.16	0.14	0.25
Large fall in sale prices for crops	0.20	0.21	0.27	0.25	0.35	0.25
Large rise in price of food	0.43	0.26	0.30	0.20	0.49	0.41
Large rise in ag input prices	0.16	0.11	0.19	0.13	0.13	0.23

unexpected shock or disaster in the past year and the nature of its financial impacts⁵. Table 4 lists the share of the population experiencing unexpected losses related to food security. In four villages a large rise in food prices was the most frequently reported source of unexpected loss of resources. It is

Sources of food

WVP data provides insight into households' physical access to food. Villages in the sample are mostly remote (See Figure 6). They average 60 kilometers, and as many as 114 kilometers, from the nearest major town. In addition to purchasing food from markets, many WVP households cultivate food crops for consumption. Table 2 reported that in all regions except Arusha, more than 50% of households are headed by a farmer. The share is higher – in excess of 90% of households – in Mwanza, Shinyanga, Dodoma and Singida regions. Most households reported devoting the bulk of their land to food and feed crops such as beans, cassava, maize, millet, groundnuts, peas and lentils, potatoes, rice, sorghum and other fruits and vegetables. Maize is most commonly listed among households' most important crop. Sunflowers and cotton are also common crops, which are sold for processing. Coffee and sugar cane were listed among the most important crops for only a small number of villages.

In WVP household surveys, respondents are asked whether their household experienced an

clear from this table that households that obtain food from markets as well as those who grow crops for subsistence faced unexpected challenges to food security in the year they were interviewed.



Focus group in Arusha region

Farmers faced substantial loss of crops due to weather. In fact, this was the most frequently

⁵ These questions were not included in the survey for the first 20 villages.

A Whole Village Project Sector Report: **Food Security and Nutrition**

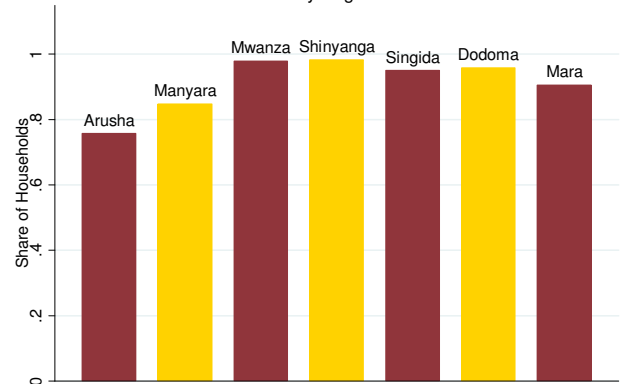
reported unexpected loss in 22 of the 28 villages with data on unexpected loss.

Agriculture

The vast majority of households in WVP villages cultivate some land and most own much of the land they cultivate. Figures 14 and 15 illustrate the average size of plots owned and cultivated by those who cultivate or own any land. The size of plots varies across as well as within regions, but most households cultivate small plots of less than five acres (Figure 16).

The share of the harvest that is sold rather than consumed or used for animal feed varies by crop.

Figure 16: Share of population cultivating less than 5 acres
By Region



Many WVP households cultivate crops as a source of income as well as to feed their families. On average, village farmers sell less than 10% of the maize, beans, and sorghum harvest and less than 20% of the cassava, rice, groundnuts, cashew, sweet potato, green vegetables, papaya and wheat harvest.

Most WVP households own some form of livestock. The most common animals are cows, chickens, sheep and goats. Figure 17 illustrates the types of livestock owned in each region. It is important to note that while these animals are owned in part for food production, they are often used as a store of wealth or a source of income.

Figure 14: Average acreage cultivated and owned
By Region

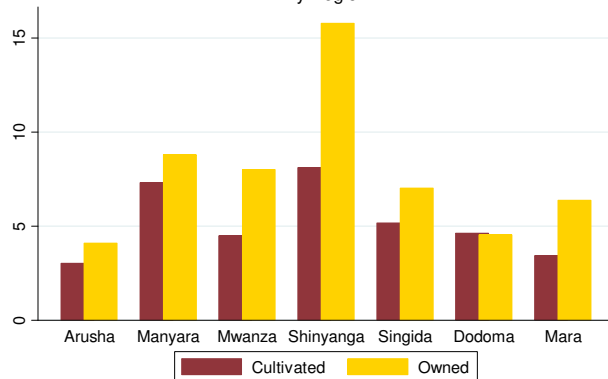


Figure 15: Average acres cultivated
By Village, Grouped by Region

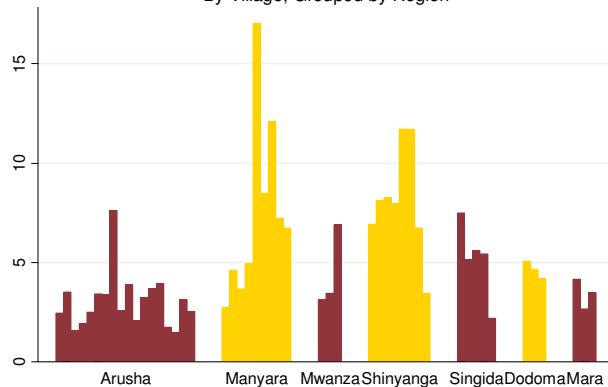
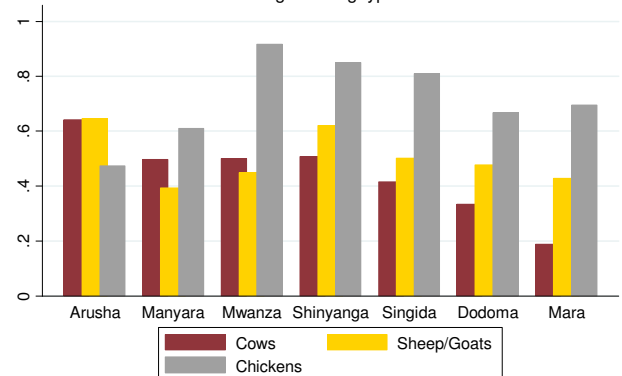


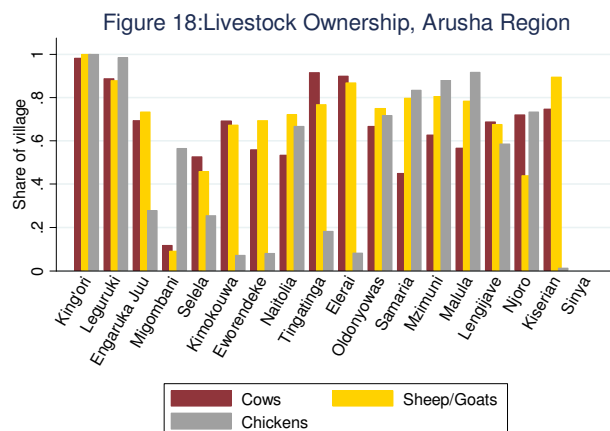
Figure 17: Livestock Ownership
Share of village owning type of livestock



A Whole Village Project Sector Report: Food Security and Nutrition

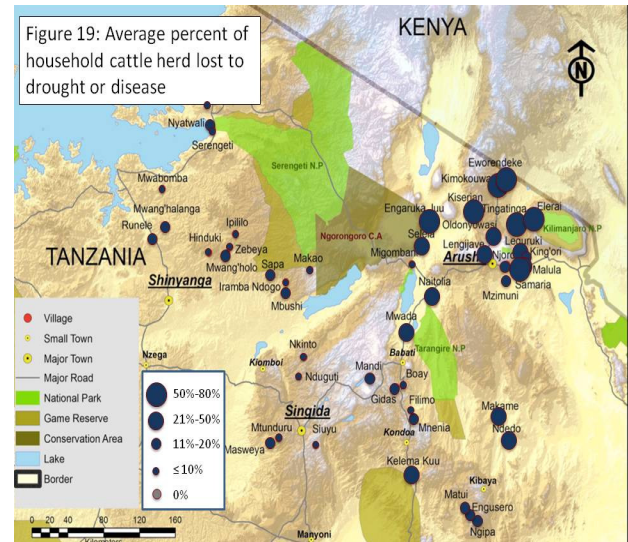
Again, regional averages hide variation among villages. Consider the case of the Arusha region (Figure 18). There is near universal ownership of all three types of animal in the village of King'ori, but very few animals other than chickens are owned by households in Migombani. In some villages like Tingatinga, Elerai, Kiserian and Sinya, owning cows is common and very few households own chickens. In others chickens are more common.

Men's, women's and village leaders' focus groups frequently cited livestock disease or a shortage of agricultural inputs and/or good agricultural



practices among the top village problems. Livestock disease was identified as a top village problem by all three focus groups in the village of Gidas and Matui. The men's focus group also identified it as a top problem in Kiserian and Selela. Availability of trusted agricultural inputs and information on good practices was listed as a top village problem in several villages. It was most frequently cited in the men's focus group, but women and village leaders also remarked on the need for better market information, better inputs and training on best practices.

As with the food insecurity measures, household concerns and decisions with respect to crop and livestock agriculture are likely to have been



significantly affected by the 2009 drought. Figure 19 illustrates the effect of the drought on livestock loss, particularly in the villages nearest the Kenyan border.

Kitchen Gardens

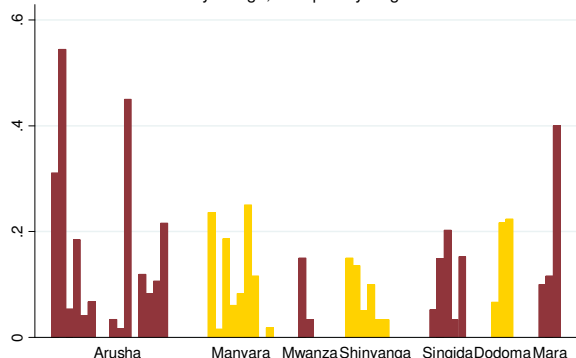
One strategy that many groups in the region advocate to lower food insecurity is "kitchen garden" cultivation. Figure 20 shows that kitchen gardens are common in only a handful of villages. Small gardens can be an efficient means of providing access to crops such as greens or tomatoes that are easy to grow and can be an



Kitchen garden

A Whole Village Project Sector Report: **Food Security and Nutrition**

Figure 20: Share of Population Cultivating Kitchen Gardens By Village, Grouped by Region



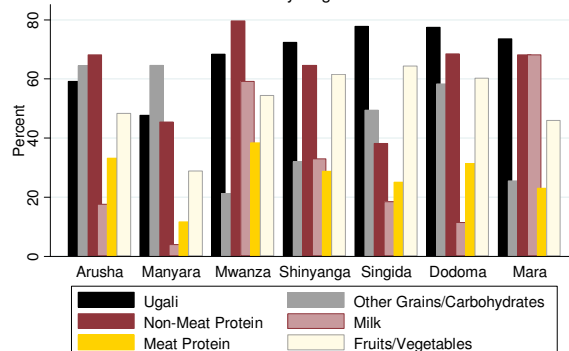
excellent source of food security, even in times of drought. For many households, kitchen gardens are also a source of income. Forty-eight percent of households with kitchen gardens ate more than half of what they produced and 39% reported selling more than half. A little over 10% of the total sample population cultivates kitchen gardens. Of those, 23% said they received some training. In the four villages where 25% or more households surveyed cultivate kitchen gardens very few individuals indicated that they received any training.

Youth and Children Under 5

Children are often the most vulnerable population to food insecurity. WVP interviews with school headmasters revealed that only half of the schools serve at least one meal. In most cases this consists of porridge at breakfast. Headmasters noted that school attendance was more consistent when they were able to offer a meal to students.

Children under the age of five face particularly serious consequences of inadequate food and nutrition. Like their parents, children under five in WVP villages do not have a varied diet. In most regions children under 5 primarily eat ugali, a mix of cassava, maize and/or sorghum. Non-meat protein, milk and fruits and vegetables make up the bulk of the rest of their diet. Other sources of nutrition vary by region. This is illustrated in Figure 21.

Figure 21: Children Under 5 Eating Food Item in Last Day By Region



The World Health Organization (WHO) has established a standardized set of measures for expected weight and height measurements given a child's age in a normal healthy population. Comparing WVP villages to a normal healthy population provides information on short and long-term food insecurity. WVP data on weight and height of children under the age of five have been used to calculate WHO "z-scores", which measure standard deviations from the mean of a normal healthy population.

Children who experience more periods of malnourishment will be short for their age or "stunted". The height-for-age z-score is therefore frequently used as a measure of cumulative malnourishment. In a normal healthy population, less than 2.5% of children will have z-scores less than -2. The share of children with stunted growth in the WVP villages is nearly 40%. Table 5 reports the share of

Region	%z-scores <-2
Manyara	50.51
Dodoma	41.67
Arusha	41.21
Singida	34.55
Mwanza	34.00
Shinyanga	33.52
Mara	32.84
Total	37.90

A Whole Village Project Sector Report: **Food Security and Nutrition**

height-for-weight z-scores less than -2 by region. This indicates a significant structural food security problem among children under five.

Weight-for-length (height) z-scores measure the child's nutritional status at the time of the interview. If a child has suffered from diarrhea or has been hungry in recent weeks a low weight-for-length z-score will be registered. A z-score less than -2 indicates the presence of "wasting," or short-term malnourishment.

Table 6: Prevalence of Wasting: Weight-for-length (height)

Region	%z-scores <-2
Manyara	4.71
Arusha	4.88
Dodoma	2.56
Shinyanga	2.11
Mara	1.96
Singida	1.82
Mwanza	1.20
Total	2.91

About 3% of the children in the total sample suffered from wasting. This is far fewer as a share of the population than those whose growth was stunted, but note that the regional average is as high as 5%. This can again be associated with the areas affected by drought. In the village of Makame in the drought-stricken Manyara region, nearly 15% of children under the age of five exhibit wasting.



Children under-five survey

Conclusions

Food insecurity is an everyday reality in WVP villages. Household hunger and concern about food insecurity are particularly affected by weather and other conditions that affect agricultural output. The severe drought conditions that prevailed during the survey period are a particular example of this.

The nutritional content of household diets is a key dimension of food insecurity that is often neglected in studies of food insecurity, especially in studies relying on more aggregate data. WVP data provides information on household diets as well as on economic and other livelihood factors influencing food consumption decisions.

Repeated data collection in WVP villages in the coming years will allow researchers to understand the structural drivers of all three dimensions of food insecurity.