Comprehensive Food Security and Vulnerability Analysis (CFSVA)

United Republic of TANZANIA

September 2010

Data collected between
November 2009 - January 2010

United Republic of Tanzania Comprehensive Food Security and Vulnerability Analysis
September 2010 (Data collected in November-January 2009/2010)

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Foreword

This report presents the results of the 2009-10 Tanzania Comprehensive Food Security and Vulnerability Analysis (CFSVA) that was carried out from November 2009 through January 2010, covering all the regions in Mainland Tanzania and Zanzibar. The baseline, which is the second after the first one done in 2005-06, was implemented by the National Bureau of Statistics (NBS) and the Office of the Chief Government Statistician (OCGS) in Zanzibar in collaboration with various stakeholders led by the Ministries of Agriculture in Mainland Tanzania and Zanzibar.

The main objective of this study was to measure levels, patterns and trends of food and nutrition insecurity indicators in both Mainland Tanzania and Zanzibar and compare the results with those from the earlier study. This baseline study was designed to provide estimates at regional level for all indicators in Mainland Tanzania and at district level for Zanzibar.

The study focused on livelihood-based food security and nutrition analysis with respect to the main pillars of food security. As such, this report provides comprehensive information for use by various stakeholders in the food security and nutrition sectors to facilitate informed decision making, planning and research.

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Acknowledgements

Table of contents

Acronyms

ARI	Acute Respiratory Infection
BMI	Body Mass Index
CFSVA	Comprehensive Food Security and Vulnerability Analysis
CMR	Crude Mortality Rate
CI	Confidence Interval
CSI	Coping Strategy Index
CsPRO	Censuses and Surveys Processing Package
CV	Coefficient of Variation
DHS	Demographic and Health Survey
DfID	Department for International Development
EA	Enumeration Area
FAO	Food and Agriculture Organization
FCS	Food Consumption Score
FSIT	Food Security Information Team
GDP	Gross Domestic Product
GoT	Government of Tanzania
RGoZ	Revolutionary Government of Zanzibar
HA	Hectare
HAZ	Height for Age Z- Score
HH	Household
IMR	Infant Mortality Rate
MALE	Ministry of Agriculture, Livestock and Environment
MKUKUTA	National Strategy for Growth and Poverty Reduction, Mainland Tanzania
MKUZA	National Strategy for Growth and Poverty Reduction, Zanzibar
MoH	Ministry of Health
NBS	National Bureau of Statistics
OCGS	Office of the Chief Government Statistician
ODAN	Emergency Assessment Branch - WFP
ODXF	WFP Food Security Analysis Service
PCA	Principal Component Analysis
PPS	Probability Proportional to Size
RFE	Rainfall Estimates
SDA	Secondary Data Analysis
SGP	Start of Growing Period
SPSS	Statistical Package for Social Sciences
STATA	Data Analysis and Statistical Software
TLU	Tropical Livestock Unit
U5MR	Under 5 Mortality Rate
UNICEF	United Nations' Children Fund
VAM	Vulnerability Analysis and Mapping
WAZ	Weight for Age Z- Score
WFP	World Food Programme
WHO	World Health Organization
WHZ	Weight for Height Z- Score
WI	Wealth Index
WRSI	Water Requirement Satisfaction Index
ZFSNPP	Zanzibar Food Security and Nutrition Policy and Programme

List of Tables

List of Figures

Executive Summary

Overview

The 2009/10 United Republic of Tanzania Comprehensive Food Security and Vulnerability Analysis (CFSVA) provides an in-depth assessment of the food security situation in both Mainland Tanzania and Zanzibar.

Mainland Tanzania is located in the Great Lakes region of Africa, bordering Mozambique, Malawi and Zambia to the south, the Democratic Republic of Congo, Rwanda and Burundi to the west and Uganda and Kenya to the north. It covers nearly 900,000 km^2, and the 2009 population is estimated to be close to 40 million people, with an annual population growth rate of 2.9percent.

The island chain of Zanzibar is located approximately 25 kilometres off the coast of Mainland Tanzania. Covering 2,654 km^2, Zanzibar is comprised of two main islands, Unguja and Pemba, and multiple islets some of which are uninhabited. The 2009 population of Zanzibar is estimated to be close to 1,300,000 people, with an annual population growth rate of 3.1 percent. It is a semi autonomous part of the United Republic of Tanzania and, as such, it has its own government, known as the Revolutionary Government of Zanzibar (RGoZ). It is divided into five administrative regions (three in Unguja and two in Pemba), with 10 districts (two in each region) and 296 shehias, the lowest administrative level.

The agricultural sector accounts for much of the economic activity in both Mainland Tanzania and Zanzibar, though the types of crops produced vary dramatically. In Mainland Tanzania, food and cash crop production (particularly maize) is still the mainstay of the agricultural sector. In Zanzibar, by contrast, cash crop production (particularly clove) comprises the bulk of agricultural activity. While slow but steady improvements have been seen in recent years, concerns remain that the agricultural sector in both areas has not reached its full potential.

As a part of the 2005-2010 National Strategy for Growth and Poverty Reduction (commonly known as MKUKUTA in Mainland Tanzania and MKUZA in Zanzibar), the Government of Tanzania (GoT) and the RGoZ have identified improving food security as a key long term development objective. To achieve this goal in Mainland Tanzania, the GoT is addressing the key constraints on agricultural productivity, which include high transaction costs (related to marketing food goods), limited access to credit and under-investment in productivity-enhancing technologies. However, these constraints, alongside chronic problems with poverty and weather-related shocks, continue to hinder growth in the commercial agricultural sector by discouraging farmers from increasing production and marketing more of their crops. To address food security concerns in Zanzibar, the RGoZ has developed and implemented a comprehensive food security and nutrition programme, entitled the Zanzibar Food Security and Nutrition Policy and Programme (ZFSNPP). The aim of this programme is to improve food security by 1) enhancing domestic agricultural production, 2) improving sanitation and health care and 3) increasing market efficiencies and access to micro credit schemes.

Scope and methods

With the GoT and RGoZ aiming to update strategic plans by 2010, the World Food Programme (WFP), the National Bureau of Statistics (NBS)/Office of Chief Government Statistician (OCGS), the Food Security Information Team (FSIT) and the Ministry of Agriculture Livestock and Environment (MALE) initiated the 2009/2010 Comprehensive Food Security and Vulnerability Analysis (CFSVA) in order to support and inform this process. By gathering poverty, food security and nutrition-related data, the CFSVA seeks to aid WFP, the GoT and other key actors in developing objectives, policies and programmes (by helping decision-makers prioritize and target resources more effectively) to respond to poverty and food insecurity throughout the country. The specific objectives of the CFSVA were to assess the current food security and nutritional status of the population and to determine whether vulnerability to food insecurity has improved or deteriorated since the first CFSVA in 2005/2006. In particular, the CFSVA addressed five questions (i) who are at risk of food insecurity; (ii) how many are they; (iii) where do they live; (iv) why are they food insecure; and (v) how can food assistance and other interventions make a difference in reducing poverty, hunger and supporting livelihoods?

The CFSVA was planned and designed by WFP, NBS/OCGS and FSIT. FSIT was responsible for technical guidance and oversight. The NBS/OCGS was in charge of technical aspects of the survey, including designing the sampling plan and determining overall sample sizes. Primary data collection was only collected in rural communities. The sampling plan differed between Mainland Tanzania and Zanzibar. In Mainland Tanzania, it called for a disproportionately stratified, two-stage cluster sample, with rural communities (PSU) first stratified by region. Twenty-one clusters, chosen using probability proportional to size (PPS) techniques, were sampled per region, with 10 households sampled within each cluster. This resulted in 210 households per region and 4410 households sampled throughout Mainland Tanzania. In Zanzibar, a stratified, two stage cluster design was also used but rural communities (PSU) were first stratified by district, rather than region. Then, twenty-one clusters, chosen using PPS techniques, were sampled per district, with 10 households systematically sampled within each cluster. This resulted in 210 households per district and 1,890 households sampled throughout Zanzibar. Data was collected using a household questionnaire (which included maternal and child health/nutrition modules) and quasi focus groups in each sampled community and amongst traders in key markets.

The survey was implemented between November and January 2009/2010, corresponding to a relatively lean period for both unimodal and bimodal regions of the country. Thus, the CFSVA captured food consumption patterns during a time when food was less easily available.

Rural Mainland Tanzania Results

How many people are food insecure and malnourished?

At the time of the survey, 4.1 percent of the households in Rural Mainland Tanzania had poor food consumption, 18.9 percent had borderline food consumption, and 77 percent had acceptable food consumption. Poor food consumption households had a mainly cereal-based diet with almost no animal protein and very little of any other food item consumed (vegetables just 3 days per week and pulses 2 days). Borderline consumption households had only a marginally better diet, eating pulses, vegetables and fruits approximately one day more per week than poor consumption households. Acceptable consumption households had an appreciably better diet with about a three-fold increase in pulse and fruit consumption and even higher increases in animal protein and milk consumption.

Among children 0-59 months of age, 5.7 percent were wasted, 36.6 percent were stunted and 14.3 percent were underweight. Height-for-age growth patterns showed that stunting begins early in childhood and peaks by 2 years of age. In addition, children in poor and borderline food consumption households experience more rapid nutritional declines early in childhood.

Because the negative effects of malnutrition are cumulative and inter generational, non-pregnant women of reproductive age were weighed and measured in order to determine their nutritional status. Of these women, 8.9 percent had a body-mass index less than 18.5 kg/m^2), with 1 percent severely undernourished (<16.00 kg/m^2), 1.2 percent moderately undernourished (16.00 to 16.99 kg/m^2) and 6.7 percent mildly undernourished (17.00 to 18.49 kg/m^2).

Where are the food insecure and malnourished people?

As shown in the map below, there were clear differences between regions in the distribution of poor food consumption households.

Poor consumption households were most prevalent in the south eastern region of Mtwara (20.0%), the central region of Manyara (17.6%), followed by the northern region of Arusha (6.8%), with high prevalence seen throughout the regions of Singida and Lindi, forming a band of vulnerability which runs from the southeast to the central northern regions. The central regions of Dodoma, Morogoro and the central northern region of Manyara also reported highest prevalence of households with borderline food consumption (at 37.8%, 33.8%, and 42.9% respectively).

The prevalence of acceptable consumption, on the other hand, was highest along the coast and in the western regions. Over 90 percent of households in the coastal regions of Dar es Salaam and Tanga and the western region of Mbeya reported having acceptable food consumption. Slightly fewer than 90 percent of households reported acceptable food consumption in Rukwa (89.1%) and Kigoma (88.9%).

The regional distribution of maternal and child malnutrition rates, at least in terms of wasting and underweight prevalence show some overlap with the distribution of poor food consumption households. For instance, maternal malnutrition and child wasting rates were highest in Arusha (15.6% and 16.6% respectively), which also reported the third highest rate of poor food consumption. Likewise, wasting rates were elevated and underweight prevalence was highest in both Manyara (8.0% and 20.7%) and Mtwara (7.1% and 19.3%), the regions with the two highest percentages of poor food consumption households. Mtwara, like Arusha, reported a high rate of maternal malnutrition as well (at 15.6%). By contrast, it is noteworthy that certain regions with a high level of acceptable consumption (like Kigoma) also reported elevated wasting and underweight prevalence (8.1% and 18.4% respectively). This suggests that other factors, independent of food consumption, are driving malnutrition rates within Tanzania.

Regional distribution of stunting prevalence was not correlated with food consumption patterns, with the highest rates seen in Iringa (54.6%), Rukwa (50.7%) and Kigoma (53.1%), regions that had amongst the lowest percentages of poor food consumption households. The lowest prevalence of stunting, by contrast, was seen in Dar es Salaam and Kilimanjaro (both with slightly over 20 percent stunted).

Distribution of poor and borderline food consumption households
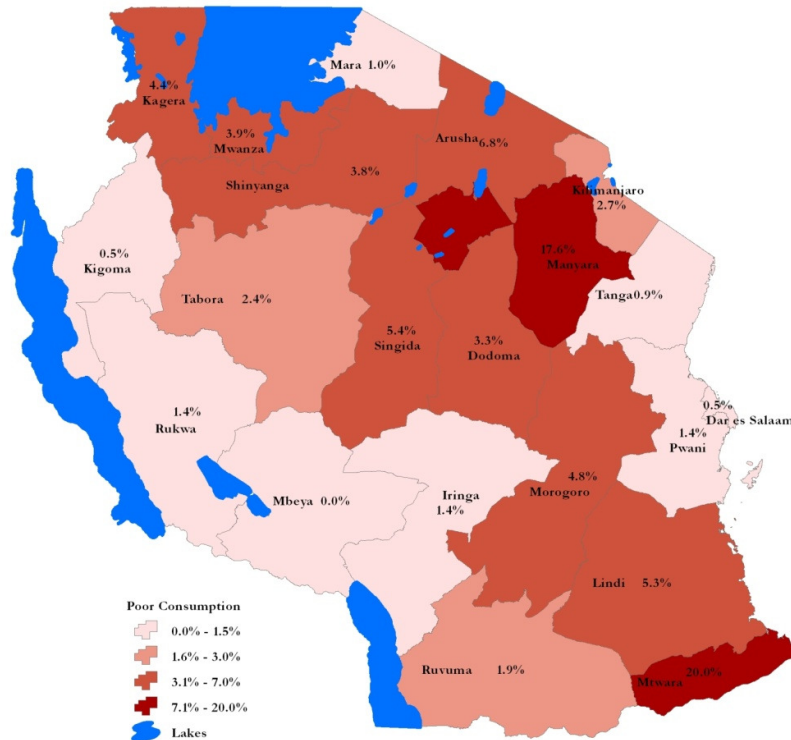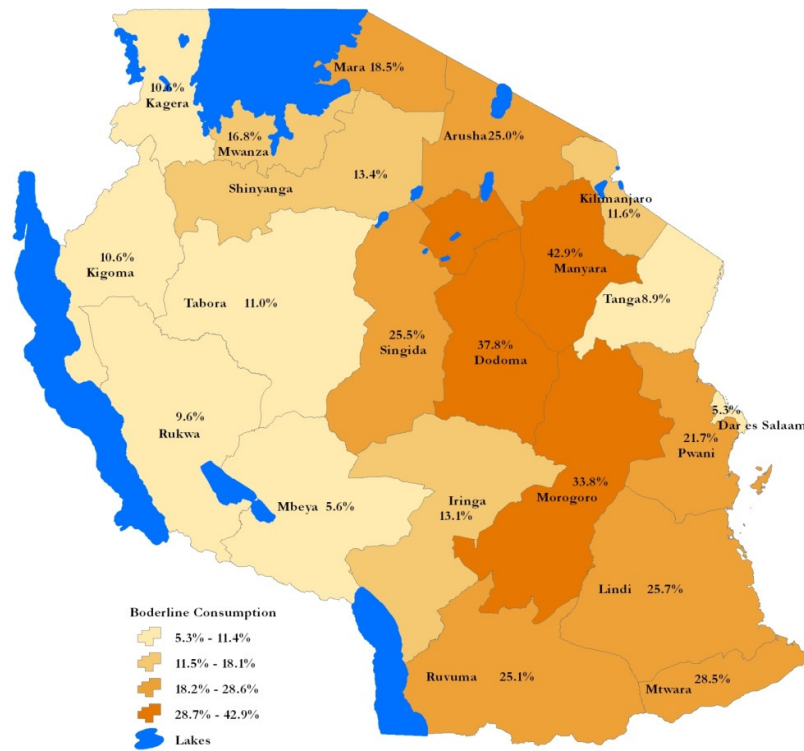
Who is food insecure?

To determine who the food insecure were, we explored various household characteristics related to food consumption at bivariate level, including:

Livelihoods: Households reliant on aid, daily work, small subsistence farming and agro-pastoralism were most likely to have poor food consumption. Indeed, the percentage of poor consumption is 7.9 percent, 6.9 percent, 5.6 percent and 5.5 percent respectively, and these four groups account for over two-thirds of all the poor food consumption households.

Demographics: Households headed by women and illiterate household heads were more likely to have poor food consumption than other households.

Wealth and Production: Food consumption was lowest among the poorest households and improved as wealth increased. Households with poorer consumption tended to:
(i) have access to less livestock;
(ii) cultivate less diverse crops;
(iii) cultivate less than 1ha of land; and
(iv) be less likely to use chemical fertilizers.

Underlying causes of food insecurity

The CFSVA explored the underlying causes of food insecurity. Controlling for potential confounding factors, several characteristics were found to have a statistically significant impact on household food security.

Food consumption was negatively affected by: (i) illiteracy of household head. Food consumption was positively influenced by: (i) having access to livestock; (ii) cultivating 4 or more crops; (iii) using chemical fertilizers; and (iv) enjoying asset wealth. The table below shows the results of interactive models which detail the regions most affected by these variables.

Factors significantly associated with food security	Regions where factors show a strong positive association with food security	Regions where factors show a strong negative association with food security
Illiteracy of household head	--	Mwanza and Mara
Access to livestock	Tanga, Mtwara, and Ruvuma	Kagera
Cultivating 4 or more crops	Dodoma, Arusha, Kilimanjaro, Singida, Rukwa, Shinyanga, Kagera and Mara	--
Using chemical fertilizers	Arusha and Shinyanga	--
Asset wealth	Arusha	--

Access to livestock seems to be associated with improved food consumption throughout the country except in Kagera. Further exploration is required to determine why Kagera differs from the rest of the country in this respect.

Multivariate analyses, including livelihood profiles, confirmed that only small subsistence farmers were significantly worse off than salaried workers (the most food secure group) after controlling for the above variables.

Shocks

Because shocks like drought and plant disease have significantly impacted the Tanzanian agricultural sector, the CFSVA explored in detail the types of shocks that households experienced. Not surprisingly, the top three shocks reported by households were drought (58.4%), high food prices (53.4%) and plant disease/animal pests (34.7%).

Drought was most frequently reported in northern (Arusha-90.5%; Tanga-93.9; Manyara-80.0%; Kilimanjaro-87.8%; Mara-85.7%), central (Dodoma-85.2%; Morogoro-80.6%) and south eastern regions (Mtwara-88.0%; Lindi-88.5%). This roughly corresponds to rainfall patterns and reflects the increasingly bimodal tendencies in the northern regions. The CFSVA, taking into account household perceptions and rainfall, has characterized the drought risk to regions as follows:

Risk classifications	Type/Timeliness of risk	Regions impacted
Seasonally low	Low hazard all year round, as perceived by households in areas with typically good moisture supply	Ruvuma, Rukwa, Kagera and Shinyanga
Seasonally high	High hazard nearly all year round, as perceived by households in areas of lower rainfall and moisture availability	Arusha, Tanga and Kilimanjaro
Peak season hazard	Hazard peaks during middle of cropping season, most likely at flowering or grain-filling stage; in areas with the highest February rainfall variability	Dodoma, Morogoro and Lindi
Planting season hazard	Hazard peaks during planting and early crop development stages	Mtwara, Dar es Salaam, Mara, Kigoma, Mwanza, Manyara, Tabora, Singida, Mbeya, Iringa, and Pwani

High food prices were a problem in many parts of the Mainland Tanzania, with high percentages of households in northern (Kilimanjaro-77.3%; Mara-80.1%), central (Dodoma-71.3%; Singida-71.4%) and southern regions (Lindi-86.3%; Mtwara-74.8%) reporting this shock. Only households in western regions reported this shock less frequently. Examined by livelihood profile, high food prices disproportionately hit daily workers (62.5%), fishermen/hunters (69.0%), households reliant on aid (60.8%), and "others" (68.4%). Large food/cash crop producers were least impacted with only 43.8 percent reporting this shock.

Problems with plant disease and animal pests were found most frequently in Lindi (83.6%), Kigoma (78.6%), Mtwara (66.9%), Mwanza (63.6%) and Mara (60.9%). The regions least affected included Shinyanga (1.9%), Ruvuma (5.0%) and Arusha (4.5%). Examined by livelihoods, large subsistence farmers and "others" were most affected, with 41.9 and 42.9 percent of households affected respectively.

Recommendations

Given these findings, the CFSVA makes the following recommendations for future programmes and policies in Mainland Tanzania.

Human Capital

The CFSVA findings confirmed the association between household head illiteracy and food insecurity, even when taking into account wealth and other confounding factors. Therefore, the CFSVA recommends strengthening policies that promote education. Since Mainland Tanzania has already instituted mandatory primary school to address literacy among children, reforms should also focus on adult literacy programmes, especially for adult women.

Natural and Physical Capital

As use of chemical fertilizers was associated with improved food security status, the CFSVA recommends that the GoT continue expanding the inputs voucher system (for fertilizer, seeds and pesticides) established in 2008. The input voucher programme, which initially targeted 700,000 poor farmers (farming less than 1ha of land), was expanded in 2009, to cover 1.5 million people. Additional expansions over time to cover more vulnerable farmers, particularly in poor food consumption regions such as Mtwara and Manyara, could significantly increase agricultural output and improve food security status.

Agricultural extension services should be provided to promote crop diversification and to help prevent and mitigate crop failures. Crop diversification not only improves food security status but substains a more diverse diet who, in turn, improves mother and child nutrition. This activity should focus particularly on regions in the north (Arusha and Manyara).

Physical capital

Safe drinking water and good sanitation provide the foundation for healthy communities and properly nourished children. As such, a general recommendation is that water and sanitation programmes be promoted in low access areas like Mara, Pwani and Tanga. These programmes would be particularly important in Mara as almost three quarters of households there do not have access to safe drinking water sources.

Food consumption and dietary diversity

A varied diet provides different nutrients needed by the body for proper growth and maintenance, so eating various types of food helps prevent malnutrition and promotes health. While households with acceptable food consumption have adequate diversity in their diets, the poor and borderline consumption households, clustered in Mtwara, Manyara, Arusha, Lindi and the central regions of the country, do not have the right variation in their diets, largely living of cereal consumption alone. The impact of this is seen in child growth and in maternal and child health. In fact, inadequate diversity in the complementary foods provided to children 6-23 months of age may explain the large increases in stunting prevalence in this age group. The CFSVA therefore recommends focusing on dietary diversity, particularly in providing assorted foods to children 6-23 months of age. This could be in the form of educational campaigns or through agricultural extension services.

Given the intergenerational nature of malnutrition, stunting may also begin in utero. Pregnant women must therefore receive the dietary diversity necessary for the development of a healthy baby. The CFSVA recommends that nutrition programmes be tailored to pregnant women to ensure they consuming an adequately varied diet, including animal proteins and milks.

Maternal and child health and nutrition

DHS data has revealed lower rates of post neonatal mortality, indicating that the country's focus on child health issues, particularly on malaria, are having an impact. The CFSVA recommends continued action on these fronts.

CFSVA data showed that stunting begins early in childhood and peaks by 2 years of age, suggesting that nutritional interventions should target children under 2 years of age and seek to improve child feeding patterns.

A key finding of the CFSVA is that high stunting rates are probably associated with child care practices shortly after birth. This argues for prenatal or early childhood interventions aimed at educating mothers on the importance of proper nutrition for themselves during pregnancy and of proper feeding for their children after birth (particularly regarding the timely introduction of appropriate and diverse complementary foods, and continued breastfeeding until 2 years of age). Increasing access to ante and post natal care, where such topics are discussed, may be one way of doing this. While the CFSVA indicates that almost all women (91%) currently seek antenatal care, perhaps the information given related to maternal nutrition and child caring practices should be strengthened.

Rural Zanzibar Results

How many people are food insecure?

At the time of the survey, only 3.3 percent of the households in Zanzibar reported less than acceptable food consumption. These households had poor diets, relying on cereal consumption 5 days per week, roots and tubers consumption 4 days per week, and vegetable as well as animal protein consumption approximately one to two days per week. Acceptable consumption households (96.7% of the households) had much better diets, eating cereals, pulses and milk about one day per week more and consuming over three times more animal proteins.

Where are the food insecure people?

There are clear differences between districts in the distribution of less than acceptable food consumption households. As the maps below indicate, they are concentrated in Pemba, with the highest percentages seen in the central and southern districts of Chake Chake (6.8%) and Mkoani (5.8%). Moving north in Pemba from Chake Chake, the level seemed to decline, with Wete showing a prevalence of 4.0 percent and Micheweni of 2.9 percent.

In Unguja, the districts most affected by less than acceptable food consumption were in the northern half of the island, with North A and North B reporting the highest prevalence (3.4 percent and 5.4 percent respectively). By contrast, the central and southern districts of West, Central and South reported the lowest prevalence with 1.5 percent, 0.5 percent and 0.5 percent of households reporting this respectively.

Patterns in the percentage of households with acceptable food consumption followed those seen amongst households with less than adequate consumption. Unguja, and particularly West, Central and South districts, reported the highest percentage of households with adequate food consumption while Pemba, and particularly the central and southern districts of Chake Chake and Mkoani, reported the lowest percentages.

Distribution of less than acceptable and acceptable food consumption households
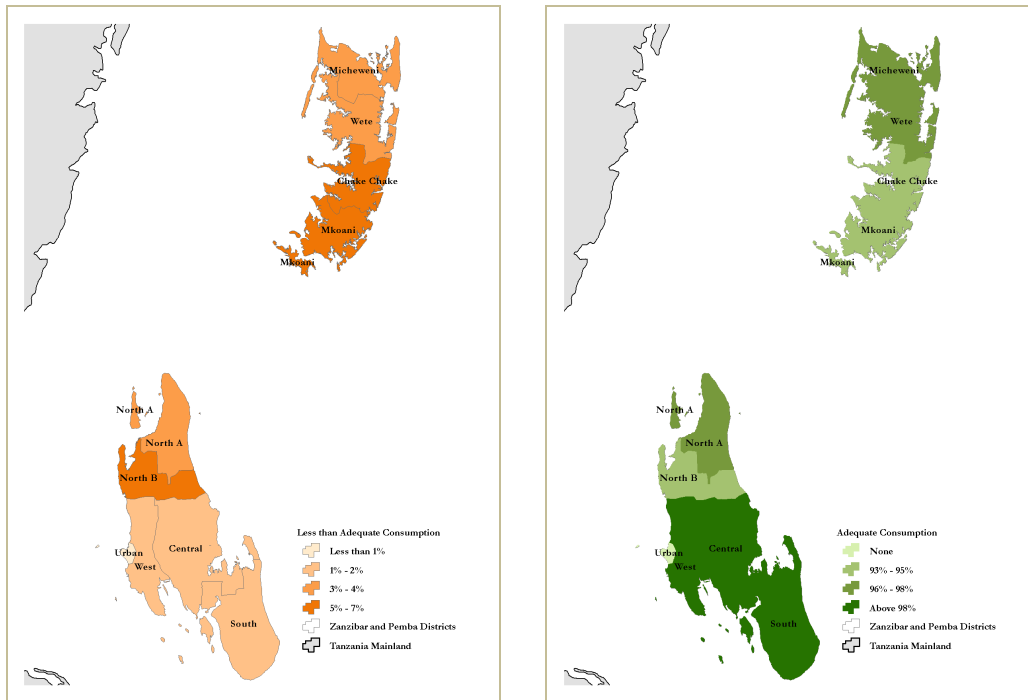
Who is food insecure?

To determine who the food insecure were, various household characteristics were explored in relation to food consumption at the bivariate level, including:

Livelihoods: Less than acceptable food consumption was more common in households reliant on aid (5.7%), agriculture (4.8%), "other" livelihoods (4.2%) and agro pastoralists (4.2%). 70.2 percent of the households with less than acceptable consumption relied on one of these livelihoods, and these four livelihoods account for over two-thirds of all less than acceptable food consumption households.

Demographics: Households headed by illiterate household heads, households headed by women and households with a high crowding index appeared more likely to have poorer food consumption than other households.

Wealth and Production: Food consumption was lowest among the poorest households and improved as wealth increased. Households with less than acceptable consumption tended to:
(i) have access to less livestock (cattle);
(ii) cultivate less than one hectare of land;
(ii) not cultivate a household garden;
(iv) be less likely to use chemical fertilizers; and
(v) engage in fewer livelihood activities.

Underlying causes of food insecurity

The CFSVA explored the bivariate associations above in more detail to ascertain the underlying causes of food insecurity. Controlling for potential confounding factors, several characteristics were found to have a statistically significant impact on household food security. Food consumption was negatively affected by: (i) households experiencing lack of rainfall over the past year. Food consumption was positively influenced by: (i) access to livestock, particularly to cattle; (ii) cultivation of a household garden; (iii) use of chemical fertilizer; (iv) asset wealth; (v) engaging in multiple livelihood activities; and (vi) farming more than one hectare of land.

In addition, the analysis confirmed that households reliant on agro-pastoralism had significantly higher mean food consumption score than all other livelihoods. Likewise, households in West district had a significantly higher mean food consumption score than households in any of the other districts in Zanzibar.

Shocks

The CFSVA examined the types of shocks that households in Zanzibar experienced. The top three shocks reported by households included high food prices (55.7%), plant disease/animal pests (49.4%) and drought (44.8%).

High food prices were most frequently reported in Pemba with 93.8 percent, 85.6 percent and 72.8 percent of households reporting this in Micheweni, Wete and Mkoani respectively. High food prices were less of a problem in Unguja as only 27.9 percent, 35.1 percent and 37.7 percent of households reported this in the South, North B and West districts respectively. Looked at by livelihoods, there was little variation, ranging from 45 percent amongst salaried workers to 65.3 percent amongst households reliant on aid.

Patterns in plant disease/animal pests were similar to those observed with high food prices, with households in Pemba again disproportionately impacted (in particular, those living in Micheweni, Wete and Mkoani). In Unguja, by contrast, the prevalence of household impacted by this shock is limited (only 11.7%, 17.2% and 18.4% in North B, South and Central districts). Examined by livelihood profile, agriculturalists, fisherfolk and agro-pastoralists were most affected while small businessmen and causal labourers were the least impacted.

Problems with drought also followed the same patterns seen above, with households in Pemba rather than Unguja more affected. Overall, drought was commonly reported by households in Micheweni, Wete and Mkoani. It was least commonly reported in Unguja's North B district. Drought was commonly reported across all livelihoods; between one-third and one-half of all households in each livelihood group reported this shock. Households relying on agriculture, agro-pastoralism and fishing were most likely to report this shock, while the livelihood profiles least impacted included households reliant on aid, casual labour and commerce.

Recommendations

Given the findings reported above, the CFSVA can make the following recommendations for future programmes and policies in Zanzibar.

Human Capital

The CFSVA findings confirm the association between illiteracy of household head and food insecurity, even when taking into account wealth and other confounding factors. Therefore, the CFSVA recommends strengthening policies that promote education. As Zanzibar has already instituted mandatory primary and secondary school to address literacy among children, reforms should, in addition, focus on adult literacy programmes, especially targeting adult women.

Natural and Physical Capital

As use of chemical fertilizers was associated with improved food security, the CFSVA recommends that the GoZ facilitate access to subsidized farm inputs such as fertilizer, seeds and pesticides. Giving farmers this technology will allow them to increase yields, bolstering both food supply and household livelihoods.

Agricultural extension services should be provided to promote crop diversification and to help prevent and mitigate crop failures. Crop diversification not only improves food security but more diverse diets should also benefit mother and child nutrition.

Finally, the CFSVA confirms that household gardens improve household food security. Household and community gardens should be encouraged as a way of strengthening household coping capacity during periods of food stress.

Physical capital

Safe drinking water and good sanitation provide the foundation for healthy communities and properly nourished children. As such, a general recommendation is that the water and sanitation programmes being conducted as a part of the Zanzibar Food Security and Nutrition Policies and Programmes be targeted to low access areas like the Pemba districts of Micheweni, Wete and Mkoani. These programmes are particularly needed in Micheweni where over three-quarters (77%) of households do not have access to improved sanitation.

Food consumption and dietary diversity

The consumption of various types of food assists in preventing malnutrition and promoting health. While households with acceptable food consumption have adequate diversity in their diets, households with less than acceptable food consumption, which are clustered in Pemba and in the North B district of Unguja, do not. These households rely on an inadequate mix of cereals, roots and tubers and animal protein consumption per week. This is likely to have an overall impact health and child nutrition, so improvements in dietary diversity could significantly improve health and nutrition outcomes.

Introduction

The 2009/2010 United Republic of Tanzania Comprehensive Food Security and Vulnerability Analysis (CFSVA) aims to gather the necessary information on food security, health and nutrition to ensure the World Food Programme (WFP) best fulfils its mandate of addressing hunger and food insecurity throughout Tanzania. As this survey used a collaborative, multi sectoral approach, it is not only intended to inform internal WFP programming activities but also to inform programming of stakeholders and other partners working in humanitarian assistance and development.

The 2009/2010 CFSVA is built on findings from WFP's initial CFSVA conducted in 2005/2006. Thus, certain results presented throughout this report will be compared to the previous findings to assess improvements or deterioration. As Tanzania is a data–rich country, other surveys are also used for comparative purposes when appropriate.

The following sections are intended to provide the historical context behind modern day Tanzania and to provide a brief summary of the country's food security challenges**.**

Background

The United Republic of Tanzania has historically relied on agriculture as the foundation of its economy and as the primary source of livelihoods for its people. From past to present day, the majority of crop production takes place on smallholder, subsistence farms. During colonialism, the Germans (followed by the British) attempted to modernize and integrate the agricultural sector by placing greater emphasis on developing trade route infrastructure (railways) and boosting cash crop production (cotton, peanuts, coffee, rubber, etc).[1] The British even established a system of cooperative farms, which encouraged subsistence farmers to adopt cash crops and animal husbandry. While food crop production was not neglected during this period, large scale food crop production schemes (e.g. the British wheat production scheme of 1943) were developed only in response to war–induced food shortages in Britain.[2]

Socioeconomic and agricultural trends continued along these lines until 1964, when Tanganyika and its island neighbour Zanzibar, formally unified to become the United Republic of Tanzania, after being granted independence from the British in 1961 and 1963 respectively. The new president of the unified republic, Julius Nyerere, immediately instituted a series of reforms aimed at correcting economic imbalances created during colonialism. The foundation of these reforms was a new development plan, entitled the Arusha Declaration. This plan reshaped the economy through an aggressive policy of nationalization and "Ujamaa" (or villagisation) whereby rural villages were forcibly organized into farming communities. Ujamaa was intended to modernize the agricultural system by gathering small subsistence farm holders into larger, collective farming units which aimed, with help from modern technologies, to rapidly increase production and foster rural development.[3] In the end, the Ujamaa policy failed, leading instead to lower overall yields and increasing problems with food availability.

Despite growing resistance from rural populations, the system persisted until the 1980s, greatly affecting the agricultural sector and leading to economic stagnation. The post Ujamaa period, however, has been characterized by moves away from the Arusha Declaration and towards economic liberalization. This has resulted in slow improvements in the agricultural sector and restored donor confidence among foreign investors and potential donors. This culminated in the 2000 and 2003 Poverty Growth Facility (PGRF) support programme from the IMF and considerable debt relief through the Heavily Indebted Poor Countries Initiative.

Current food security challenges

Despite the implementation of the various poverty reduction strategies, progress in establishing a dynamic commercial agriculture sector has been slow and most communities remain dependent on smallholder, subsistence farming. Likewise, clove production and exports, the bedrock of Zanzibar's economy, remain far below the level seen in the 1970s. Recognizing the need to hasten improvements in the agricultural sector, the Government of Tanzania (GoT) and the Revolutionary Government of Zanzibar (RGoZ) have identified improving food security as a key objective of the

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[1] Haupt, Werner. Germany's Overseas Protectorates 1884-1918. Friedberg: Podzun-Pallas Verlag, 1984.
[2] 1999 interview of David Hines; (b) London *Daily Telegraph* obituary of David Hines 8 April 2000.
[3] Agricultural Council of Tanzania (ACT). *Agricultural history.*
 Online at: http://www.actanzania.org/index.php?Itemid=19&id=17&option=com_content&task=view

2005-2010 National Strategy for Growth and Reduction of Poverty, better known as MKUKUTA in Mainland Tanzania and MKUZA in Zanzibar[4]. To focus efforts, the GoT has identified the key constraints to the agricultural sector and to food security in general. These include 1) high transaction costs related to marketing food goods, 2) limited access to credit and 3) underinvestment in productivity–enhancing technologies. These factors are widely recognized as obstacles in the ongoing transition from subsistence to commercial agriculture. In addition, the RGoZ has developed and implemented a comprehensive food security and nutrition programme, entitled the Zanzibar Food Security and Nutrition Policy and Programme (ZFSNPP). The aim of this programme is to achieve better food security by 1) enhancing domestic agricultural production, 2) improving sanitation and health care and 3) increasing market efficiencies and access to micro credit schemes.

With the GoT and RGoZ aiming to update strategic plans in 2010, the World Food Programme (WFP), the National Bureau of Statistics (NBS)/Office of Chief Government Statistician (OCGS), the Tanzania Food Security and Information Team (FSIT) and the Ministry of Agriculture, Livestock and Environment (MALE) initiated the 2009/2010 CFSVA in order to support and help inform this process. By gathering detailed food security information, the CFSVA is intended to provide an updated assessment of the current state of food security in Tanzania and a multi–sectoral evaluation of potential causes and remedies.

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[4] MKUKUTA and MKUZA are the Kiswahili acronyms for this development strategy. Specifics of the MKUKUTA and MKUZA strategy can be found online at: http://www.povertymonitoring.go.tz/mkukuta.asp or at http://www.unpei.org/PDF/TZ-zanzibar-strategy-growth-poverty-reduction.pdf

CFSVA Objectives and Methodology

Objectives

The CFSVA seeks to compile and critically analyze information on the food security and nutrition situation in Tanzania and to provide comprehensive baseline information to all the actors working in humanitarian assistance and development (e.g. Government, UN agencies, civil society, and donors, etc.). Primary objectives include to:

a) provide an accurate and detailed assessment of the current food and nutrition security situation using primary data collected during the CFSVA and other existing data;
b) identify areas where assistance may be required and build a profile of households who are vulnerable and food insecure; and
c) assess the causes and risk factors of food insecurity and child malnutrition from a multi disciplinary perspective and to determine potential ways to mitigate both.

Specifically, the report will answer five main questions:

Who are the food insecure and who are those vulnerable to food insecurity?
How many are there?
Where do they live?
Why are they food-insecure?
What interventions might be appropriate to reduce their food insecurity and vulnerability?

By answering these questions, the CFSVA seeks to inform and evaluate current nutrition and food security programming in Mainland Tanzania and Zanzibar including ongoing national processes such as the 2005-2010 MKUKUTA and MKUZA. The CFSVA also aims to strengthen existing contingency plans by identifying populations vulnerable to food insecurity and assessing susceptibility to socio-economic, natural, political or other shocks.

Conceptual Framework and Definitions

At the World Food Summit in 1996, it was agreed that food security exists when "all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life".

Food security is determined by the interaction of a broad range of political, socio-economic, and production– and health–related factors. While there is no single, direct measure, food security has three distinct but interrelated dimensions: food availability, household food access, and individual food utilization. Here are some brief definitions of these terms:

1) **Food availability:** the amount of food physically available to a household (micro level) or in the area of concern (macro level) through all forms of domestic production, commercial imports, reserves and food aid;
2) **Food access:** the physical (e.g. road network, market) and economic (e.g. own production, exchange, purchase) ability of a household to acquire adequate amounts of food; and
3) **Food utilization:** the intra-household use of the accessible food and the individual's ability to absorb and use nutrients (e.g., as a function of health status).

CFSVA is based on a particular understanding of food security and vulnerability, which is best illustrated by the Food and Nutrition Security Conceptual Framework (see Figure 1). This framework is a combination of UNICEF's nutrition framework and DFID's Sustainable Livelihoods Framework. It informs not only the selection of indicators and approaches for the analysis, but also the design of field assessment instruments. It considers food availability, food access, and food utilization as core elements of food security and illustrates how they can be explored using a variety of community, household and individual level variables (including households' asset endowments, livelihood strategies, and political, social, institutional, and economic environments) along the causal pathway towards the ultimate outcomes of food insecurity, malnutrition and death.

The CFSVA recognizes the dynamic nature of food security by identifying the populations and households at risk of food insecurity. This requires assessing household vulnerability to food insecurity, defined as "the probability of an acute decline in access to food, or consumption, often in reference to some critical value that defines minimum levels of human well-being". Vulnerability is a function of risk and risk management. Here are some brief definitions of key terms:

1. **Exposure to risk**: the probability of an event that, if it did happen, would cause a welfare loss (e.g. drought); and

2. **Risk management**: the ability to mitigate the possible consequences of a probable event. This can in turn be divided into ex-ante risk management (preparedness) and ex-post risk management (ability to cope). The ability to cope is the response after an event occurred; it could be non–sustainable and affect the resource base of the household (like the selling of productive assets) or it could be more sustainable (e.g., non–negative responses, like migration). The ability to cope is undermined by the intensity of the event itself as well as poor structural and social conditions such as poverty.
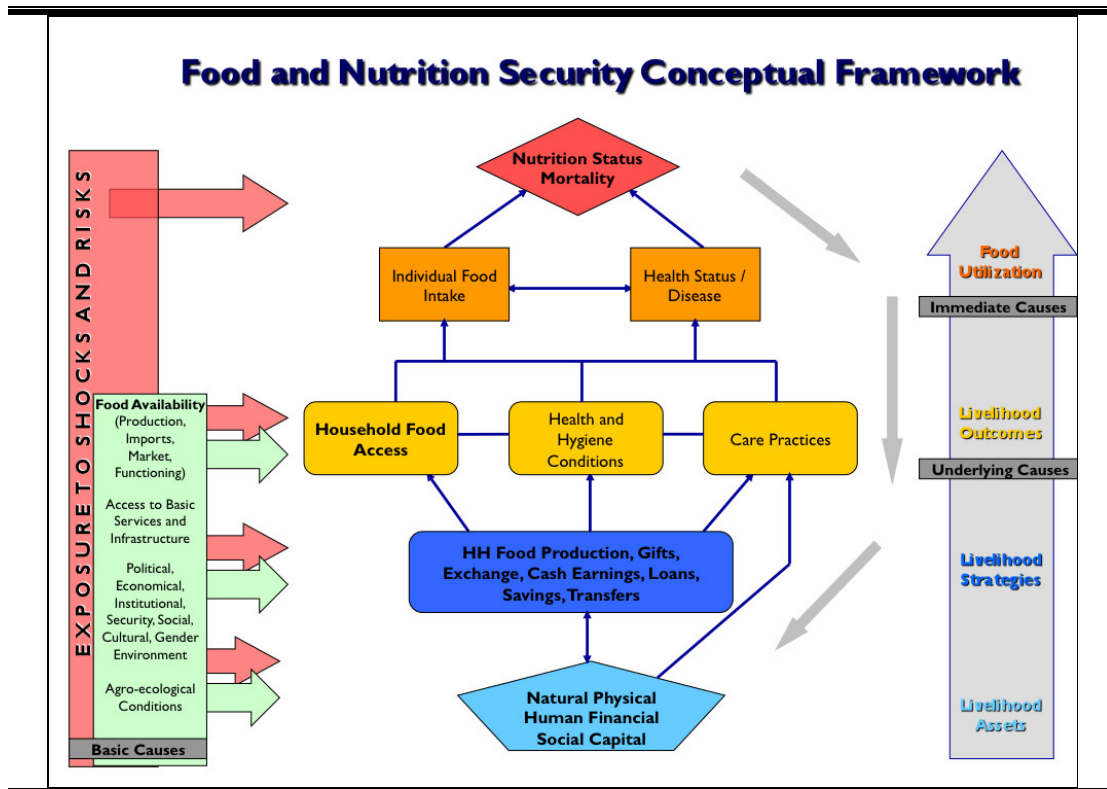
Fig 1: Food and Nutrition Security Conceptual Framework
(Source: WFP, Comprehensive Food Security & Vulnerability Analysis Guidelines)

Nutritional status is the balance between the intake of nutrients and their expenditure in the processes of growth, reproduction, and health maintenance. Consequently, malnutrition exists when diets provide insufficient (or excess) calories and protein for growth and maintenance or when nutrients cannot be fully utilized due to illness. Anthropometric indicators have been used to assess the nutritional status of women 14-49 years of age and children 6 and 59 months old in this CFSVA.[5] Specifically, the nutritional status of women was measured using body mass index (BMI). Child nutrition was measured using weight-for-height, weight-for-age and height-for-age z-scores. These indicators are defined as follows:

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[5] As will be explained further in the Methodology section, the nutritional status of women and children is only reported for Mainland Tanzania. This is because the nutritional information collected in Zanzibar was not of sufficient quality. Follow up assessments to re-collect this information are in the planning phases.

Body Mass Index (BMI): A simple measure of weight for height that is commonly used to classify underweight or overweight in adults. It is calculated by dividing weight in kilograms by height in meters squared (weight kgs/ height m^2).

Weight-for-height (wasting): A measure of acute malnutrition which is the result of a reduced energy intake over a short period of time due to either food shortage or poor health. Z-scores are obtained by examining a child's weight and height against the new (2006) NCHS/CDC/WHO reference growth data and determining how many standard deviations (SD) that child is away from the mean. "Global Acute Malnutrition" (or GAM) is commonly used to refer to a combination of moderate and severe wasting (<-2 SD) and oedema. "Severe Acute Malnutrition" (or SAM) is commonly used to refer to severe wasting (<-3 SD) and oedema.

Height-for-age (stunting): A measure of linear growth, which reflects longer term, rather than acute nutritional deficiencies. Z-scores are obtained by examining a child's height and age against the new NCHS/CDC/WHO reference growth data and determining how many standard deviations (SD) that child is away from the mean.

Weight for age (underweight): A composite measure of both chronic and acute malnutrition, thus capturing aspects of both stunting and wasting. Z-scores are obtained by examining a child's weight and age against the new NCHS/CDC/WHO reference growth data and determining how many standard deviations (SD) that child is away from the mean. Underweight is one of the indicators used to measure the progress towards MDG 1 (eradicate extreme poverty and hunger), in particular on Target C which proposes to "reduce by half the proportion of people who suffer from hunger".[6]

To understand how food insecurity and insufficient food intake impact nutritional status among children and mothers, the CFSVA assessed the strength of association between BMI, wasting, stunting and underweight and certain key food security, socioeconomic and health indicators.

Methodology

The design and implementation of the 2009/2010 CFSVA involved three stages: (1) a literature and secondary data review; (2) primary data collection at household, trader and community level; and (3) primary data analysis and reporting. The CFSVA followed a participatory approach involving government, line ministers and departments/agencies, UN agencies, donors, NGOs and community representatives in order to encourage productive partnerships (i.e., for data collection, analysis, reporting), build synergies and avoid duplication in assessment activities.[7] The preparation of instruments (open-ended or closed-end questionnaires, etc.) and identification of type of respondents (key informants, focus groups, households) was conducted in close consultation with all the partners. The sampling frame was carried out by the NBS/OCGS. The following sections discuss the specific methodologies utilized.

Sources of data

To assess the distribution and severity of food insecurity in Tanzania, the CFSVA relied on both secondary and primary data sources.

Secondary Data Analysis (SDA)

To inform and guide the CFSVA, a comprehensive Secondary Data Analysis (SDA) was conducted in April 2009. The goal of this process was to identify and compile existing reports addressing food security, health and nutrition issues within Tanzania and to identify the data gaps which the planned CFSVA could address. Surveys identified during the review include the 2004/05 Tanzania Health and Demographic Survey (THDS), the 2005 Mainland Tanzania Nutrition Survey, the 2005/06 Tanzania Comprehensive Food Security and Vulnerability Analysis (CFSVA) and the 2007 Tanzania Household Budget Survey undertaken by the NBS.

Data related to the following topics were compiled:
> geographic distribution of populations;
> poverty and inequality indicators;
> government investment in social services;

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[6] Source: http://www.undp.org/mdg/
[7] See the "key stakeholders and partners" paragraph for a complete list of partners.

    literacy and health levels among population groups;
    gender inequalities;
    food production patterns;
    access to land; and
    nutritional status of women and children.

Primary Data Collection and Analysis

A key component of the CFSVA was a primary data collection exercise conducted at household, community and trader level throughout the country (including Mainland Tanzania and Zanzibar). The aim of these surveys was to explore and identify: (a) the socio-economic characteristics of sampled households; (b) household food consumption (frequency, diversity) and sources; (c) access to health and education infrastructure, and to water and sanitation facilities; (d) assets and livelihood strategies (e.g. income/livelihood sources, ownership of productive and non productive assets, land and livestock ownership, and agricultural production) (e) household exposure and response to risk; and (f) identify current household food security and nutrition profiles.

The trader survey was intended to identify: (a) current and seasonal food availability at markets and (b) food prices.

It should be noted that only results for the household survey in Zanzibar are reported below, as data from the trader and community surveys were not of sufficient quality.

Sampling strategy for primary data collection

Administratively, Tanzania is divided into 21 regions and 128 districts. Zanzibar is divided into 5 regions and 10 districts. The goal of the CFSVA sampling strategy was to provide sufficiently precise estimates of key food security indicators for the rural areas of each region in Mainland Tanzania and each district in Zanzibar. To achieve this, a stratified, two-stage sampling methodology was adopted.

For Mainland Tanzania, the first stage involved stratifying rural areas by region. Then, 21 Enumeration Areas (EAs) were identified per region using Probability Proportional to Size (PPS) sampling techniques and 10 households were chosen per EA using systematic sampling techniques. This yielded 210 households per region for a total of 4,410 households in Mainland Tanzania. For Zanzibar, on the other hand, the first stage involved stratifying the rural areas of the islands by district. Then, similar to the Mainland, 21 EAs were identified per district using PPS sampling techniques and 10 households were chosen per EA using systematic sampling techniques. This yielded 210 households per district for a total of 1,890 households in Zanzibar.

The 2006 agricultural sample census served as the sampling frame. As this sample census was not exhaustive, sub–sampling techniques were employed. The NBS/OCGS was the key technical partner responsible for determining the sampling size (according the agreed upon criteria) and for conducting the actual sampling in collaboration with WFP technical personnel.

Figure 2 shows the strata (i.e. regions) and the geographical distribution of the enumeration areas sampled in Mainland Tanzania. It is important to note that a similar map of sampled clusters could not be included because the data for the specific location of the clusters was not of sufficient quality.
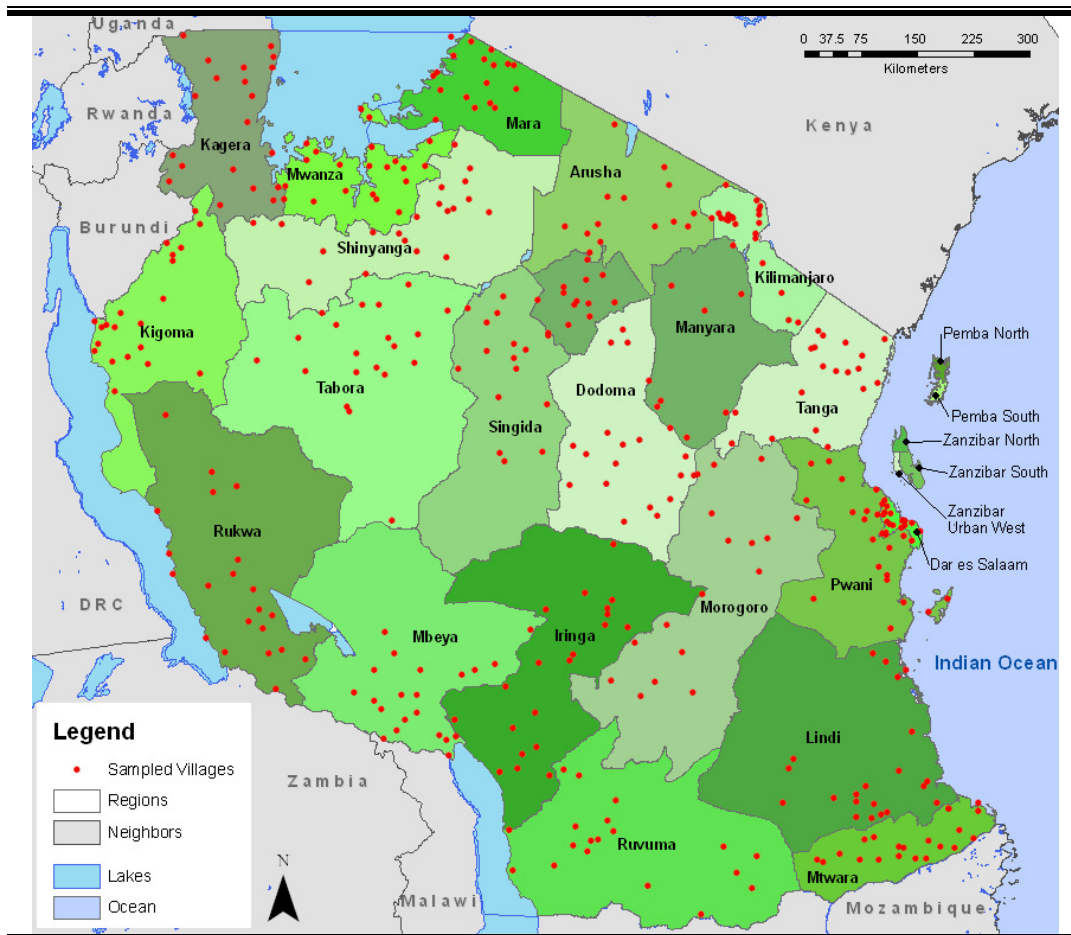
Fig 2: Strata and communities sampled for the 2009 Mainland Tanzania CFSVA
(Source: 2009/2010 CFSVA)

As stratification was disproportionate (meaning the same number of households were sampled per region/district, regardless of the actual rural population of the region/district), it was necessary to develop and apply regional or district level weights to the household, women and children's datasets to obtain correct estimates. The actual weighting schemes applied are discussed in greater detail in the "Limitations and challenges" section.

Instruments

In agreement with key stakeholders, primary data collection involved the following instruments:

Household questionnaire: This questionnaire was administered to household heads and women (with anthropometric measurements taken on both women and children) in each sampled household. It consisted of thirteen modules, including: (1) demographics; (2) housing and facilities; (3) household assets and productive assets; (4) inputs to livelihoods; (5) migration and remittances; (6) sources of credit; (7) agricultural production; (8) expenditure; (9) food sources and consumption; (10) shocks and food security; (11) external assistance and programme participation; (12) maternal health and nutrition; and (13) child health and nutrition.

Community questionnaire: This semi-structured questionnaire was administered to opinion leaders and key informants in each sampled community. It consisted of six modules, including: (1) demographic information; (2) agriculture; (3) livestock and pasture; (4) health; (5) access to social services and economic infrastructure; and (6) access to markets. Information gathered through these interviews was intended to contextualize the information gathered in the household questionnaire.

Markets and trader questionnaire: This questionnaire was administered to a selection of traders in key marketplaces in each region. It consisted of 6 modules, including: (1) general characteristics

of the traders; (2) market prices and availability; (3) market performance; (4) constraints and response capacity; (5) credit and stocks strategy; and (6) transaction costs, competition, and household market access. Information gathered in the course of these interviews was intended to further inform food availability and access issues.

The internationally–accepted key indicators used in the questionnaire modules above were decided upon in collaboration with key stakeholders and partners. Again, it should be stressed that while all instruments were used throughout the country, only certain modules of the household questionnaire were of sufficient quality to use in Zanzibar.

Enumerator training and data collection

Before collecting the data, a training of trainers (ToT) and an enumerators' training (ToE) were organized by NBS/OCGS at national and regional level respectively. NBS/OCGS Regional Supervisors, WFP staff and nutrition experts from Sokoine University of Agriculture were trained during the ToT. The training also involved pre-testing of questionnaires before finalizing the tools. The ToE followed immediately after the ToT in all the regions, and was conducted supervisors trained during the ToT. In all, 105 enumerators were trained for data collection and 33 team leaders were trained on data collection and field supervision.

Data collection commenced in late November 2009, immediately after the completion of the ToE training in all regions. It continued until mid January 2010.

Data entry and analysis

Data entry was conducted by 20 NBS-trained data entry clerks using the Censuses and Surveys Processing Package (CSPRO). The data entry process, as well as the initial validation checks, was overseen by NBS managers. Once entered, data was then exported to the Statistical Package for Social Science (SPSS) for cleaning and analysis. Data cleaning involved basic checks of distribution, standard deviation and skewness. Problems in the data were assessed for data entry errors and interviewer bias. Statistical analysis was conducted by WFP in Tanzania and Rome. While all basic analysis was conducted in SPSS, different analysis software was at times required for specific components of the analysis. For instance, ADDAWIN was used to conduct PCA and cluster analysis.[8] WHO Anthro was required to calculate weight for height, height for age and weight for age z-scores from children's anthropometric measurements.[9] STATA 9.0 was used to conduct multiple linear regressions on food consumption and anthropometric indicators.

It is important to note that data entry was not necessary in Zanzibar, as all data was collected electronically using PDAs.

Key stakeholders and partners

The CFSVA utilized an established, multisectoral stakeholder group, termed the Tanzania Food Security and Information Team (FSIT), to guide and oversee the Tanzania CFSVA. Below is a list of the key partner organizations that made this survey possible.

Government Ministries, Departments and Agencies

Tanzania National Bureau of Statistics (NBS)/ Office of Chief Government Statistician (OCGS)
Disaster Management Department (DMD) - Office of the Prime Minister
National Food Security Division (NFSD) - Ministry of Agriculture Food Security and Cooperatives
Ministry of Livestock Development and Fisheries (MLDF)
Tanzania Food and Nutrition Centre (TFNC)- Ministry of Health and Social Welfare
Tanzania Meteorological Agency (TMA)
Sokoine University of Agriculture (SUA)

UN Agencies
1. Food and Agriculture Organization (FAO)
2. United Nations Children's Fund (UNICEF)
3. World Food Programme (WFP)

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[8] ADDAWIN is available at http://cidoc.iuav.it/~silvio/addawin_en.html.
[9] Flagged z-scores were excluded from the analysis.

Other Non-Governmental Organizations (NGOs)
> Oxford Committee Against Famine (OXFAM)
> World Vision Tanzania
> Famine Early Warning Systems Network (FEWSNET)
> Save the Children (UK)

Limitations and challenges

All care and effort throughout the data collection process was directed towards collecting accurate and reliable information on the food security status of households. As is the case with any large scale survey, however, there are certain key limitations in the data that must be acknowledged.

Limitations on Rural Mainland Tanzania Data

The first and most important limitation is related to the representativity of the findings. As this was a rural survey only, it excluded all urban areas. Thus, the findings can only be considered representative of rural households in each region and at mainland level. An urban assessment has since been conducted to provide specific information on the food security status in the urban areas. Also, this survey was implemented from late November through mid January, making findings only representative of households at this particular point in time.

Another key limitation in the survey design affected representativity. As sub–sampling techniques were employed in the CFSVA sampling, representativeness of the findings was influenced by both the survey design of the agricultural sample census (which served as the sample frame) and that of the CFSVA. Given that sampling in both cases was conducted in a PPS fashion (the agricultural census using PPS per district and the CFSVA using PPS per region), larger communities had a higher chance of selection first in the agricultural sample census and then an even higher chance of selection (because of PPS) in the CFSVA. Thus, the CFSVA sample (at least in Mainland Tanzania) was biased towards larger rural EAs or communities, rendering its findings likewise. To minimize this bias, complex weighting techniques were employed which aimed to reduce the weight given towards high population EAs and increase the weight given to lower population EAs. This required that region–specific household weights be modified at an EA level using an EA population correction factor, with the end result being cluster specific weights.

Finally, the data collected went through the initial validation checks during the data entry stage but, given time constraints, it did not go through the second more comprehensive set of checks designed to identify and correct mistakes not captured during the first validation process. In practical terms, this probably resulted in slightly larger than normal data loss because data entry personnel were not able to cross check data in the database with the actual questionnaires. The impact of this on the survey's accuracy and precision is not measureable.

Limitations on Rural Zanzibar Data

In Zanzibar, there were problems in data retrieval[10] which resulted in certain sections being dropped from the analysis. The sections dropped included 1) the maternal and child health and nutrition section, 2) the trader questionnaire and 3) the community level questionnaire. While this means that certain subjects, at least in relation to Zanzibar, were not addressed in this CFSVA, there are plans to re–collect the missing data in the future.

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[10] Data in Zanzibar was collected using PDAs. The data was therefore stored on PDA cards and there were no hard copies of questionnaires. Unfortunately, not all of the data could be located subsequently on the cards.

Mainland Tanzania 2009/2010 CFSVA Results

Household food security depends on whether a household can meet a basic set of needs that ensure safety, good health, and adequate nutrition (sufficient and nutritious food, clean water and safe sanitation, health care, and access to economic and educational opportunities). Certain assets or capital enjoyed by the household help determine whether it meet these basic needs. These include: 1) human and social capital; 2) natural capital; 3) physical capital; and 4) economic capital. The CFSVA aims to measure the availability of these capital assets to households in order to better understand both the advantages and constraints they experience and hence make it easier to identify vulnerability to food security. The following sections detail the findings.

Human and Social Capital

Human and social capital refers to the demographic characteristics (household size, composition, life expectancy, fertility rate, etc.), as well as the educational attainment and health status of households. It is important because not only education, but also national and household level demographics determine the economic opportunities available to the household, its position within the community and ultimately its well–being both in terms of health and food security.

Demographics

The 2002 census in Tanzania estimated the Mainland population to be approximately 33.5 million[11]. With an estimated growth rate of 2.9 percent, the current population is believed to be close to 40 million, with a population density of 38 inhabitants per square kilometre. Spanning almost 900,000 km^2, population density not surprisingly varies significantly across the 21 administrative regions of Mainland Tanzania, with the urban areas of Dar es Salaam showing the highest population density (1,786 per km^2) and rural populations of Lindi and Rukwa regions showing the lowest (12 per km^2 and 17 per km^2 respectively).[12]

Tanzania has a young population (see Table 1). The CFSVA found that around 20 percent of the population is under 5 years of age and just over 45 percent is under 15. Working age adults (15-59 years of age) comprise approximately 46 percent of the population and the elderly just over 8 percent. This is largely consistent with the population distribution observed in the 2004/2005 TDHS.[13] Patterns remain largely consistent across regions, with the exception of Kilimanjaro and Mtwara which have slightly older populations (over 60% above the age of 14).

Table 1: Age distribution of household members

	0-2 years	3-5 years	6-14 years	15-59 years	60+ years
Male (49.8% of total)	8.6	10.7	26.6	47.0	7.2
Female (50.2% of total)	8.0	9.7	23.9	50.2	8.3
Rural Mainland Tz	8.9	10.8	26.4	45.7	8.1

Source: 2009/2010 CFSVA

The percentage of dependents to total household members (the dependency rate) averaged 53.8 percent and about one-fifth of households reported dependency rates as high as 70 percent. There was little regional variation. With more dependents than wage earners, households have less labour power and production potential, rendering them less able to cope with illness or disability and less able to help take care of others in emergencies. This in turn weakens social safety nets. In a country where HIV prevalence may be as high as 5.7 percent percent among prime age adults[14], this is a notable vulnerability. This is especially true since about 5 percent of households have experienced an adult death in the last six months, 10 percent of households currently report at least one chronically–ill/disabled adult and almost one-fifth (18%) care for at least one orphan. Notably, if 2009/2010 data is compared to 2005/2006 data, the percentage of households that experienced an adult death have declined by half while the percentage of households caring for a

[11] National Bureau of Statistics (NBS), Ministry of Planning, Economy and Empowerment (MPEE). United Republic of Tanzania 2002 Census. Volume X. Dar es Salaam, 2006.
[12] National Bureau of Statistics (NBS), Ministry of Planning, Economy and Empowerment (MPEE). United Republic of Tanzania 2002 Census. Volume X. Dar es Salaam, 2006.
[13] National Bureau of Statistics (NBS) [Tanzania] and ORC Macro. 2005. *Tanzania Demographic and Health Survey 2004-05.* Dar es Salaam, Tanzania: National Bureau of Statistics and ORC Macro.
[14] Source: WHO, UNAIDS, *09 AIDS Epidemic Update*, 2009. Tanzania HIV prevalence rate refers to 2007.

chronically ill/disabled member increased by two percentage points. This possibly reflects the fact that anti retroviral (ARV) usage has increased 345 percent since 2005, saving lives but leading to increases in the numbers of adults living with HIV/AIDS.[15]

As Table 2 illustrates, the percentage of households experiencing deaths or caring for chronically ill/disabled adults or orphans varies substantially by region. Mwanza and Mara report the highest percentages of caring for chronically ill/disabled adults and orphans (at 15% and 30% respectively) while Mtwara and Arusha report the lowest (at 2-3% and 6-7%). The percentage of households experiencing an adult death was highest in Tanga (8.1%) and Mwanza (7.7%) and lowest in Mtwara (1.4%).

The CFSVA explored the types of orphans being cared for. Overall, the percentage of households caring for paternal orphans (15.0%) was almost triple that of maternal orphans (5.7%). Double orphans were cared for by 7.9 percent of households. This pattern was largely consistent across regions.

Table 2: General characteristics of regions in Mainland Tanzania

Regions	Pop. density (*)	Num of HH members (average)	Dependency rate	% of Female HHH	% of HHs with chronically ill/ disabled	% of HHs with orphans
Dodoma	41	5.7	56.0	24.1	14.2	19.5
Arusha	35	5.5	52.5	28.2	2.5	6.2
Kilimanjaro	103	5.8	49.9	25.9	12.1	11.9
Tanga	61	5.3	52.5	26.1	5.2	24.1
Morogoro	25	4.5	52.1	25.4	12.4	14.1
Pwani	27	4.9	55.5	26.1	6.1	15.9
Dar es Salaam	1,786	5.9	49.1	24.1	4.0	23.6
Lindi	12	5.1	47.3	19.1	13.4	12.1
Mtwara	67	4.2	51.3	22.9	2.8	6.1
Ruvuma	18	5.3	48.7	20.6	11.5	15.7
Iringa	26	5.0	54.6	30.9	4.2	19.8
Mbeya	34	5.2	54.1	18.7	11.4	24.0
Singida	22	6.6	57.1	17.7	11.0	14.4
Tabora	22	6.9	56.1	18.1	14.7	20.9
Rukwa	17	6.1	54.9	12.6	2.8	18.1
Kigoma	45	6.3	56.2	12.9	10.9	8.5
Shinyanga	55	7.3	56.0	22.8	8.1	21.0
Kagera	71	6.0	59.7	20.7	13.6	23.1
Mwanza	150	8.4	54.4	18.2	15.7	27.1
Mara	70	8.0	55.3	20.1	14.8	29.3
Manyara	23	6.8	56.3	16.4	8.7	10.0

(*)Source: National Bureau of Statistics (NBS), Ministry of Planning, Economy and Empowerment (MPEE). United Republic of Tanzania 2002 Census. Volume X. Dar es Salaam, 2006.

Given the prevalence of paternal orphans, it is not surprising that rural Mainland Tanzania has a relatively high percentage of households headed by women (22%). The highest percentages (between 24-30%) span from the southern region of Iringa, through the central region of Morogoro, to the coastal regions of Pwani and Dar es Salaam and finally into the northern regions of Tanga and Arusha. The western regions of Rukwa and Kigoma have the lowest percentages of households headed by women (both approximately 12%).

Almost 79 percent of households are headed by a couple, either married (72.3%) or in a partnership (6.5%). The majority of remaining households are headed by a widow(er) (11%). The proportions varied in certain cases across the strata, though much of the variation was between the percentage married, those living in partnerships or those widowed. In Dodoma, for instance, only 58 percent of households were headed by a married couple but close to 18 percent were in

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[15] The Global Fund. The Global Fund 2010: Innovation and Impact. March 2010.
Online at: http://www.theglobalfund.org/en/publications/progressreports/2010/

partnerships. All other proportions were in line with national averages. In Iringa, on the other hand, the percentages married and in partnerships were lower than national averages, but the percentage widowed was the highest of any region at 18 percent.

Overall, the mean age of household head was 46. This varied only slightly across regions, with Kilimanjaro reporting the highest mean age at 53. Pwani and Mbeya reported the lowest age at 42.

Education

Improving access to education and reducing illiteracy is a primary focus of the Tanzanian government. In 2002, the government instituted the Primary Education Development Programme. Its objectives were to expand access to primary schools, improve the quality of schools and increase retention levels. To achieve these goals, the programme introduced grants to primary schools, increased funding for educational inputs and sought to build capacity within the district councils and local primary schools. Further commitments to improve education were integrated into the 2006 National Strategy for Growth and Reduction of Poverty (MKUKUTA) where the goal of universal literacy by 2010 was established.

Government statistics show that this commitment is having an impact. Nationwide, net school enrolment rates (for children 7-13 years of age) have increased dramatically over the past decade from 59 percent in 2001 to 84 percent in 2007. Illiteracy rates, on the other hand, have not changed substantially, though this indicator is unlikely to react as quickly as improving attendance.[16] CFSVA findings from rural areas show mixed success. Comparing 2005/2006 and 2009/2010 CFSVA data, illiteracy rates show slight declines from 27 percent in 2005/2006 to 23.5 percent in 2009/2010. Net enrolment rates, on the other hand, appear to be deteriorating from 82 percent in 2005/2006 to 70.5 percent in 2009/2010 though this should be interpreted carefully as the age ranges of comparisons differed between years.[17] In fact, since the 2005/2006 CFSVA reported net enrolment of 7-13 year-old children and the 2009 CFSVA of 7-14 year-old children, the difference observed could be driven by higher drop-out rates among 14 year-old children.

Regionally, literacy rates[18] are highest in Ruvuma (91%), Kilimanjaro (88.6%) and Dar es Salaam (86.4%) and lowest in Mtwara (59.5%). Net enrolment rates, shown in Figure 3, were also highest in Kilimanjaro and Tanga (at 79%) and lowest in Rukwa (58.8%) and Mtwara (60%).

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[16] National Bureau of Statistics (NBS) [Tanzania]. 2007. *Household Budget Survey 2006/2007.* Dar es Salaam, Tanzania.
[17] The 2005/2006 CFSVA reported net enrollment rates for children 7-13 years of age while the 2009 CFSVA reported enrollment rates for children 7-14 years of age. Given the way the data was collected in 2009, it was not possible to adjust it to make it comparable to the 2005/2006 CFSVA findings.
[18] Literacy is defined for purposes of the CFSVA by whether a "household head can read or write a simple message in any language".
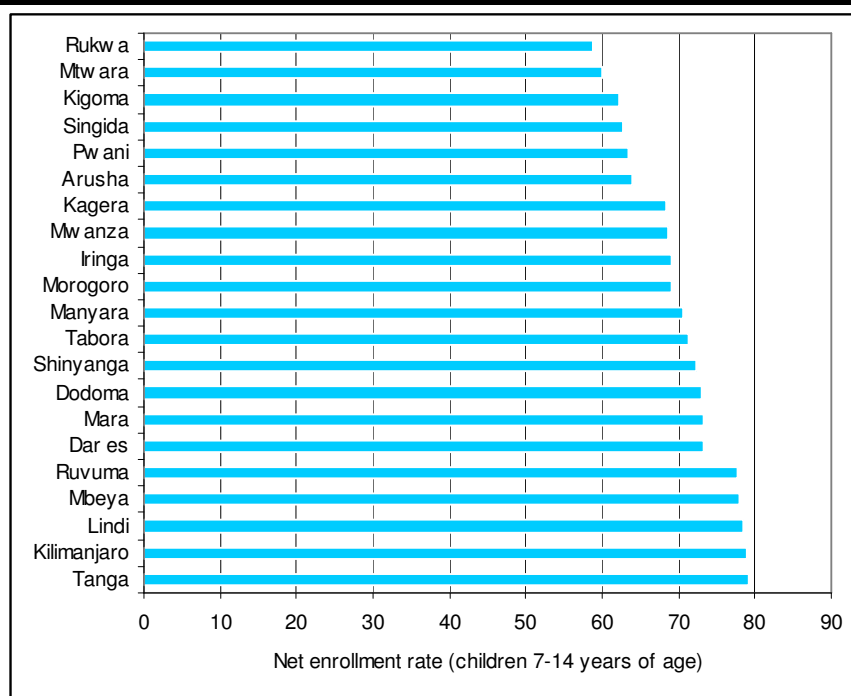
Fig 3: Net enrolment rate by region
(Source: 2009/2010 CFSVA)

A look at absenteeism among those children enrolled in school revealed that only 8 percent of children missed a week of school in the past 6 months. Among those that did, sickness was usually given as the reason by both boys (44%) and girls (17.3%). Shinyanga reported the highest rate of absenteeism (12%) and Ruvuma the lowest (1.4%). Generally speaking, sickness was the primary cause of being absent though high percentages of boys in Arusha (50%), Tabora (39%) and Kigoma (50%) reported missing school because they refused to go. In Kilimanjaro, 34 percent of boys said they missed school because the household couldn't cover school expenses. The same reason was given by 13 percent of both boys and girls in Morogoro.

Other education findings, detailed in Table 3, show that 57 percent of household heads and 54 percent of spouses completed primary school. Approximately one-fifth of household heads have no schooling while 9.1 percent have at least some secondary schooling or higher. The percentage of spouses of household heads with no education is slightly higher at 30.9 percent and correspondingly the percent with at least some secondary school or higher is lower at 4.9 percent. Overall patterns, however, show marked improvement since the 2005/2006 CFSVA: the percentage of household heads finishing primary school has jumped 17 percentage points (from 40% in 2005/2006) whilst the percentage of those with no schooling has dropped 7 percentage points (from 27% in 2005/2006).

Regional variations largely mirrored the same patterns seen in net enrolment and literacy, with Ruvuma, Kilimanjaro and Dar es Salaam reporting the lowest percentage of household heads with no education and Mtwara reporting the highest (36.0%).

Table 3: Education levels of household head and spouse of household head by region

	% Literate HH head*	education level of HH head				education level of spouse of HH head			
		None	Some primary	Completed primary	Some secondary or more	None	Some primary	Completed primary	Some secondary or above
Dodoma	67.0	30.5	6.1	54.2	9.2	31.6	5.6	59.1	3.7
Arusha	64.7	34.2	13.8	48.9	3.0	42.0	10.6	44.2	3.2
Kilimanjaro	88.6	11.5	17.5	62.9	8.1	13.4	17.5	63.4	5.8
Tanga	81.4	16.9	13.0	59.9	10.2	26.0	6.1	64.1	3.8
Morogoro	77.2	21.3	16.1	55.2	7.4	29.8	18.7	48.0	3.4
Pwani	71.2	28.1	11.1	53.9	6.9	39.4	6.8	48.7	5.1
Dar es Salaam	86.4	13.2	8.1	59.5	19.2	16.1	7.4	65.5	11.0
Lindi	76.6	22.9	7.2	61.9	8.0	31.6	6.1	61.1	1.2
Mtwara	59.5	36.0	7.2	44.3	12.5	42.8	5.0	47.8	4.4
Ruvuma	91.4	7.3	7.5	68.9	16.3	14.6	6.1	71.9	7.4
Iringa	85.3	10.3	8.7	69.5	11.5	20.3	11.3	64.6	3.9
Mbeya	80.9	18.5	7.4	63.1	10.9	31.3	5.4	59.1	4.2
Singida	74.2	24.1	6.3	65.3	4.3	29.4	3.9	64.5	2.2
Tabora	77.2	21.9	12.2	52.5	13.5	44.9	10.6	40.1	4.4
Rukwa	84.9	14.6	14.8	63.9	6.7	29.4	14.2	53.6	2.8
Kigoma	77.2	21.7	20.7	51.8	5.8	38.4	9.1	47.5	5.0
Shinyanga	67.7	26.9	12.5	54.4	6.2	37.5	12.9	45.8	3.9
Kagera	80.4	18.1	16.7	52.4	12.9	30.0	9.7	52.7	7.7
Mwanza	79.1	14.1	21.1	56.2	8.6	24.2	15.8	53.3	6.6
Mara	80.1	15.7	20.2	53.5	10.6	21.2	8.2	60.0	10.7
Manyara	67.2	30.8	7.7	55.7	5.8	38.2	8.2	50.0	3.5
Rural Mainland Tz	76.5	21.2	12.8	57.0	9.1	30.9	9.9	54.3	4.9

(*) Literacy is defined by the ability of the household head to read/write a simple sentence in any language.
Source: 2009/2010 CFSVA

The CFSVA collected information on each community's distance to schools, measured by how long it takes to get there on foot. Overall, 85.8 percent of communities are within one hour's walk of a primary school and 45.2 percent within one hour of a secondary school.[19] Examined by region, substantial variation was seen with only slightly over half of communities in Mbeya reporting a primary school within one hour and regions such Tanga, Morogoro, Pwani, Tabora and Shinyanga all reporting that 100 percent of communities were within one hour's walk of a primary school. Access to secondary schools was highest in Shinyanga and Kilimanjaro, where 81.1 and 70.0 percent respectively of communities reported being within one hour of a secondary school. Poorest access was reported in Mbeya, Signida, Mwanza and Mara, where only 33.3 percent of communities reported being within a one hour walk of a secondary school.

Health

High disease burdens and poor access to healthcare are widespread in Tanzania. In fact, previous reports indicate that vast majorities of deaths (~92%)[20] are due to preventable causes and, at least in certain areas, most deaths occur at home without any health care being sought during the course of the illness.[21] Most deaths are related to common diseases such as malaria, pneumonia and childhood diarrhoea, however, the emergence of HIV/AIDS has complicated this picture somewhat. The current state of the HIV/AIDS epidemic and its implications on the overall health and well-being of Tanzanians is discussed in Text Box 1.

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[19] These particular categories were reported as key informants had the possibility to choose between the following options: less than one hour, between one and two hours, more than three hours. It is important to note that even living within one hour of a primary school presents quite a challenge to a child. This equates to approximately a 5 km walk one way.
[20] Ministry of Health, National Mortality Burden Estimates for 2001. Dar es Salaam.
[21] Kamugisha M, Gesase S, Mlwilo TD, Mmbando BP, Segeja MD, Minja DT, Massaga JJ, Msangeni HA, Ishengoma DR, Lemnge MM. Malaria specific mortality in the lowlands and highlands of Muheza district, north-eastern Tanzania. Tanzania Health Research Bulletin, Vol 9, No. 1, 2007, pp.32-37.

Box 1: HIV/AIDS in Tanzania

In Tanzania, the first AIDS cases were reported in 1983. Since that time, the epidemic has intensified, affecting all segments of society and disproportionately hitting the most productive members. The effects of the epidemic in the health sector have been significant, leading to higher morbidity and mortality among young adults. The loss in human capital has led to further economic and social problems, with losses in productivity hampering development and poverty reduction programmes, and a new generation of AIDS orphans placing greater strain on both communities and existing social safety nets. UNAIDS, in fact, estimates that in 2007 Tanzania had 970,000 orphans.

While HIV/AIDS surveillance at antenatal care (ANC) sites were initially established in 1990, it was not until the 2004 DHS HIV/AIDS Indicator Survey (HIS) that the full scale of the problem amongst the general population was revealed. According to this survey, 7.7% of women and 6.3% of men were found to be HIV+. Prevalence varied substantially by region, with 14% of adults (15-49 years of age) infected in Mbeya and only 2% in Manyara.

In 2008, a subsequent DHS HIV/AIDS and Malaria Indicator Survey (HIMIS) was conducted, showing a slight decrease in overall prevalence (from 7 to 5.7% overall) alongside a consistent decrease in age–specific rates (with the exception of those 45-49 years of age). The slight decreases observed are notable given the Tanzanian Government's increased commitment to fighting the epidemic, be it through establishing a lead agency in HIV/AIDS policy, the Tanzania Commission for AIDS or through its increasingly multi–sectoral approach to HIV/AIDs programming.

Recognizing these significant health challenges, the National Strategy for Growth and Poverty Reduction (MKUKUTA) stresses the importance of health in overall well–being and is seeking new ways to ensure equal access to health care, treatment and support across Tanzania. Specifically the strategy tries to address some of the obstacles to health care access, including lack of quality of care, long distances to health facilities with inadequate or expensive transport costs, and weak exemption and waiver systems for those unable to afford care.

Current health outcomes show both successes and failures. Improvements in childhood vaccination coverage and TB treatment compliance rates are important steps in the right direction. Also, substantial reductions in post neonatal mortality rates (deaths from 1 -12 months of age shown in Figure 4) show key improvements in managing infectious and vector borne diseases amongst young children.

The World Health Organization (WHO) also notes how successfully health services have been expanded in rural areas. Specifically, WHO's Service Available Mapping points to increases in the percentage of households living within 5 kilometres of health centres from 45 percent in 1980 to now include most of the population.[22] Data collected on the existence of health facilities in communities sampled for the CFSVA seem to support these conclusions, with overall 86.2 percent of communities reporting a health centre (defined as a facility, clinic, dispensary or pharmacy) and 92.5 percent of communities reporting the presence of at least one health worker (defined as village health care worker, a traditional midwife/ TBA or a traditional healer). There were significant variations by region in a couple of instances, with Iringa in particular reporting very limited access to care. Overall, in this region, 55 percent of communities reported having neither a facility nor a health worker. Kilimanjaro reported the second largest proportion of communities without health facilities or workers (15%). On the other hand, 100 percent of communities in Morogoro, Mbeya and Mwanza reported having health facilities and workers.

Some notable areas where improvements in health are not being seen include nutritional status, as there are still large numbers of stunted children throughout Tanzania.[23] Also, the percent of births taking place in health care centres or with trained health workers is not improving but rather declining which has implications on infant and maternal mortality rates and may help explain why maternal mortality rates show slight increases rather than declines since 1985.[24]

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[22] Ministry of Health and Social Welfare- Mainland Tanzania, Ministry of Health and Social Welfare- Zanzibar and the World Health Organization. Tanzania Service Availability Mapping 2005-2006. Geneva, Switzerland, 2007.
[23] Child nutritional status is examined in-depth in the Health and Nutrition Chapter.
[24] According to DHS data, 10-year rates/ 100,000 live births was 529 from 1985 to 1995 but 578 between 1996 and 2005.
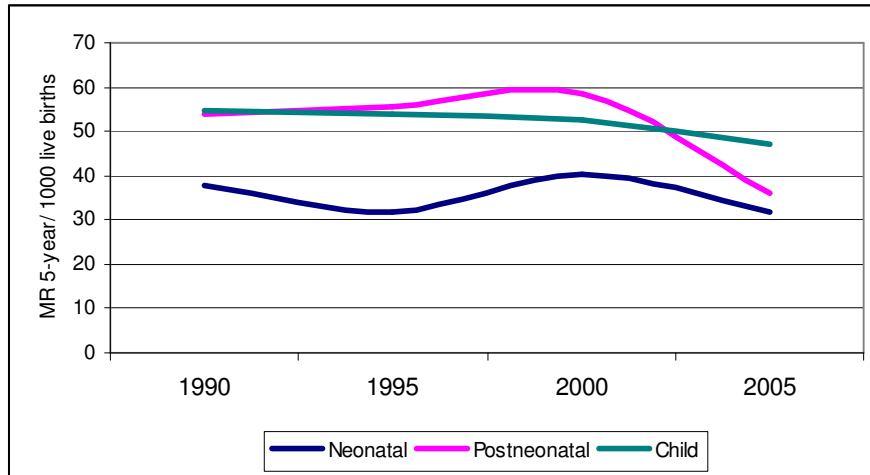
Fig 4: Trends in child mortality
(Source: DHS data, 1990-2004/2005)

Migration and displacement

The enduring instability in the Great Lakes Region and the Horn of Africa has resulted in numerous, large-scale population displacements and ensuing waves of refugees, disproportionately affecting Tanzania. It is estimated that Mainland Tanzania has hosted over half a million refugees in the last few decades: one of the largest refugee populations in Africa. In recent years, however, the GoT has been active in seeking solutions to the refugee issue. As a result, refugee populations in Tanzania are in decline. This is not only due to repatriation programmes and the ensuing closure of refugee camps but also the naturalization and local integration programmes that have allowed over 162,000 Burundian refugees to apply for Tanzanian citizenship. UNHCR estimates that by the end of 2010, Tanzania will be home to 90,000 refugees, almost all located in the north western region of Kigoma.

Alongside refugee movements, internal migration is an important issue in Mainland Tanzania. CFSVA data indicates 13.1 percent of households saw a member leave in the past three months. One-third of these reported that the members had left to find work, just under one-quarter reported leaving for education and 28 percent gave "another reason". Among households that knew where their member had gone, almost half (43.5%) reported leaving their home district to go to a large urban area. This illustrates the urbanization trends widely observed in Tanzania and other eastern and southern African countries. It also highlights a current urban developmental challenge evident in many African cities: the need for proportional growth in infrastructure and social services to meet ever-increasing demand.

Migration, and particularly urbanization, also has important implications for the spread of HIV/AIDS. As has been observed previously, work migrations are a key catalyst in the spread of HIV/AIDS.[25] Work migrants or "Mobile populations" as they are identified in the National Multi-Sectoral Framework on HIV/AIDS 2003-2007 refer to different categories: commercial sex workers (CSW) (often working as bar maids or in domestic service), petty traders, migrant workers, military personnel and long distance truck drivers.[26] These populations are highly vulnerable to HIV/AIDS as they spend a good deal of time away from home and many, particularly women, do not have the social status to protect themselves in situations that expose them to the virus. Studies of HIV monitoring systems in Tanzania have provided evidence on the increased vulnerability of mobile populations to HIV/AIDS, with the prevalence of HIV in trading centres twice that of the communities immediately surrounding them (within 2 kms) and 4 times that of surrounding rural villages (within 8 kms).[27] Likewise, previous studies of barmaids in Dar es

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[25] J. Crush, B. Williams, E. Gouws amd M. Lurie, "Migration and HIV/AIDS in South Africa" Development Southern Africa 22 (2005): 293-318
[26] Tanzanian Commission for HIV/AIDS. National Multi-Sectoral Strategic Framework on HIV/AIDS 2003-2007. Dar es Salaam, 2002.
[27] Boerma J, Urassa M, Senkoro, K, Klokke A, Ng W, Japheth, ZL. Spread of HIV infection in a rural area of Tanzania. AIDS. 1999. July; 13 (10).

Salaam have found 29 percent to be HIV positive, with younger barmaids showing prevalence as high as 45 percent.[28] The impact of this is not limited to increasing the spread of HIV. Instead, this ultimately results, as these workers get sick and cannot work, in lower urban to rural remittances and eventually a transfer of people living with HIV/AIDS back to their home villages placing the burden of care for the sick squarely on the shoulders of rural communities.

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[28] Mahlu, F, Bredberg-Raden, U, Mbena E, Pallangyo K, Kiango, J Mbise R, Nyarmuryekunge K and Biberfeld, G. Prevalence of HIV infection in healthy subjects and groups of patients in Tanzania. AIDS, 1987. Dec; 1 (4): 217-21.

Physical Capital

Physical capital refers to housing structures and facilities, quality of water and sanitation and asset ownership. Housing structures and facilities consider the quality of dwelling units, and sources of lighting and cooking fuel. Water and sanitation examines primary and secondary sources of drinking water and the quality of toilet facilities. Asset ownership refers productive assets such as hoes and axes, and non-productive assets, like table, chairs and mobile phones. Durable and stable physical capital is important as these assets can boost a household's coping capacity, increasing its ability to withstand external shocks.

Housing Amenities

Infrastructure, Housing Materials and Cooking and Energy Sources

The crowding index measures the number of people sleeping per room. It is an important indicator of vulnerability as the higher the number of household members sleeping per room, the more likely the household is to suffer poor hygiene, disease and generalized poverty. Households in rural areas of Mainland Tanzania averaged 6.1 members and reported a mean crowding index of 2.4. Nationally, 29 percent of households reported three or more people sleeping per room, which is concerning as anything over two people per sleeping room places children's health and school performance at risk.[29] Nonetheless, households and regions reporting a very low crowding index should not necessarily be interpreted as better off, as these households may actually be elderly-headed households or widow-headed households, which are intrinsically more vulnerable to health problems or income shocks.

The crowding index varied substantially by region. The highest crowding index was observed in Manyara and Rukwa (2.8) while the lowest was observed in Ruvuma (1.8) and Mtwara (1.8).

A look at housing structures revealed that the vast majority were constructed from temporary materials. On average, 78 percent of household floors were made from mud, while 21 percent were concrete. Examined geographically, concrete was commonly used in two regions, Kilimanjaro (51.2%) and Dar es Salaam (62.0%). In all other regions, more than 70 percent of the floors were constructed in mud. Roofs, on the other hand, were either of galvanized iron (57.6%) or straw (29.3%). Again, the largest differences were seen in Dar es Salaam and Kilimanjaro, where 85 and 94 percent of households reported galvanized iron respectively. Straw roofs were most common in Rukwa (59.9%).

Almost all households reported kerosene lamps as their primary lighting source (90.8%), and only 4 percent had access to electricity. There was little variation by region, with more than three-quarters of households in every region using kerosene lamps as their primary light source. An analysis of cooking fuel revealed similar findings. In this case, 97 percent of households reported using wood/ charcoal for cooking. Again there was no significant variation by region.

As a generalized proxy measure of access, the CFSVA also inquired as to the distance between a community and a major road. Road access is crucial in ensuring the community has access to health centres, schools and markets and more so in the case of Mainland Tanzania, as households rely on road access to transfer agricultural surplus to markets for sale. Without this access, many are discouraged from cultivating excess crops. Almost three quarters (73.2%) of communities reported living within one hour walk from the nearest major road, 16.6 percent reported living within a 1-2 hour walk of a road and 10.3 percent reported living more than 3 hours walk from a road. Dar es Salaam (95% within one hour) and Ruvuma (100% within one hour) reported the best access to roads while the largely agro-pastoral regions of Arusha (47.4% within one hour) and Manyara (52.4% within one hour) reported the worst.

Water and Sanitation

Access to improved drinking water sources remains a problem in Tanzania. Only 58.8 percent of households surveyed in the CFSVA reported access to it. These included 30.3 percent with access to a public tap/piped water, 12.5 percent with a borehole with pump, 14.2 with a

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29 The United Kingdom Office of the Deputy Prime Minister. "The Impact of Overcrowding on Health & Education: A Review of Evidence and Literature." Office of the Deputy Prime Minister Publications, 2004.

protected ground well and 1.4 percent with rainwater. For those without access to improved water sources, 21.1 percent relied on ponds, lakes, rivers or streams, 19.3 percent relied on unprotected wells and 1.4 percent on water vendors. Plurality reliance on drinking water from ponds, lakes, rivers and streams is notable given that water in Lake Victoria and other major bodies of water are polluted because of agricultural practices and unplanned settlements.[30] Access to water remains largely unchanged since the 2005/2006 CFSVA, which reported that 59 percent of households had access to improved water sources during the dry season and 51 percent during the wet season. This finding is also in line with UNICEF estimates showing 54 percent of the rural population with access to improved drinking water.

Figure 5 shows water access by region, revealing dramatic differences in improved drinking water access. Almost three quarters of households in Mara, for instance, reported no access whatsoever. By contrast, only 6.3 percent of households in Kilimanjaro said the same. Other areas reporting the least access to improved drinking water sources included Pwani and Tanga where 63.2 and 61.6 percent did not have access to improved drinking water sources.

The CFSVA also investigated whether households had to pay for access to their drinking water source. Nationally, over one-quarter (25.7%) of households stated that they were required to pay for their drinking water; the mean fee was around 5,000 Tanzania shillings (TShs) per month. The proportion of households that paid for water was highest in Dar es Salaam (67.1%) and Kilimanjaro (66.2%).

Over one-third of households (34.8%) reported relying on an alternative water source at some point during the year, either in conjunction with main water sources (19.5%) or as a replacement when main water sources are not usable (15.3%). This water source was only slightly less protected than the main sources, as rainwater (considered a protected source) was the second most frequently mentioned alternative (22% of households). The most frequently reported alternative water was from lakes, ponds, rivers or streams (27.2%). Secondary water sources were more often relied upon in Mtwara (74.1%), Lindi (62.2%) and Mwanza (54.8%) than other regions.

The CFSVA also examined access to improved sanitation. Overall, 88 percent of households reported having access to improved sanitation facilities, including 84 percent with traditional pit latrines, 2.4 percent with improved pit latrines and 1.4 percent with flush toilets. Of those that had no improved facilities, 3 percent relied on open pit latrines and 9 percent did not have any toilet facilities at all. As Figure 5 details, the lack of access to improved toilet facilities was most prevalent in Arusha (34.2%) and Shinyanga (30.0%) perhaps because of the agro-pastoral lifestyle common in these areas. The CFSVA also found that 90 percent of households reported having sanitation facilities within the household compound.

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[30] Machiwa P. Water quality management and sustainability: The Experience of the Lake Victoria Environmental Management Project (LEVMP)—Tanzania. Physics and Chemistry of the Earth, A/B/C. Vol. 28, Issues 20-27, 2003, 1111-1115.
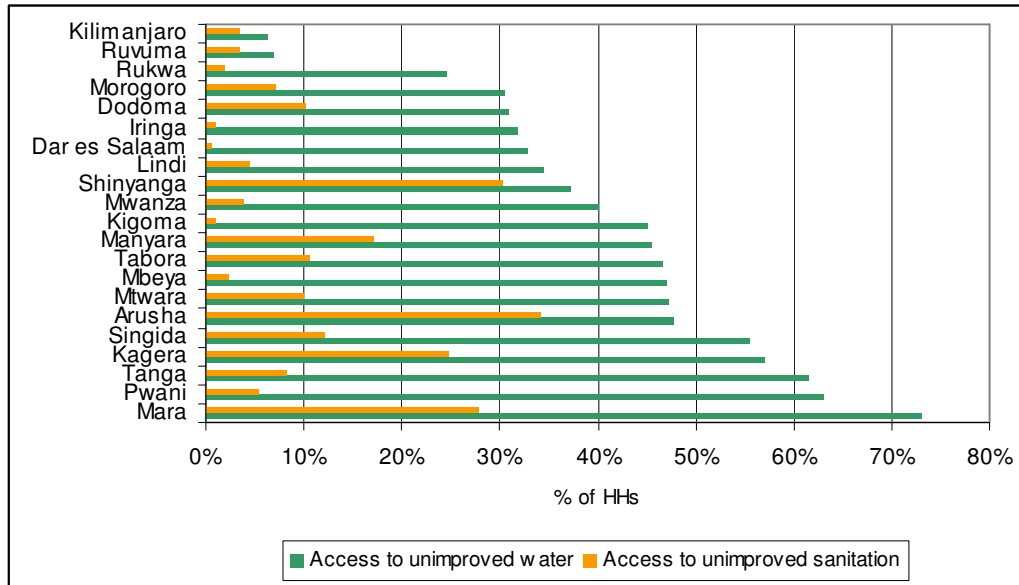
Fig 5: The percentage of households with no access to improved drinking water or sanitation
(Source: 2009/2010 CFSVA)

Asset ownership and wealth index

To examine household asset wealth, the CFSVA asked households if they owned a series of 21 pre-determined productive and non productive assets. Their responses were used together with information on other physical capital items to compute a household wealth index. To do so, after a careful screening, a Principal Component Analysis (PCA) was conducted using the following set of wealth-related variables[31]:

> Material of the roof and floor,
> Ownership of radio
> Ownership of tape player
> Ownership of bicycle
> Ownership of mattress
> Ownerships of chairs
> Ownership of phone
> Ownership of charcoal stove
> Ownership of lantern

After completing the PCA, the first factor[32] was selected as the wealth index and to ease interpretation, wealth quintiles were computed, resulting in five categories ranging from poorest to richest.

Geographic distribution of household in the poorest wealth quintile

Examining the percentage of households in the poorest wealth quintile by region revealed some striking differences. As Figure 6 shows, the regions with the highest percentage of households in the poorest wealth quintile were Mtwara and Arusha. Here, 50 percent and 36 percent of households fell into the poorest quintile. By contrast, regions with the lowest rate of households in the poorest quintile were Kilimanjaro, Mara and Dar es Salaam. In these regions, only 1.4, 4.7 and 5.2 percent of households (respectively) fell into the poorest category.

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[31] Productive assets were excluded from the Wealth Index computation because the ownership of these assets reflects the livelihood activities of households rather than wealth. The variables with a poor contribution (i.e. component loading) were excluded from the final PCA.
[32] The percentage variance of the first factor accounted for was 29.95%.
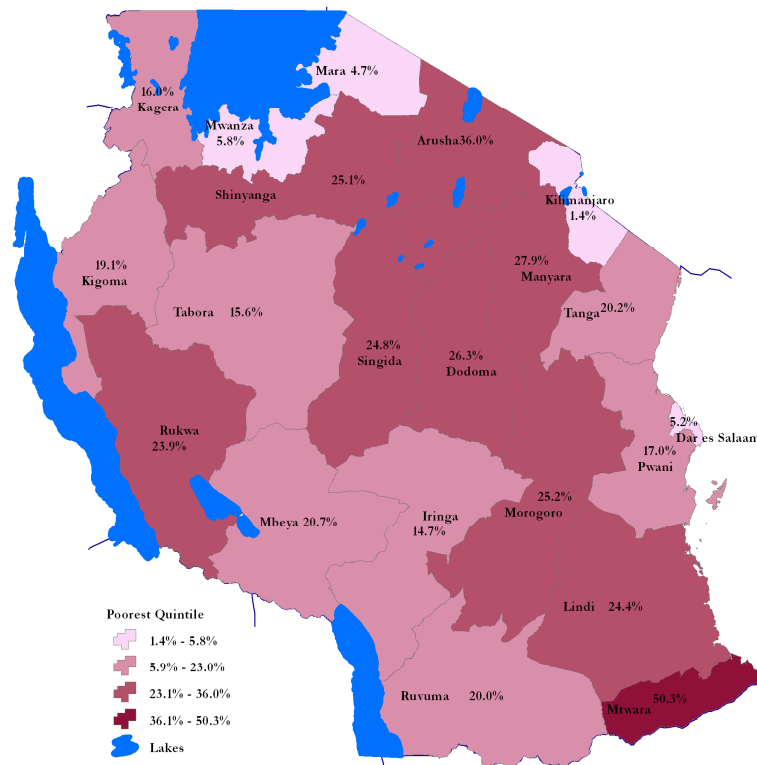
Fig 6: Regional distribution of households in the poorest wealth quintile
(Source: 2009/2010 CFSVA)

Figure 7 examines the associations between asset ownership and the wealth index for those variables included in the wealth index. The proportion of households using poor roofing and flooring materials decreased across wealth quintiles, while asset ownership (for all assets) increased across the quintiles. Examined more closely, assets like charcoal stoves, phones and tape players were only common amongst the higher wealth quintiles, with fewer than 30 percent of households in the moderate, poorer and poorest wealth quintiles reporting ownership. Lanterns, bikes, radios, mattresses and chairs, on the other hand, were owned not just by wealthier households but also by a sizeable percentage of households in the poorest and poorer quintiles.

The CFSVA also assessed how well the wealth index correlated with other variables typically associated with wealth, including access to good sources of drinking water, proper sanitation, household head gender, household head education levels, livestock access and the presence of disabled or chronically ill members. Results are shown in Figure 7. Overall, wealth was found to be significantly (p=0.05) associated with the proportion of: (1) households headed by women, (2) illiterate household heads and (3) households using poor sources of water and unimproved toilets. In each case, percentages declined as wealth increased.

a)

b)
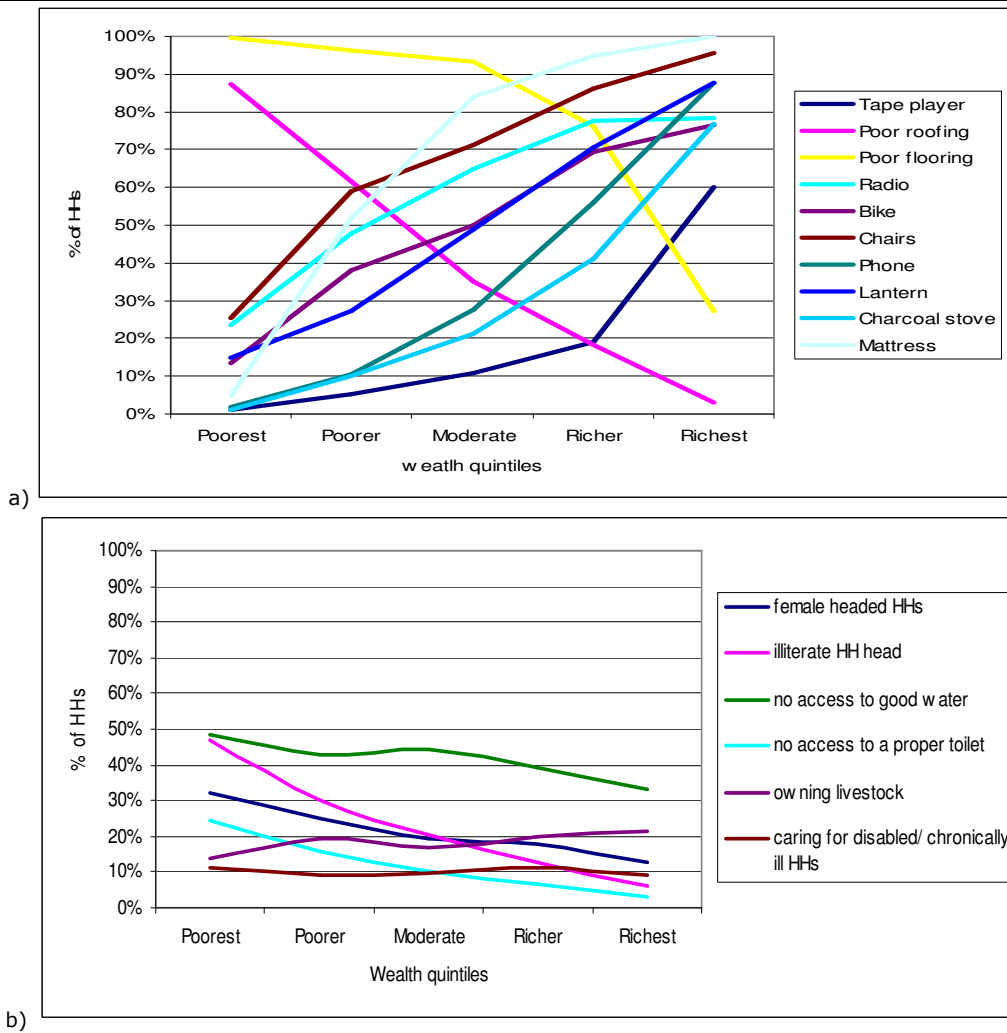
Fig 7: Association between wealth quintiles and indicators of wealth/vulnerability
a) Association between wealth quintiles and asset ownership (variables included in the wealth index);
b) Association between wealth quintiles and typical indicators of vulnerability
(Source: 2009/2010 CFSVA)

Economic Capital and Livelihood Strategies

Economic capital refers to a household's livelihoods[33] and financial resources, including income, expenses, debts and access to credit.

Income and activities

Knowledge of livelihood strategies and how households access income is crucial in determining how sustainable household food security status is. It also helps to identify populations at risk from shocks (i.e., severe droughts/floods, sharp increase in agricultural inputs, food prices, etc.). To capture this dynamic, the CFSVA asked households to detail up to four income-generating activities that contributed to the livelihoods of the household. For each activity, the household was then asked 1) how much of its outputs were directly consumed as food, 2) the total income derived from the activity and 3) the relative contribution of each activity to overall household livelihoods.

On average, households in Mainland Tanzania engaged in 1.8 livelihood activities, with 33 percent of households reporting one activity, 54 percent of reporting 2 and 12 percent reporting 3. Only about 1 percent of households reported 4 activities.

According to government estimates, agriculture accounts for 45 percent of Tanzanian GDP.[34] So it is not surprising that agriculture was the most common activity with 89.1 percent of households reporting it as one of the 4 livelihood activities and 79.9 percent reporting it as their main activity.[35] Agriculture was listed as an activity by over three quarters of households in every region with the exception of Arusha, Lindi and Dar es Salaam where small business and daily work was more common.

The second most common activity was livestock production, reported by a quarter of households.[36] The next most common was small business at almost 17 percent, daily work at 14 percent and business/commerce at 13 percent. All other activities were reported as one of the four main livelihood activities less than 5 percent of the time. More details on the geographical distribution of these activities can be found under "livelihood strategies profiles" on page 37.

Seasonality and distribution of activities

In order to determine seasonal fluctuations in livelihood activities, the CFSVA also asked which months households participated in each activity. Figure 8 details the analysis for the main livelihood activities (agriculture, livestock, business/commerce, small business and daily work). As this shows, high season for agricultural activities runs from November through March, peaking in January and February. This corresponds with the main planting period at the start of the Musimu rains, the main harvesting period after the Vuli rains and the land preparation period prior to planting for the Masika season. During these two months, as much as 80 percent of households are engaged in agricultural activities. Low season for agriculture runs from July through September. This corresponds to the dry season in unimodal areas of the country and to the harvesting period after the Masika rains. During this time approximately 30 percent of the population is engaged in agricultural activities. A detailed discussion of the cropping seasons in uni- and bi-modal parts of the country and their characteristics is in "Natural Capital" (page 45).

As Figure 8 shows, the other activities show little or no seasonal fluctuations. Livestock production is conducted by 24 percent of households throughout the year, while commerce/business and daily work are conducted by 10 percent. Small business activity fluctuates only slightly between 11-15 percent. It is noteworthy that when agricultural activity is low, there is no increase in other main livelihoods, indicating that households do not rely more on other activities when agricultural work is scarce.

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[33] Livelihood strategies, as defined by DFIDs sustainable livelihood framework, are the range and combination of activities and choices (including productive activities, investment strategies, etc.) made by households in order to achieve livelihood outcomes such as food security.
[34] Source: "National Strategy for Growth and Poverty Reduction (MKUKUTA)".
[35] "Agriculture" includes both farming and selling of garden/agricultural products, but selling of garden/agricultural products has a limited importance.
[36] "Livestock" includes both raising livestock and selling of livestock products/cattle, but the latest two activities have a limited role.
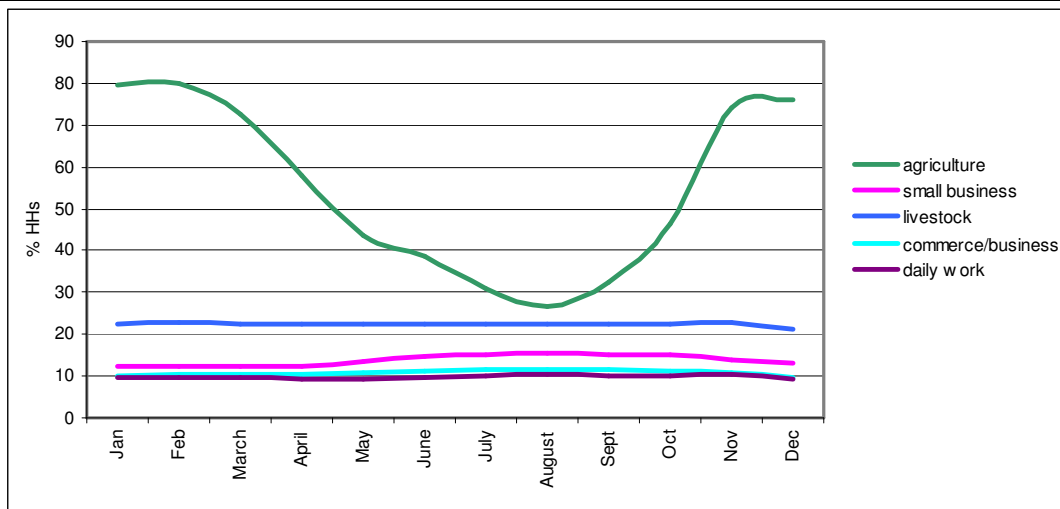
Fig 8: Seasonality of main livelihood activities
(Source: 2009/2010 CFSVA)

The CFSVA also attempted to better understand the division of labour within households by asking which members were engaged in the main livelihood activities. For agricultural activities, 31 percent of households reported that both the household head and the spouse were involved. Almost 18 percent reported the involvement of the household head alone, while 3.3 percent reported the involvement of the spouse of household head alone. Very few children were involved. Only 2.3 percent of households indicated that women and children were those primarily involved and 1 percent or fewer reported that men and children only or children only were involved. Household member involvement in livestock production, small business and daily work differed somewhat. Children played a larger role in looking after livestock than in agriculture. Overall, 12 percent of households said that children were primarily responsible for livestock production, whereas the heads of households alone were more engaged in small business and daily work. In fact, women were usually responsible for the latter activities, with 11.2 percent reporting that women only engaged in small business and nine percent saying the same for daily work.

Migrations and remittances

Given the importance of work migration and remittances in Mainland Tanzania, the CFSVA explored both seasonal and prolonged migratory patterns in greater detail. Overall, 15.2 percent of households reported having one family member working away from the household, with 4.3 percent considered seasonal and 11.5 percent listed as prolonged migrants. Regional differences were substantial. Households in Kilimanjaro and Tanga reported the highest percentage of migrant workers at 42 percent and 29 percent respectively. The overwhelming majority (over 90%) of migrants reported in Kilimanjaro, however, were prolonged rather than seasonal. In Tanga, the proportions were substantially different. Slightly over 40 percent of migrants were seasonal while the remainder were prolonged. Rukwa, Manyara and Shinyanga reported the lowest levels of work migration with fewer than 7 percent of households reporting a work migrant. In all three regions the majority of migrant workers were prolonged rather than seasonal.

Data on the destination of migrant workers indicate that many travelled to Dar es Salaam (42.3%), while over one third went to "another region" (35.4%) and fewer than a quarter stayed within the same region (23.2%). Dar es Salaam was a popular destination for migrant workers from the southern, central and coastal regions and was most popular, unsurprisingly, for those living in the rural areas of Dar es Salaam region. Migration to Dar es Salaam was not common amongst households in the western regions.

Few people appeared to travel outside the country for work. Only 2.2 percent of households reported a migrant worker leaving the household for another country in the Great Lakes Region or Horn of Africa, and even fewer (1.5%) left the country to go "abroad". Travelling "abroad" was most common in border regions but certain non-border regions like Mwanza and Dar es Salaam reported migrant workers leaving the country as well.

As Figure 9 shows, seasonal migrations peaked between September and November, corresponding to the end of the crop marketing period for the Musimu and Masika harvests as well as the land preparation period for the coming Musimu rains. Therefore, one explanation for these migrations may be that they are related to agricultural activities. Importantly, however, this period also corresponds to the end of the long dry season, so the findings might also suggest that migrations are in part undertaken to bridge the income gaps between planting seasons.
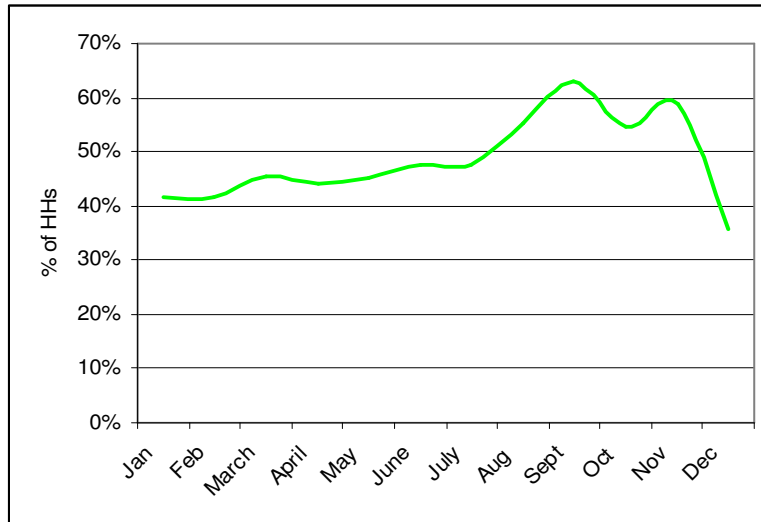
Fig 9: Seasonality of temporary work migrations
(Source: 2009/2010 CFSVA)

Overall, 70.5 percent of households reported receiving money from seasonal migrants, with 39 percent receiving one payment per year and 38 percent at least 2-4 payments per year. Fewer than a quarter of households reported 4 or more payments per year. In terms of the amount of money sent back, almost half of households (46.2%) received between 0-50,000 TShs, almost a quarter (24.6%) received 50,000 to 100,000 TShs and 29.2 percent received 100,000 TShs or more. Examined by region, significant variations existed though no discernible patterns were detected. Generally speaking, however, remittances were highest in Shinyanga and Mbeya and lowest in Iringa, Kigoma and Singida. These findings are shown in Figure 10.

As stated before, prolonged migrants comprised the bulk of migrations. Regionally, households in Kilimanjaro were most likely to report a prolonged migrants (38%) while those in Shinyanga, Rukwa, Singida and Manyara were least likely to (under 5%). As they were away for greater periods of time, prolonged migrants were more likely to send larger remittances. On average, 29 percent of household received payments between 50,000-100,000 TShs and almost 34 percent of households received remittances in excess of 100,000 TShs. The highest remittances came from migrants from Tanga, Mbeya and Kagera. In these three regions, between 50 percent and 60 percent of households reported receiving 100,000 TShs or more in remittances. Also, although Manyara reported few prolonged migrants, close to 65 percent of households there who reported prolonged migration received at least 100,000 TShs in remittances.
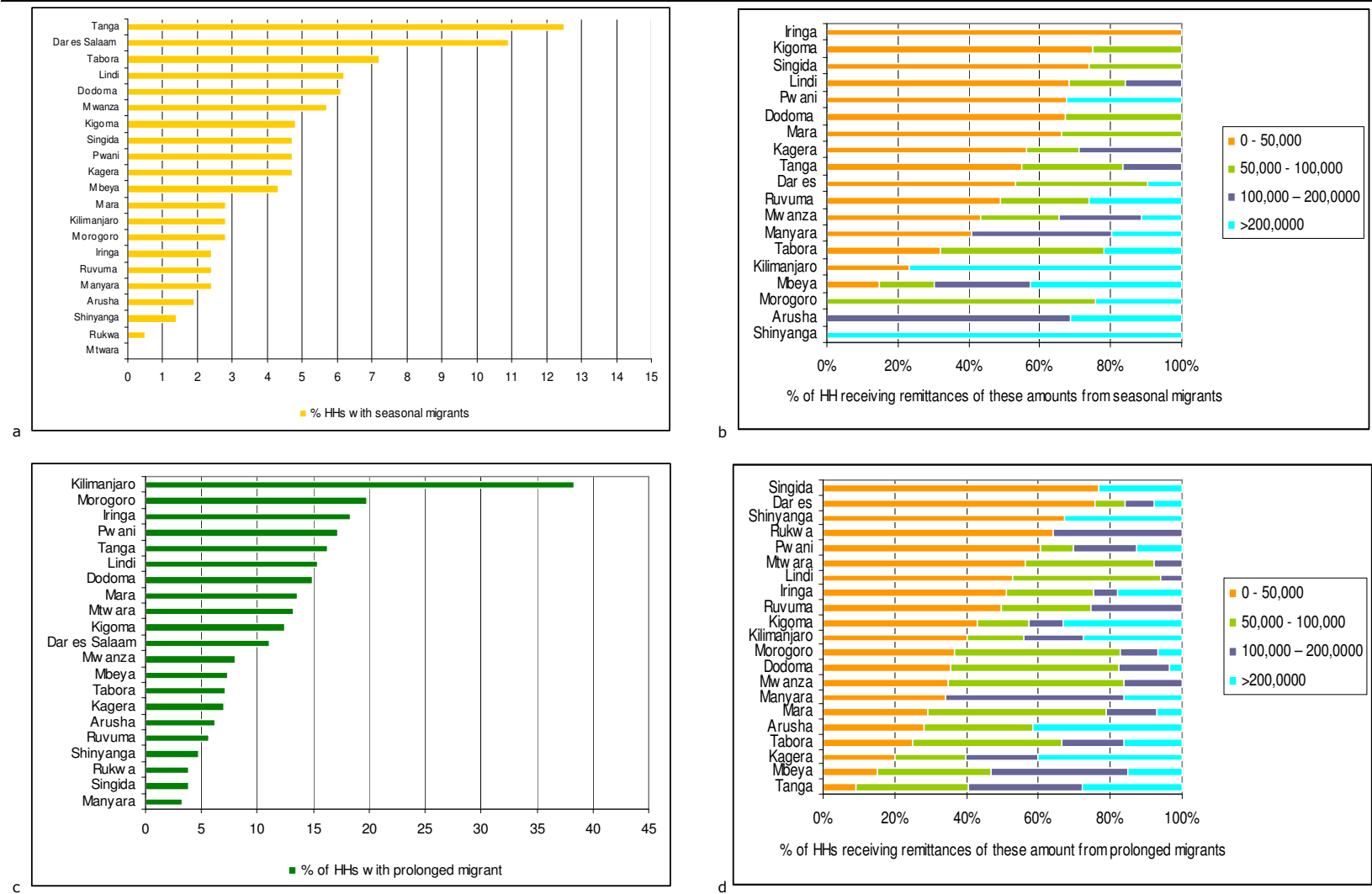
Fig 10: Patterns in migration and receipt of remittances by region

a) Percentage of households with a seasonal migrant; b) amount of remittances from seasonal migrants; c) Percentage of households with prolonged migrants; d) amount of remittances from prolonged migrants (Source: 2009/2010 CFSVA)

Livelihood strategy profiles

Principal component and cluster analysis were used to group together households that show similarities in the types of activities and the relative importance of these activities to overall livelihoods. As approximately half the population relied almost exclusively on agricultural activities, we had to further classify these households according to other agricultural characteristics, including 1) the total amount of land cultivated and 2) the relative amount of crop production devoted to consumption.

The final analysis resulted in the creation of 12 livelihood profiles, including: 1) small subsistence farmers, 2) small food/ cash crop farmers, 3) big subsistence farmers, 4) big food/cash crop farmers, 5) small business, 6) commerce, 7) daily work, 8) agro-pastoralists, 9) fisherfolk/ hunters, 10) households reliant on aid, 11) "other" activities and 12) salaried workers.

Overall, the four most common livelihood profiles were: "Small subsistence farmers" (26% of households), "Agro-pastoralists" (12% of households), "Big subsistence farmers" (12% of households), "Small business" (11% of households). Table 4 provides an in-depth description of each livelihood profile and details the percentage of the population that belongs to each.

Table 4: Description of livelihood profiles

Livelihood group and percentage of total	Description *(based on average characteristics of the group)*
Small subsistence farmers **26%**	Small subsistence farmers depend nearly entirely on agriculture for their livelihoods (relative contribution of this activity to the overall livelihood is 92%). They farm less than 2 ha of land and, on average, they devote at least half of their total crop production to self-consumption.
Agro-pastoralists **12%**	Agro-pastoralists build their livelihoods on a combination of livestock (49%) and agriculture (45%).
Big subsistence farmers **12%**	Households depend nearly entirely on agriculture for their livelihoods (the relative contribution of this activity is estimated at 91%). They farm more than 2 ha of land and, on average, they devote at least half of total crop production to self-consumption.
Small business **11%**	On average, 57 percent of households´ livelihoods are generated by small business activities while agriculture accounts for 39 percent.
Daily workers **9%**	Daily work generates 58 percent of the livelihoods amongst these households, while agriculture contributes another 39 percent.
Commerce **9%**	These households rely on commerce for 54 percent of their livelihoods; agriculture is also important, accounting for 42 percent.
Small food/cash crop farmers **6%**	Households depend nearly entirely on agriculture for their livelihoods (the relative contribution of this activity is estimated at 94%). They farm less than 2 ha of land and, on average, they devote less than half of the total crop production to self-consumption.
Big food/cash crop farmers **4%**	Households depend nearly entirely on agriculture for their livelihoods (the relative contribution of this activity is estimated at 94%). They farm more than 2 ha of land and, on average, they devote less than half of the total crop production to self-consumption.
Others *(non specified)* **4%**	Households depend mainly on other (non-specified) activities (35%), though artisan work accounts for 23 percent of livelihood activities.
Salaried **3%**	On average, 70 percent of livelihoods for these households are generated by salaried work.
Fisherfolk/hunters **3%**	Fisherfolk/hunters generate over half of their livelihoods from fishing (55%) though agriculture and hunting are also important (23% and 14% respectively)
Aid **2%**	Aid accounts for 78 percent of livelihoods amongst these households.

Source: 2009/2010 CFSVA

Figure 11 shows the relative contribution of each activity to overall household livelihoods for each livelihood profile. As this figure indicates, among each of the four agricultural profiles, the relative contribution of agricultural activities to overall livelihoods is between 92 and 94 percent.

For non agricultural livelihood profiles, agricultural activities still remain an important income source. It contributes between 18 percent in households reliant on aid, to 45 percent amongst agro-pastoralists. This is not surprising as agriculture accounts for almost half of the country's GDP. What is notable amongst these households, however, is that each has at least one other "main" livelihood activity.
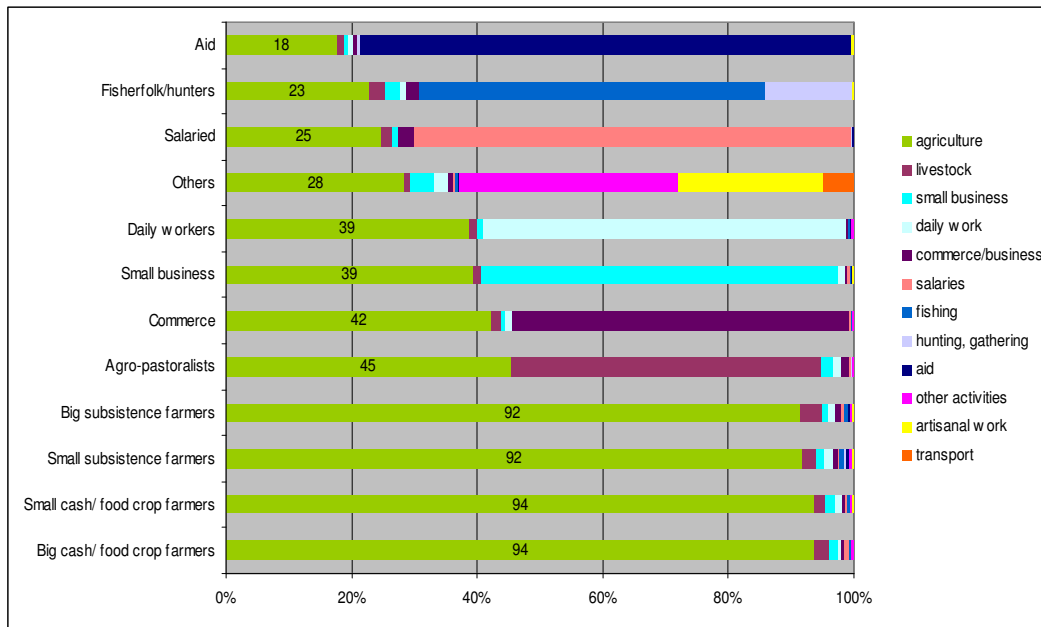
Fig 11: Activities contribution to livelihoods by livelihood group
(Source: 2009/2010 CFSVA)

Table 5 shows bivariate comparisons between livelihood profiles and background characteristics that are typically associated with economic well-being or vulnerability to food insecurity. As this shows, three livelihood profiles consistently appear more vulnerable: 1) small subsistence farmers, 2) daily workers and 3) households reliant on aid. All three profiles have amongst the highest percentage of households headed by women, uneducated household heads, households with unimproved water/toilet facilities and households in the lowest wealth quintile. Households reliant on aid, however, appear particularly vulnerable as the heads tend to be elderly (aged 67 years on average), uneducated (54%), female (68%) and poor (with 40% in the lowest wealth quintile).

Table 5: Comparisons of indicators of vulnerability and livelihood profiles

	Demographic				Water & sanitation		Economic/ Livelihood		
	% HHs headed by women	% with uneducated head	age HH head	crowding index	% with unimproved water	% with unimproved toilet	% in poorest wealth quintile	number of activities	Tropical Livestock Unit (TLU)
Small food/ cash crop farmers	19.2	18.9	45.0	2.3	39.3	8.2	18.7	1.4	0.6
Small subsistence farmers	**25.5**	**24.9**	**47.1**	2.4	**45.8**	**16.5**	**27.1**	1.5	0.8
Big food/ cash crop farmers	7.7	13.6	45.4	2.1	37.4	5.5	7.1	1.5	1.6
Big subsistence farmers	17.8	21.2	**50.2**	2.3	38.9	7.6	17.1	1.6	2.3
Small business	**26.6**	17.0	41.9	2.4	44.7	9.5	14.6	2.0	0.6
Commerce	21.3	8.9	42.0	2.3	37.6	8.1	6.7	2.1	1.1
Daily work	**24.5**	**27.4**	45.3	**2.5**	35.2	**16.3**	**34.5**	2.0	0.3
Agro-pastorals	16.8	26.0	48.5	2.4	**45.5**	**18.4**	19.5	2.2	5.5
Fisherfolk/hunters	13.7	21.5	40.9	**2.5**	43.4	7.9	**24.0**	2.0	0.5
Aid	**63.8**	**53.7**	**67.2**	1.6	**45.5**	3.5	**39.9**	1.8	0.1
Others	18.0	16.5	42.3	2.4	37.0	6.6	11.8	2.0	0.5
Salaried	11.3	3.4	42.9	2.3	39.2	3.5	1.0	2.1	1.1
Rural Mainland Tanzania	21.6	21.1	46.1	2.4	41.8	12.0	19.9	1.8	1.5

* Tropical Livestock Unit (TLU) is a standardized measure of access to livestock. It is a method that standardizes the consumption of different types and sizes of livestock according to that of a 250 Kgs cow, enabling access to livestock to be compared between households. It is explained further in the chapter "Natural Capital" (page 45).
Source: 2009/2010 CFSVA

The main livelihood profile, small subsistence farmers, are found throughout the country but particularly in Mtwara (54.1%) and Shinyanga (46.5%). Big subsistence farmers, on the other hand, are clustered primarily in Ruvuma (30.7%) and Kigoma (37.0%). Agro-pastoralists, which comprise 12 percent of the population, are particularly prevalent in Arusha, Mbeya and Manyara where they represent 39.4 percent, 23.7 percent and 23.6 percent of the population respectively. Small business livelihoods were not surprisingly clustered around commercial centres, with Dar es Salaam, the surrounding region of Pwani and Mbeya showing high percentages of this group (23.8% in Dar es Salaam and Pwani and 24.4% in Mbeya). Daily workers and households reliant on aid were both most prevalent in Morogoro. The distribution of the main livelihoods group by region can be seen in Figures 12 and 13.
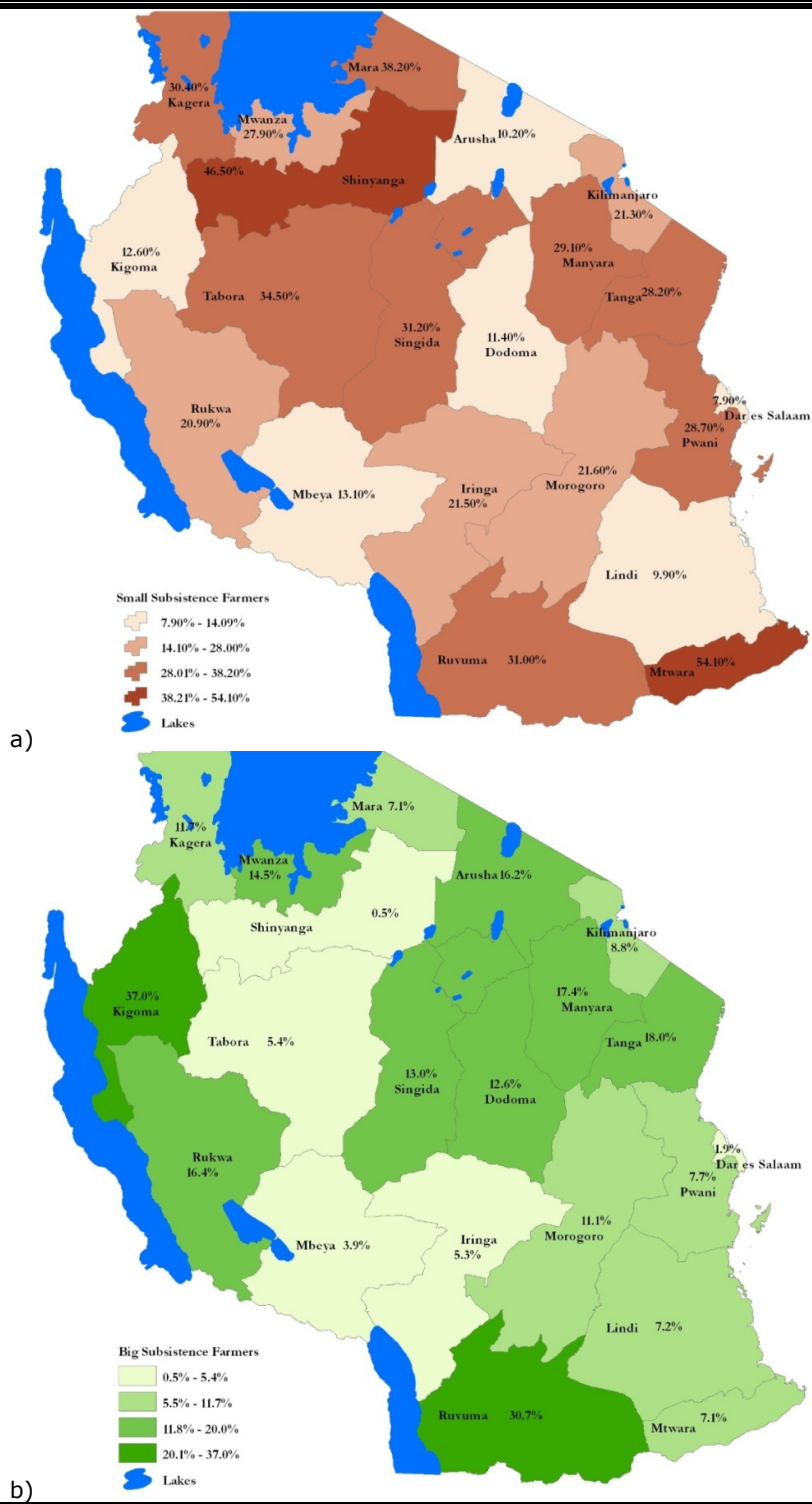
Fig 12: Regional distribution of main agricultural livelihood profiles
a) small subsistence farmers; b) big subsistence farmers (Source: 2009/2010 CFSVA)
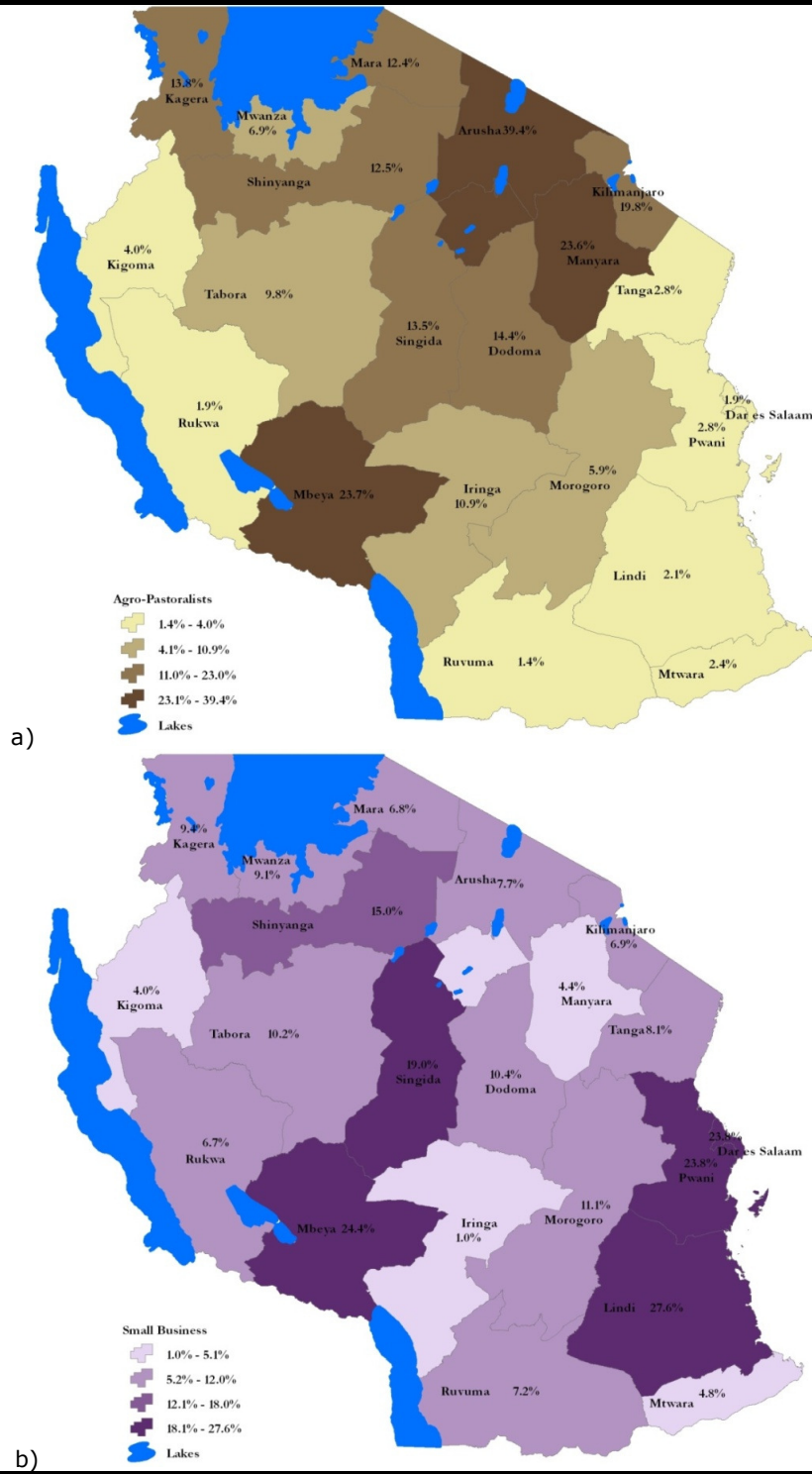
Fig 13: Regional distribution of other main livelihood profiles
a) agro-pastoralists; b) small business (Source: 2009/2010 CFSVA)

Expenditures

Food and non food expenditures, and expenditure quintiles

The 2009/2010 CFSVA collected information on cash and credit expenditures at household level for 15 food items and 17 non-food items. Food expenditures and certain non food expenditures were collected using a 30 day recall period. Expenditures on an additional 10 non food items were collected using a 6 month recall. To standardize reporting, however, all expenditures were converted to monthly expenditures, creating the following variables: 1) total household food expenditure per month, 2) total household non food expenditure per month, 3) per capita monthly expenditure and 4) expenditure quintiles. CFSVAs are not meant to be comprehensive expenditure surveys, so the absolute values for each type should be interpreted with care. Yet, regional and livelihood based comparisons can be used with confidence to explore differences in purchasing power and to identify expenditure patterns.

Table 6: Food and non food expenditures by region

	per capita exp	Total food expenditure	Total non food expenditures	% monthly food exp
Dodoma	12,243	36,172	32,141	54.5
Arusha	18,525	56,243	37,147	62.7
Kilimanjaro	26,669	74,225	69,968	56.8
Tanga	21,430	59,557	39,422	61.2
Morogoro	19,158	44,625	34,331	59.5
Pwani	19,695	57,295	31,838	66.4
Dar es Salaam	42,124	118,683	109,140	56.4
Lindi	17,557	56,457	28,678	68.6
Mtwara	9,192	19,788	16,624	51.8
Ruvuma	18,076	41,620	47,443	49.7
Iringa	17,674	37,531	51,256	45.1
Mbeya	20,248	44,978	56,012	47.6
Singida	12,575	36,856	43,166	50.5
Tabora	16,916	55,949	50,668	56.6
Rukwa	17,558	42,386	57,015	46.0
Kigoma	21,936	56,491	70,382	49.2
Shinyanga	17,445	55,358	67,434	48.6
Kagera	20,661	56,252	62,775	49.8
Mwanza	18,475	66,232	73,157	51.8
Mara	20,325	86,134	67,487	60.3
Manyara	13,917	38,229	41,626	51.7
Rural Mainland Tz	18,572	53,435	52,102	54.1

Source: 2009/2010 CFSVA

Table 6 shows the total food and non food expenditures as well as per capita expenditures both overall and by region. Household in mainland Tanzania had a mean per capita expenditure per month of 18,572 TShs and total food and non food expenditures of 53,435 and 52,102 TShs per month. Close to 99 percent of all expenditures were made in cash rather than credit. Per capita expenditures were highest amongst households in Dar es Salaam and Kilimanjaro. The lowest expenditures were reported in Mtwara. Across regions, households reported that 54 percent of their monthly expenditures were spent on food products. This varied significantly by region with households in Iringa reporting the lowest percentage expenditure on food (at 45%) and households in Lindi reporting the highest (69%).

A closer look at aggregate food and non food expenditures (see Figure 14) reveal that the highest non food expenditures were for soap, transport, medical expenses and clothing, each consuming about 5 percent of total expenditures. The highest food expenditures went to purchases of maize (15%), meat (8%), sugars (7%), rice (5%) and oil (5%). Compared with data from the 2005/2006 CFSVA, overall percentage expenditure on food seems to have declined from 58 percent to 54 percent. Much of this decline appears to be related to decreases in maize purchases, which accounted for over 20 percent in 2005/2006 and, just three years later, is now down to 15 percent. This decline may be explained by improvements in amounts of own production or increases in maize prices since 2006.
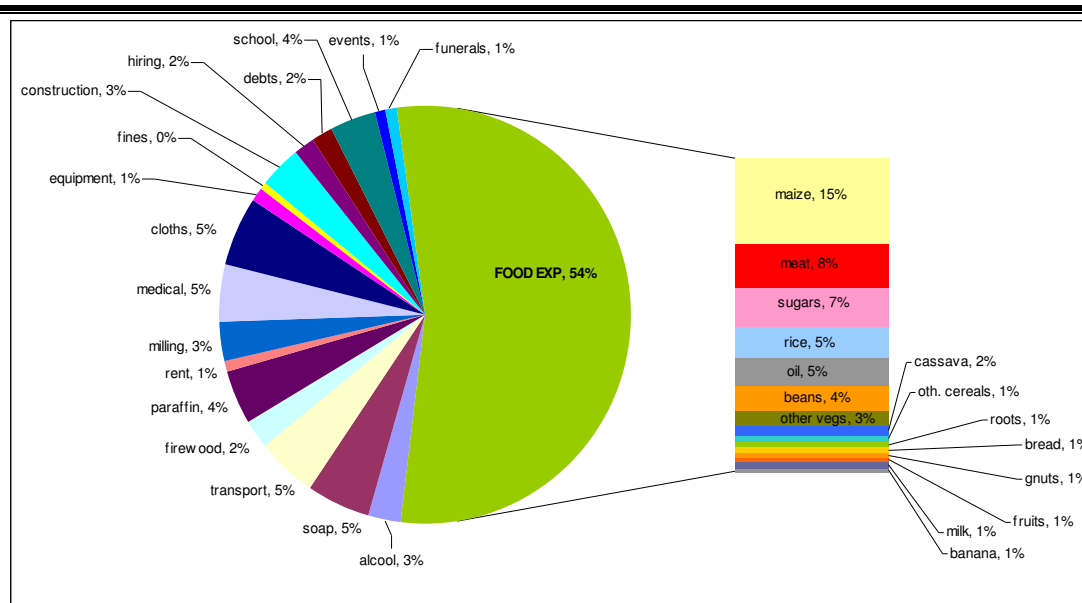
Fig 14: Composition of total food and non food expenditures
(Source: 2009/2010 CFSVA)

Table 7 examines expenditures and expenditure quintiles by livelihood profiles and wealth quintiles. Overall, salaried workers reported the highest per capita expenditures, reportedly spending close to 33,000 TShs per person per month. This is not surprising because they are the group least likely to engage in agriculture. The lowest per capita spending was seen amongst small, subsistence farmers, one of the poorest and most vulnerable livelihood profiles. These households spent fewer than 15,000 TShs per person per month. Fisherfolk/ hunters and households reliant on aid, again two poor and vulnerable livelihood profiles, reported the highest percentage expenditure on food at 61 and 60 percent respectively. The livelihood profile reporting the highest per capita expenditures, salaried workers, also reported the lowest percentage expenditure on food at 48 percent. The findings that poorer livelihoods spend a larger percentage of their income on food, while not surprising, is a point of concern as these household are both less able to build their asset base and more likely to suffer disproportionately from shocks such as drought or rapid increases in food prices.

Table 7: Food and non food expenditures by wealth and livelihoods profiles

	Per capita monthly exp (TShs)	% monthly food exp	% in high/ highest expenditure quintile
Livelihoods			
Small food/ cash crop farmers	19,403	52.6	45.4
Small subsistence farmers	14,877	54.8	30.4
Big food/ cash crop farmers	21,491	48.8	48.6
Big subsistence farmers	17,078	52.3	36.2
Small business	22,635	55.7	50.6
Commerce/agriculture	23,424	51.9	54.2
Daily work	15,112	58.3	29.6
Agro-pastoralists	17,194	51.5	37.5
fisherfolk/hunters	19,544	60.5	38.2
Aid	17,148	61.9	36.5
Others	21,432	56.7	46.2
Salaried	32,616	48.6	70.8
Wealth quintiles			
Poorest	11,656	57.7	20.8
Poorer	14,404	55.6	26.0
Moderate	18,072	55.8	40.6
Richer	19,961	52.1	46.1
Richest	28,414	49.1	65.9

Source: 2009/2010 CFSVA

household are both less able to build their asset base and more likely to suffer disproportionately from shocks such as drought or rapid increases in food prices.

A look at expenditures by wealth quintiles revealed strong correlations between the two. Per capita total expenditures and percentage of households in the high/highest expenditure quintiles both increased in steps across wealth quintiles, from poorest to richest. Similarly, percentage expenditure on food decreased across wealth quintiles. The implication of these findings is that as wealth increases, households spend more money overall (including on food) but the share of total

expenditures spent on food declines as non food expenditures begin to build the asset base of the household.

Expenditure quintiles were then used to assess the association between expenditures and various indicators of vulnerability or household well-being. As shown in Table 7, poor livelihoods such as small subsistence farmers, households reliant on aid and daily workers all show low rates of households in the high or highest expenditure quintiles. Likewise, the most well-off livelihood profile, salaried workers, shows the highest percentage of households in the high or highest expenditures quintiles. Indicators of vulnerability, as shown in Table 8, also seem to decrease across expenditure quintiles, from low to high. Specifically, the percentages of households headed by women, uneducated household heads, crowding, households with poor drinking water sources/ toilets and those in the lowest wealth quintile all decrease as expenditures increase.

Table 8: Characteristics of expenditure quintiles

	% HHs headed by women	% with uneducated head	age HH head	crowding index	% with unimproved water	% with unimproved toilet	number of activities	Tropical Livestock Unit (TLU)*
Lowest expenditures	23.9	30.0	47.9	2.7	44.9	14.5	1.7	1.6
Low expenditures	24.1	27.1	47.3	2.5	45.6	15.6	1.8	1.6
Moderate expenditures	21.3	17.9	44.9	2.4	41.2	12.2	1.9	1.6
High expenditures	18.7	16.7	45.2	2.3	40.9	9.9	1.8	1.5
Highest expenditures	17.9	10.1	44.4	2.0	36.6	6.7	1.9	1.4

Tropical Livestock Unit (TLU) is a standardized measure of access to livestock. It is a method that standardizes the consumption of different types and sizes of livestock according to that of a 250 Kg cow, enabling access to livestock to be compared between households. It is explained further in the chapter "Natural Capital" (page 45).
Source: 2009/2010 CFSVA

Credit, Cash, Exchange

While credit comprises less than 3 percent of all expenditures, 32 percent of households report having access to credit and of these, 22.8 percent reported actually receiving a loan in the past year. The main sources of credit were micro finance institutions such as NGOs (37.4%), family/relatives (21%) and banks (21.9%). Households most often reported using credit for business investment (31.0%), agricultural inputs (18.3%) and food (16.9%). The median loan provided was 113,000 TShs and the mean length of time for loan repayment was 8 months. Almost 70 percent of households anticipated being able to fully repay the loan, while 14 percent expected to be able to pay back at least half of it. On the other hand, 17 percent of households indicated that they would be unable to pay back even half of the loan and 3 percent indicated they would not be able to pay back any of it.

Access to and use of credit varied by livelihood group. Wealthier livelihood profiles, including salaried workers and big food/ cash crop producers, reported greater access to loans, with 60 and 45 percent of households reporting access respectively. By contrast, households in marginal livelihood groups like those reliant on aid had very limited access to credit. In fact, only 6 percent of households in this livelihood profile reported access. Examining uses of credit, the wealthiest livelihood profile, salaried workers, reported using loans for home purchases (25%), home improvements (11%), business investments (18%) and/or food (12%). By contrast, the worse off livelihood profiles, those reliant on aid and daily work, reported using these loans either for food purchase only (as in the case of households reliant on aid) or for a mix of medical care (31%), food (20%) and agricultural inputs (19%) (as was the case with daily workers). Looking at the way loans are used within agricultural households, large food/ cash crop producers were able to invest in more productive harvests by using the loans received to purchase agricultural inputs (55.6%), while small subsistence farmers were unable to do the same because the bulk of loan monies were needed for direct food purchases (40%). As a result, only 16 percent of loans to small subsistence farmers were invested in agricultural inputs.

Natural Capital

This chapter presents findings on climate, productive land, irrigation, major crops and agricultural inputs, utilization and duration of harvest, and access to livestock.

Agricultural Production

Climate

The climate of Tanzania varies from tropical, high humidity conditions along the coast to lower rainfall (<500mm), semi-arid conditions in the Central region, and high rainfall areas (>2000mms/year) in the mountains of the northeast and southwest.

The mean annual rainfall varies from 320mm to 2400mm, with about half the country receiving less than 750 mms of rain annually. Most of the country experiences a unimodal rainfall regime, characterized by a long dry season extending from May to October and one long rainy season (termed the Musimu rains) stretching from November to April. Some parts of the country, however, experience a "bimodal" rainfall regime (see Figure 15), with a short rainy season (termed the Vuli rains) extending from October to early January and a longer rainy season (the Masika rains) running from mid March to the end of June. Note that these two seasons are not clearly separated by a well defined dry period as occurs in regions with proper bimodal rainfall regimes. Rather the period of February to mid March is less rainy and with significant dry spells.

Areas with bimodal rainfall regime are largely confined to the northern regions of the country, from coastal regions of Pwani and Dar es Salaam to Kagera on the western shore of Lake Victoria.

Overall 60-70 percent of all cereal is believed to be grown in the regions of the country with unimodal rainfall, which makes the food availability situation of the country highly dependent on the timeliness and adequacy of the Musimu rains.
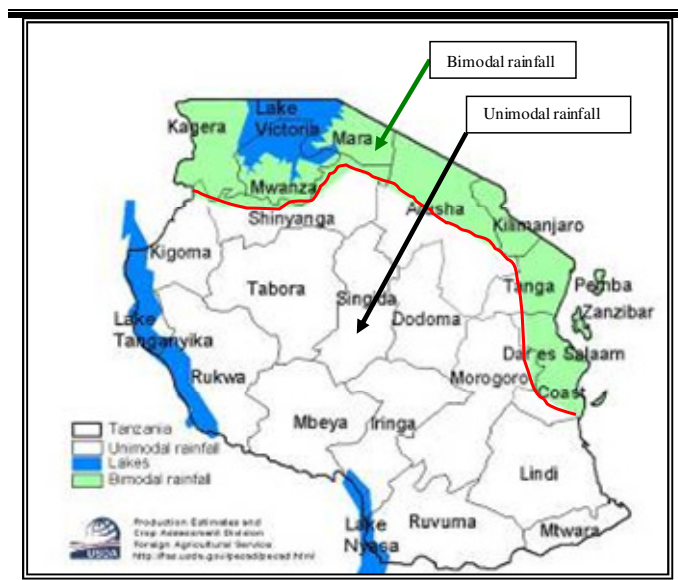
Fig 15: Unimodal and bimodal regions in Tanzania

The cropping calendar varies depending on whether households experience bimodal or unimodal rainfall regimes (see Figure 16). Households in unimodal areas experience one cropping season, beginning with pre-planting and land preparation activities in September and October, followed by planting in November and December. Harvesting begins in May and continues until August. Marketing activities largely overlap with harvesting, but extend for two months after the harvest ends.

Households in bimodal areas, on the other hand, experience two cropping seasons. Pre-planting and land preparation for the Masika season begin in mid January and continue until mid March. Planting occurs thereafter (mid March to mid May), with harvesting beginning in July and continuing to September. Marketing of this harvest largely corresponds with the harvesting season itself. Pre-planting and land preparation activities for the Vuli season begin in September, one month before the rains usually begin. Planting then begins in October and continues through November. Harvesting starts in mid January and ends mid march. Marketing of this crop starts in mid February and runs to the end of March. It should be noted that land preparation activities, harvests from the previous season and marketing of previous season harvest all occur at the same time in the bimodal areas of the country. Therefore, mid January to the end of March and July to the end of September are highly labour-intensive periods for farmers in these areas.

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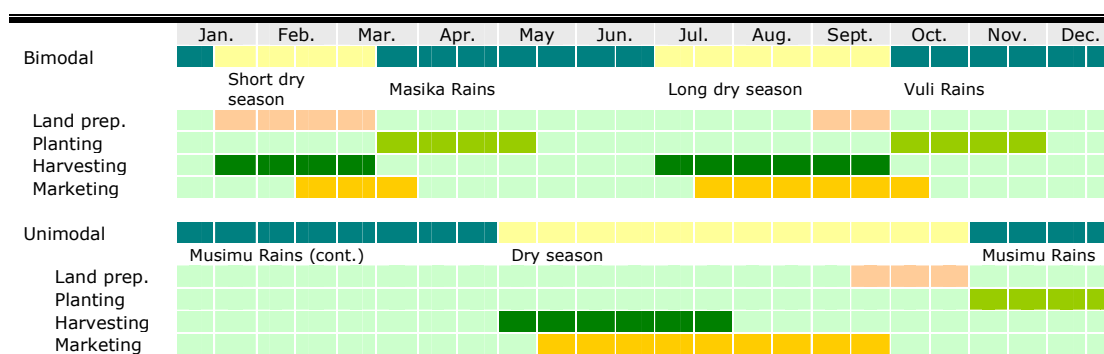
Fig 16: Cropping seasons calendar
(Source: WFP, Vulnerability Analysis and Mapping Unit)

Productive Land

As agriculture accounts for 45 percent of Tanzanian GDP, access to land remains a crucial issue throughout the country. To examine land access, the CFSVA collected information on how many households farmed in each season (the Musimu, Masika and Vuli seasons), how much land was farmed and whether the land farmed was owned by the household. Overall, 51.4 percent of household cultivated crops during the Musimu season, 44.8 percent cultivated crops during the Masika season and 20.9 percent cultivated crops during the Vuli season. As Table 9 indicates, the plurality of households relied on smallholder farming (<0.5 ha) during each seasons, and large scale farming (>2 ha) was more common during the Musimu and Masika seasons.

Table 9: Distribution of farm sizes per cropping season

	Masika	Musimu	Vuli
< 0.5ha	27.3	37.9	44.2
0.5-1ha	22.9	15.3	25.9
1-2 ha	26.4	20.3	18.2
> 2ha	23.4	26.5	11.8

Source: 2009/2010 CFSVA

Examined by region, large scale farming (>2 ha) during the Musimu season was prevalent in Dodoma (52.1%), Kigoma (90.6%) and Manyara (44.9%). Small scale farming (<0.5 ha) was more prevalent in Mtwara (51.1%), Tabora (80.4%) and Shinyanga (89.3%). Looking at the Masika season, large scale farming was most prevalent in Kigoma (49%), Rukwa (41.1%) and Ruvuma (39.8%) while small-scale farming was seen most frequently in Dar es Salaam (63.6%) and Mara (50.1%). As large scale farming is uncommon for the Vuli season, it was only seen in Kigoma, Arusha, Pwani and Tanga, and only in the case of Kigoma did more than one-quarter of households engage in such activities. Small scale farming was common, particularly in Mbeya (76.1%), Morogoro (67.8%), Dar es Salaam (66.1%), Mara (66.8%) and Manyara (56.2%).

Overall, regardless of cropping season, households reported having a legal title for the overwhelming majority of land farmed (86-88%).

Geographical distribution of farming seasons

For each region, the seasonal predominance of farming was also determined and mapped (Figure 17), highlighting the geographical distribution of the farming calendar. To do that, a farming season was considered as "existing" in the agricultural scenario of a region if more than 20 percent of the households farmed during that season. Five fairly consistent groups arose from this simple classification – Musimu only, Masika only, Masika-Musimu, Vuli-Masika and Vuli-Masika-Musimu.

The central regions are dominated by Musimu-only farming, while the Vuli-Masika group predominates in the north and west. Masika-only is predominant in the south of the country[37] while the western regions farm in all three seasons. Some regions present intermediate characteristics (Lindi, Mwanza) and could be re-assigned to other classes (Masika and Musimu respectively) for greater geographic consistency. Overall patterns result from the nature of seasonal rainfall distributions with near-bimodality for the Vuli-Masika regions, and unimodal season for the others – the prevalence of Masika only farming in the south is due to a progressive

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[37] This includes Mbeya where, although officially classified as Vuli-Masika, the Masika season is overwhelmingly more dominant.

shift in rainfall timing as one goes south. The wetter areas in the west (Kagera, Kigoma) enjoy a longer rainfall season allowing farming in all three seasons.

| | Households farm during: | | |
	Masika season	Musimu season	Vuli season
Dodoma	0	100	0.5
Arusha	66.5	0	38.6
Kilimanjaro	84.9	30.8	3.8
Tanga	94.1	1.4	88.1
Morogoro	19.6	73.9	15.2
Pwani	69.7	0.4	42.4
Dar es Salaam	36.2	0	15.2
Lindi	75.8	55.6	0.9
Mtwara	0	92.4	0
Ruvuma	96.3	1.4	1.5
Iringa	2.9	95.7	0
Mbeya	91.4	3.7	26.9
Singida	0.4	98.1	0
Tabora	0.5	95.2	0
Rukwa	95.2	0	0.5
Kigoma	43	45.8	49.6
Shinyanga	1	94.6	0
Kagera	58.6	40.1	57.6
Mwanza	47.9	70.6	0
Mara	96.3	1	79.8
Manyara	10.4	84.2	7.5
Rural Mainland Tz	44.8	51.4	20.9

Fig 17: Seasonal distribution of farming by region
(Source: 2009/2010 CFSVA data)

Crop Production

Regional crop production patterns

FAO estimated the cropping patterns in Tanzania in 1997 (see Figure 18). To examine how these patterns might have changed, the CFSVA collected information on the four main crops cultivated.
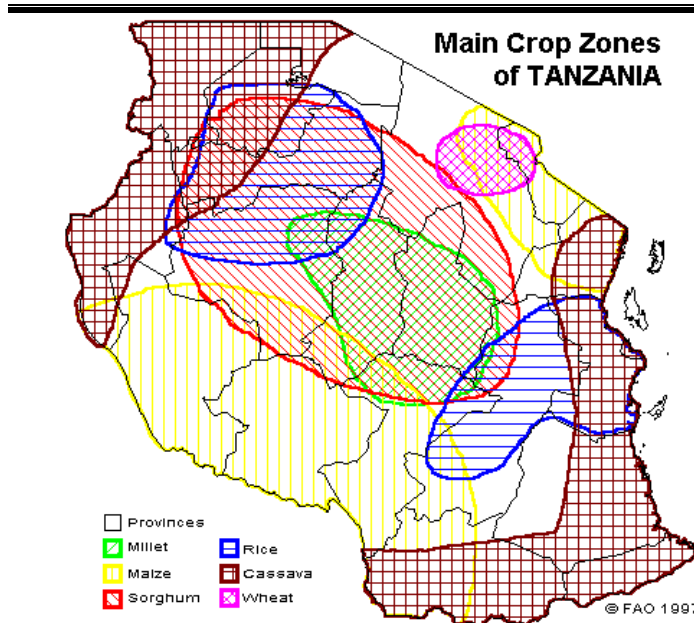
Fig 18: Main crop zones of Tanzania
(Source: FAO, 1997)

Although almost all households cultivate crops, crop diversity and predominant crop types vary considerably across the country, creating a complex farming panorama.

At the national level, the crops cultivated most frequently were maize (90.5%), kidney beans (36.5%), cassava (29.3%), rice (23.0%) and groundnuts (20.6%).[38] Other cash crops (17%), sorghum (16.4%) and sweet potatoes (16.5%) are grown by sizeable percentages of households. All other crops are grown by fewer than 7 percent of households.

Except for maize, the national percentages hide considerable geographic variations in crop production patterns. Figures 19 and 20 show the prevalence of households farming a given crop in each region.

Maize is grown throughout Mainland Tanzania with 14 of 21 regions registering prevalence in excess of 90 percent of households (and all but three with a prevalence higher than 75%).

All other crops have well-defined geographic patterns. Kidney beans were heavily focused in the northeast, northwest and southern provinces while cassava was concentrated in the northwest, coastal and north eastern regions. Rice was produced in Morogoro and the regions to its east towards the coast as well as in the western provinces from Mwanza to Mbeya. With the exception of the southeast region of Mtwara, groundnut production was concentrated mostly in the western half of Mainland Tanzania, in particular in Tabora and its neighbours. Sorghum was present in southeast and central regions as well as in Mara. Sweet potatoes were confined to the northwest of Mainland Tanzania (and present in Dar es Salam) while cash crops (coffee, cotton, tobacco and cashew) predominated in Kilimanjaro and in a belt extending towards Mbeya in the south (plus Lindi in the southeast).

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[38] Results generated by using the multiple response option.
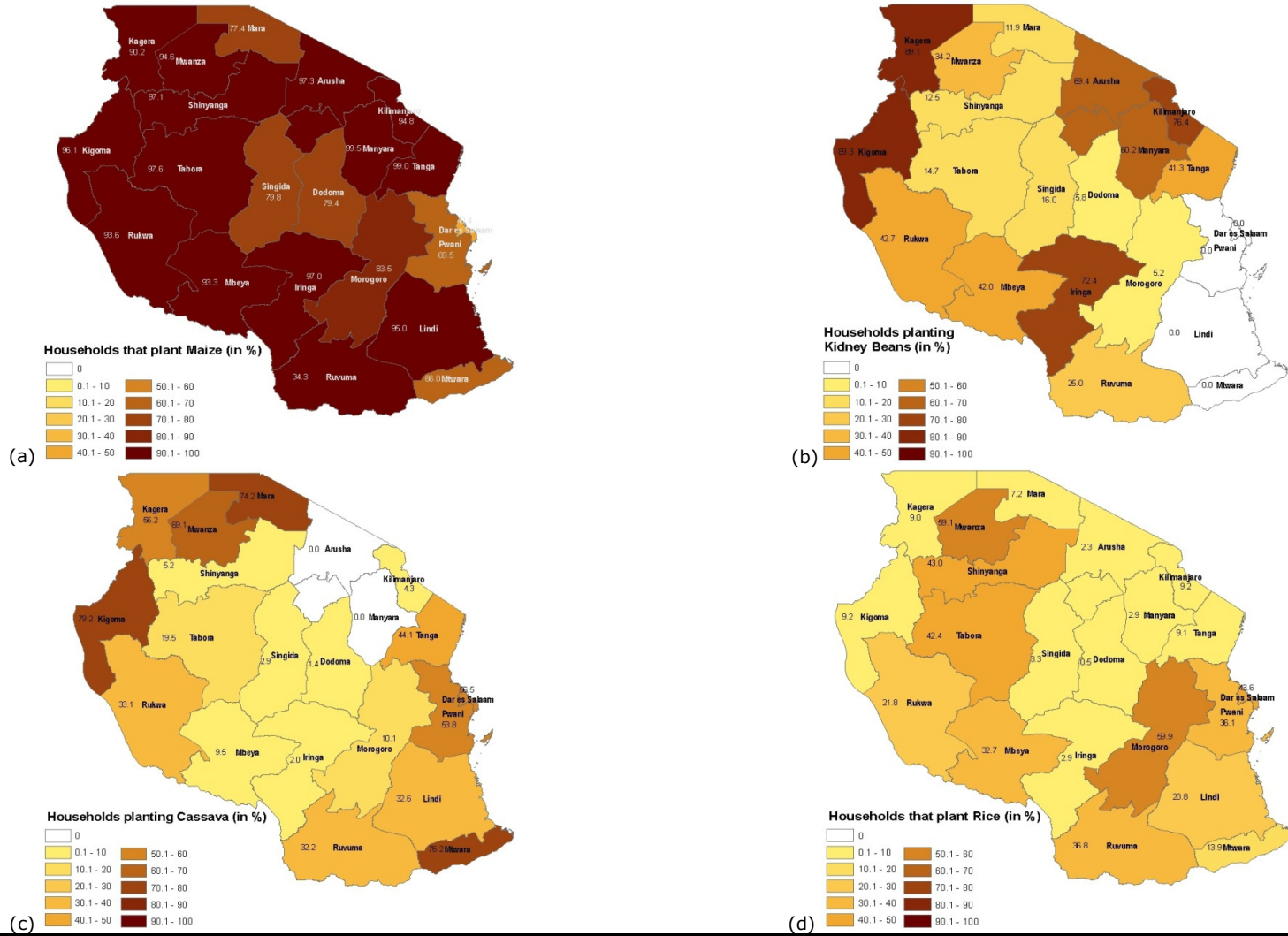
Fig 19: Prevalence of crops in Tanzania: (a) maize, (b) kidney beans, (c) cassava and (d) rice
(Source: 2009/2010 CFSVA)
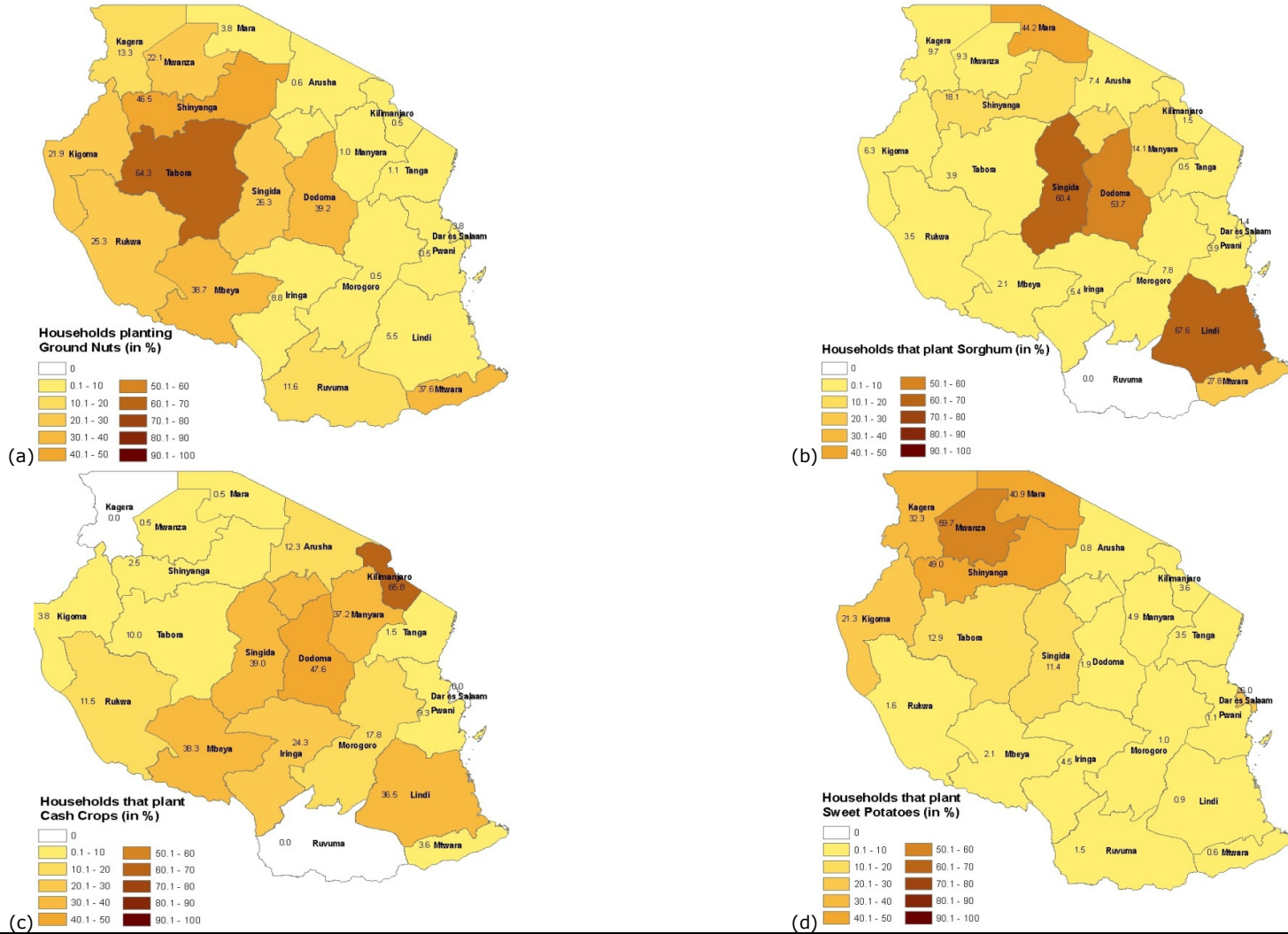
Fig 20: Prevalence of crops in Tanzania: (a) groundnuts, (b) sorghum, (c) cash crops, (d) sweet potatoes
(Source: 2009/2010 CFSVA)

An attempt was made to consolidate the geographical clustering of crops into a map that would convey the crop composition for each region (see Figure 21). In spite of the complexity of cropping arrangements, some broadly groupings can be defined.

Cropping Groups (maize plus ...)

- Cash Crops and Kidney Beans
- Rice and Cassava
- Rice and Cash Crops
- Cassava and Kidney Beans
- Cassava and others
- Cash Crops and Sorghum
- Ground Nuts and Kidney Beans
- Ground Nuts and Rice
- Ground Nuts and Sweet Potatoes
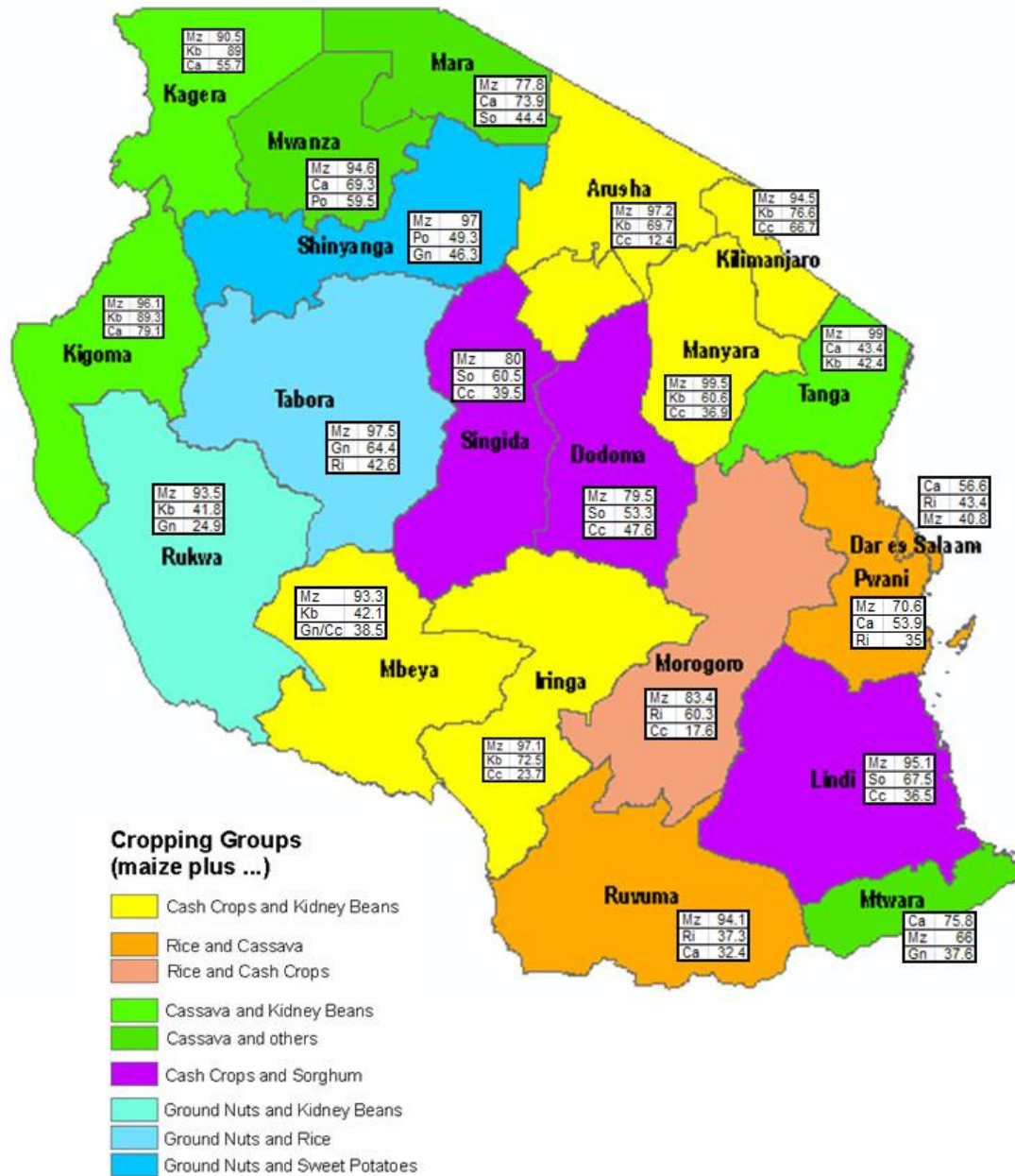
Fig 21: Cropping groups in Tanzania
Map shows crop groups in Tanzania based on the three most prevalent crops in a region.
(Source: 2009/2010 CFSVA)

As for crop diversity, as many as 39 percent of households cultivated at least four crops. In order to illustrate geographical variation in crop diversity, the proportion of households planting four or more crops in each province was mapped and the result is shown in Figure 22.
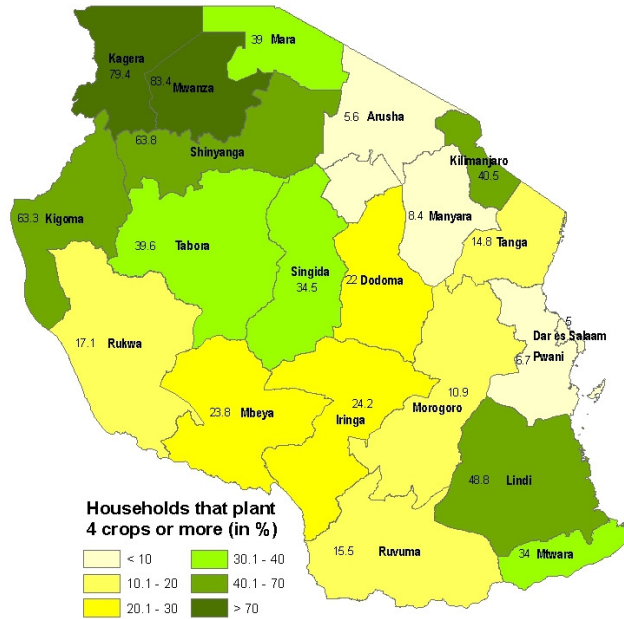
Fig 22: Proportion of households planting four or more crops
(Source: 2009/2010 CFSVA)

The highest diversity was seen in the west-northwest (Mwanza, Kagera, Shinyanga, Kigoma) and the southeast (Lindi and Mtwara). Notably these are the regions with the highest mean rainfall and longer rainfall season. This is also where farming has a greater tendency to extend over multiple seasonal periods (Vuli, Musimu, Masika). Lowest crop diversity is seen in the north eastern provinces (Arusha and Manyara), the coast (Pwani and Dar es Salam) and Morogoro. Note that the crop diversity in the north eastern province of Kilimanjaro (the only exception to the aforementioned trend) can be explained by their producing a wide variety of cash crops.

Crop production patterns by livelihood profiles

There were few notable differences across livelihood profiles on the major crops cultivated, and this is especially true looking only at the four main livelihood groups (see Figure 23). Yet, it is worth mentioning that among these four profiles, agro-pastoralists reported rice and cassava production least frequently (only 6% of the time)[39], small business households mentioned kidney bean production least frequently (10%) and small subsistence farmers reported cassava cultivation most frequently (12%).

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[39] Multiple response analysis has been conducted and response percentages have been taken into consideration (instead of percentages of cases) in the attempt to control for the number of crops cultivated.
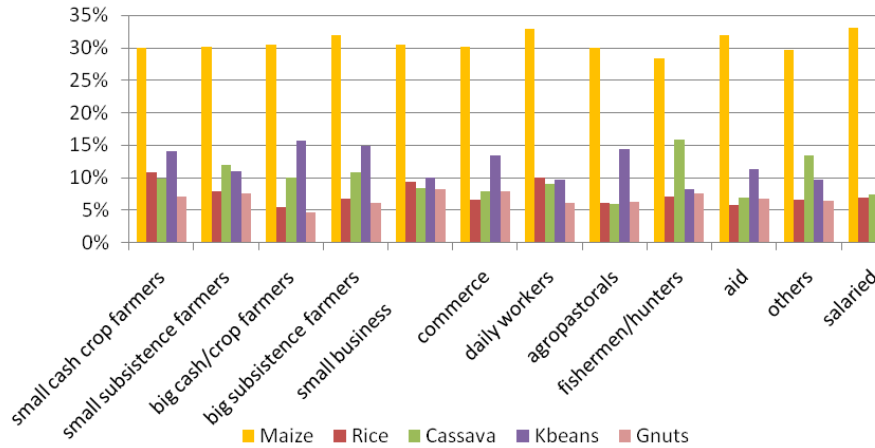
Fig 23: Crop production by livelihood profiles
(Source: 2009/2010 CFSVA)

Duration of harvest

Households involved in agriculture were also asked how many months their harvest lasted for each season in which they cultivated crops. The duration of crop harvests is particularly important in Mainland Tanzania since the examination of livelihoods showed that no other income-generating activities replace agricultural activities during slow periods. In practical terms, this means that households are not replacing the income lost during these months, leaving them with less money to purchase food and making them more reliant on remaining food stocks.

Harvests from the Masika and Vuli seasons lasted 4.7 and 3.6 months on average. Those from the Musimu season, by contrast, lasted almost a full month longer (5.5 months). This is not surprising given that Musimu harvests are typically larger. Combining data from the duration of harvest and secondary cropping calendar information, Figure 24 attempts to estimate the proportion of households with remaining food stocks at a given point over the year. As this figure indicates, July is the first month of harvest for the Masika season while May is the first month of harvest for the Musimu season. January is considered the first month of harvest for the Vuli season.

As Figure 24 shows, reserves from the Vuli harvest tend to decline most rapidly with fewer than 30 percent of household retaining reserves after just four months. Reserves from the Musimu and Masika harvests, however, are still reported by 50 percent or more of households four months after the harvest. The Musimu harvests, however, tend to last longer than the Masika harvests. The percentage of households reporting reserves from the Musimu harvest does not fall below 20 percent until two months prior to the next Musimu harvest. By contrast, examining reserves from the Masika harvest, under 20 percent of households have reserves left a full four months before the next Masika harvest. Since these households are probably benefiting from the Vuli harvest during this period, this may be less of a problem than it appears. However, the regions of Ruvuma and Rukwa are fully dependent on Masika harvests (and to a lesser extent, Mbeya – see Figure 17) so they could be short of food during this period.
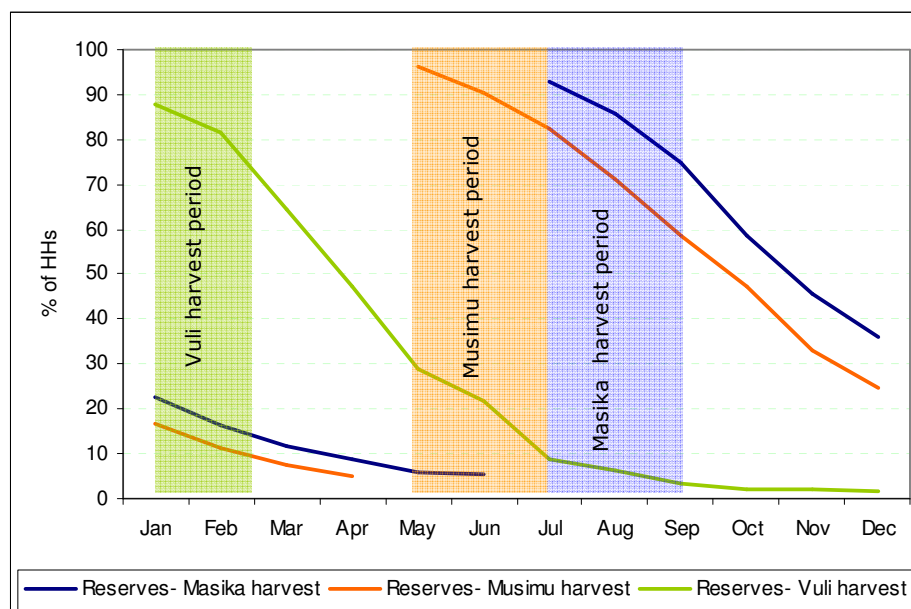
Fig 24: Percentage of households with reserves from previous harvest, by month and season
(Source: 2009/2010 CFSVA)

Duration of harvest by livelihood profiles

Finally, harvest duration was also examined by livelihood profile. Overall, harvests are shortest for households reliant on aid and daily work, regardless of cropping season. By contrast, harvests last the longest for big food/cash crop farmers and salaried individuals. Table 10 shows the average duration of harvest by season and livelihood profile.

Table 10: Duration of harvest by season and livelihood profile

	Duration of harvest (average no. months)		
	Masika season	**Musimu season**	**Vuli Season**
Small food/ cash crop farmers	5.2	5.4	4.2
Small subsistence farmers	4.6	5.6	3.5
Big food/ cash crop farmers	5.2	7.2	4
Big subsistence farmers	4.5	5.9	3.6
Small business	4.1	4.7	3.7
Commerce	4.8	6	3.5
Daily work	3.7	3.9	2.8
Agro-pastoralists	5.3	6	3.6
Fisherfolk/hunters	4.4	4.3	3.8
Aid	2.6	4.1	2.9
Others	4.6	5	2.2
Salaried	5.2	6.6	3.7

Source: 2009/2010 CFSVA

Seeds and agricultural inputs

In Mainland Tanzania, there is limited use of agricultural inputs. Findings from the CFSVA show that only 14.5 percent of cultivating households reported the use of chemical fertilizers and only 31.6 percent used natural fertilizers. Interestingly, the 2009/2010 CFSVA shows only a slight

increase since 2005/2006 in the percentage of households using natural fertilizer (up from 30% in 2006) but a large decrease in the use of chemical fertilizers, dropping from a previous rate of 23 percent.

Examined by region, the use of both chemical and natural fertilizers varied substantially. The bulk of chemical fertilizer use is concentrated in the regions of Kilimanjaro (49.9%), Ruvuma (59.7%), Iringa (47.6%) and Mbeya (45.1%). Dar es Salaam (19.3%), Tabora (24.8%) and Arusha (16.2%) show the next highest proportion of chemical fertilizer use. In all other regions, however, fewer than 10 percent of households use chemical fertilizer. Patterns are largely similar for natural fertilizer, except in the western and north western regions. In these areas, natural fertilizer is used much more frequently that chemical ones.

Figure 25 examines fertilizer use by livelihood profile. Overall, salaried households and small food/ cash crop farmers report using the most chemical fertilizer, with 26 percent and 25 percent of households reporting this respectively. Small subsistence farmers, alongside daily workers and fisherfolk, all report the lowest use of chemical fertilizer with just over 10 percent of households each profile reporting this. Examining use of natural fertilizer, agro-pastoralists were the livelihood group most likely to report use, with over half (56%) of agro-pastoral households reporting this. Salaried households and big subsistence farmers were the next most likely livelihood groups to use natural fertilizers, with 39 and 33 percent of households reporting this respectively.

The CFSVA also assessed the sources of seeds for the most frequently cultivated crops. Overall, reserves from previous harvests were the most frequent source reported (59.7% of households). Purchase was the second
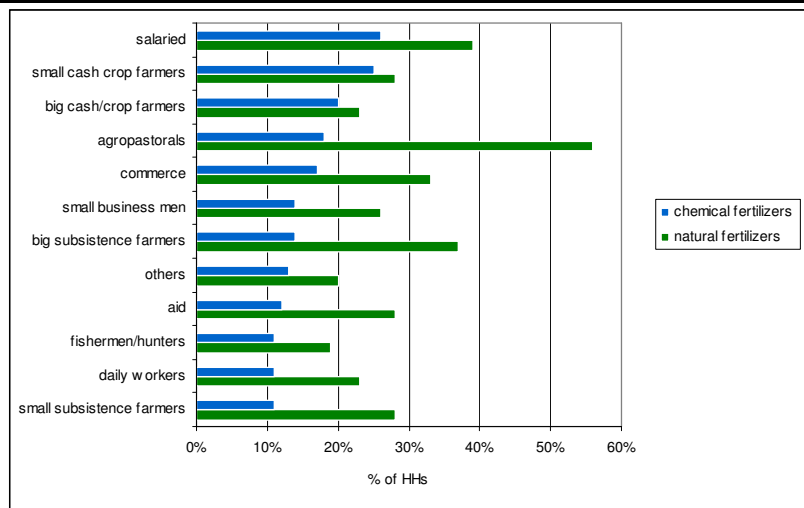
Fig 25: Use of chemical and natural fertilizers by livelihood profile (Source: 2009/2010 CFSVA)

most source with slightly less than one-third (31.7%) of households reporting this. Fewer than 5 percent of household reported any other seed source.

Looking at the two main crops, maize and kidney beans, the same pattern was seen. Overall, reserves from the previous harvest were the main seed source for 56.2 and 60.8 percent of households respectively. Seed purchase was only reported by 38.9 percent and 35.5 percent of households respectively.

Post-harvest loss is believed to be a major problem in Tanzania but there is scarcity of data on the topic. Of the available data, almost all relates to cereal grains and grain legumes, where overall losses are estimated at 30-35 percent.[40] To address this gap, the CFSVA asked households to quantify how much of their last harvest was lost, for whatever reason. Unfortunately, because of challenges in the data collection process, the CFSVA is not able to provide precise estimates. Yet, data was used to classify households according to whether 20 percent or more of each household's last harvest was spoiled for any reason. As Figure 26 indicates, there were regional differences. The regions with the largest number of affected households included Lindi (56.8%) and Iringa (62.5%). By contrast, households in Dodoma reported crop loss least frequently, with no households losing over 20 percent of their last harvest.

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[40] PASS (2002). Investment Potential of the Horticultural Industry in Tanzania. Private Agricultural Sector Support Ltd
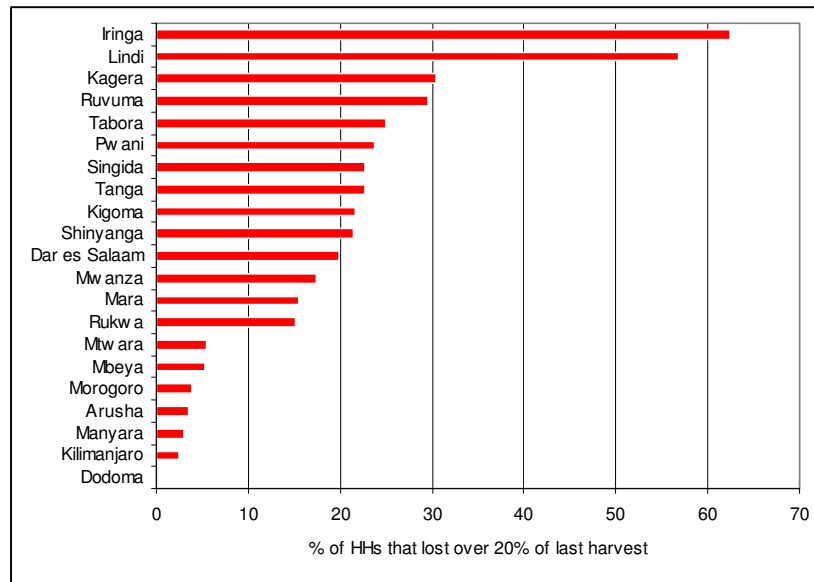
Fig 26: Percentage of households that lost over 20 percent of last harvest
(Source: 2009/2010 CFSVA)

Access to livestock

Access to livestock is widespread in Mainland Tanzania.[41] The CFSVA found that 70 percent of households have access to livestock. Chickens were the most common animals reported, with 56.6 percent of households having access to at least one. Goats and cattle were the next most common, with 28.2 and 23.6 percent of households respectively having access to at least one. Sheep and pigs were the least common (at 11 and 10% respectively). Examined by region, Iringa (86.4%), Singida (83.2%), Arusha (81.1%) and Manyara (81.4%) were most likely to report access to livestock, though patterns differed depending on the type of animal. Cattle access was especially frequent in the agro pastoral regions of Arusha (57.0%), Kilimanjaro (56.6%) and Manyara (54.9%) while access to chickens was quite frequent in Kilimanjaro (82.9%), Iringa (76.4%) and Singida (77.1%). Access to goats and sheep was also higher in agro-pastoral communities, with Arusha, Kilimanjaro and Manyara reporting the highest percent of these animals as well.

To better assess the livestock available to a household, livestock holdings were converted into Tropical Livestock Units (TLUs). The average TLU per household is 1.5.[42]

Figure 27 shows the distribution of TLU across Mainland Tanzania. There is a clear geographical pattern with access to livestock (average TLU) higher in the northern regions of Arusha (3.3), Mara (3.4) and Manyara (4.9) and lower in the eastern and western regions. Access to livestock is higher in Arusha, Manyara and Mara as these regions experience the lowest annual rainfall, making pastoralism the most viable livelihood for most households. The regions with the lowest access to livestock include Morogoro, Ruvuma, Dar es Salaam, Lindi, Mtwara and Kigoma.

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[41] Having access to livestock was defined as managing or owning at least one of the following animals: chickens, goats, pigs, cattle, sheep, ducks or donkeys.
[42] Weights used to calculate TLU; cattle = 0.5, goats = 0.1, sheep = 0.1, pigs = 0.2, donkey = 0.6, poultry = 0.01, turkey = 0.05. The formula to calculate TLU is as follows: TLU = (# of bulls + # of cows + # of oxen)*0.5 + (# of goats)*0.1+ (# of sheep)*0.1+ (# of chicken + # of ducks)*0.01+ (# of pigs)*0.2+ (# of donkeys)*0.6
The conversion factors used in the Tanzania CFSVA apply for Sub Saharan Africa according to the Food and Agriculture Organization (FAO). (see: http://www.fao.org/wairdocs/ILRI/x5443E/x5443e04.htm)
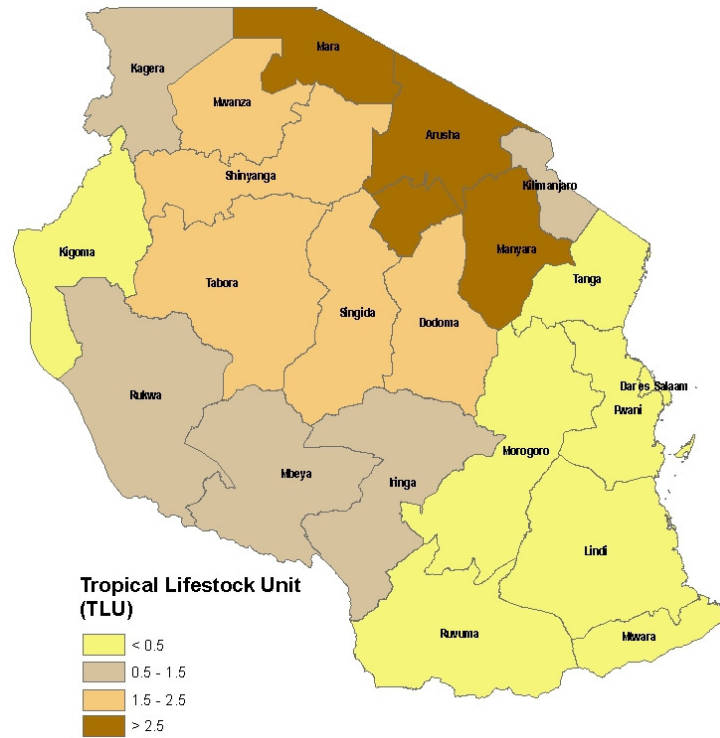
Fig 27: Distribution of TLU (Tropical Livestock Units) in Tanzania
(Source: 2009/2010 CFSVA)

Food consumption

This chapter presents findings on dietary diversity, current consumption patterns, household food consumption groups and their geographic distribution.

Dietary Diversity and Food Sources

Dietary diversity

While survey data represent the situation at a given time, seasonality influences food access and availability. The CFSVA was conducted in November, December and January 2009/2010, which corresponds with the planting period for the Vuli season and the beginning of the Musimu rains. As such, the survey was conducted during relatively lean periods for the regions in both unimodal and bimodal areas. We can therefore conclude that the survey data represents a time when the food availability situation was more difficult.

CFSVA findings indicate that, at the time of the survey, children (less than 15 years old) were eating an average of 2.9 meals per day, while adults were eating 2.5 meals. Three quarters of households said that the number of meals per day was usual for that time of year.

The CFSVA collected information on the consumption of 21 specific food items in the week preceding the survey. To simplify the analysis, each food item was grouped into one of nine food groupings including cereals (maize, rice, other cereals), roots and tubers (cassava, sweet potatoes, banana, other roots and tubers), pulses (groundnuts, beans and peas), vegetables (including green, leafy vegetables and shoots), fruits, animal proteins (fish, meat, eggs), milk, oils and fats (including oil and sunflowers' seeds), and sugar/sugar products. Then we examined the number of days, over the last week, that each food group was consumed.

a)

b)

Fig 28: Food item consumption
a) Percentage of households consuming item at least 1 day a week; b) Mean number of days item consumed (Source: 2009/2010 CFSVA)

As Figure 28 shows, diets in Mainland Tanzania are heavily cereal-based and only rarely include animal proteins. Overall, cereals are consumed at least one day per week by 97% of households. On average cereals were eaten almost daily (6.4 days per week), with maize being the most common cereal consumed (5.8 days per week). The second most common food group was oils and fats, which were consumed 4.5 days per week. On average, vegetables were consumed more days (4.3) than sugars (3.8). Pulses, fruits and tubers were eaten much less frequently (3.5, 3.0 and 2.3 days per week respectively). Finally, animal protein and milk were consumed least frequently: on average, animal proteins were eaten 2.9 days per week while milk was consumed only 1.4 days per week.

a)

b)

Fig 29: Food item consumption by livelihoods and wealth

a) Mean days food item consumed by livelihood profile; b) Mean days food item consumed by wealth quintile (Source: 2009/2010 CFSVA)

Figures 29 and 30 show the consumption of food items (average number of days per week) by livelihood profiles, wealth quintiles and region. Results by livelihood groups show that small subsistence farmers, households reliant on daily work and those reliant on aid have the least diverse diets, with a notable lack of milk consumption in all three. Salaried workers have the most diversity in their diets, with the highest animal protein consumption of any livelihood profile.

Results by wealth quintile show a general increase in the number of days food items are consumed as asset wealth increases. Pulses, oils and sugars appear to be the first food items to increase as wealth increases. As households become even wealthier, however, both milk consumption and animal protein consumption show the largest increases. Cereal consumption does not differ substantially by wealth.

Comparisons by region indicate that Mtwara and Manyara have amongst the lowest dietary diversity. While all other regions report cereal consumption between 6-7 times per week, households in Mtwara report consuming cereals only 4.3 times per week. Households in Manyara, on the other hand, report eating tubers and pulses only 1 and 2 times per week.
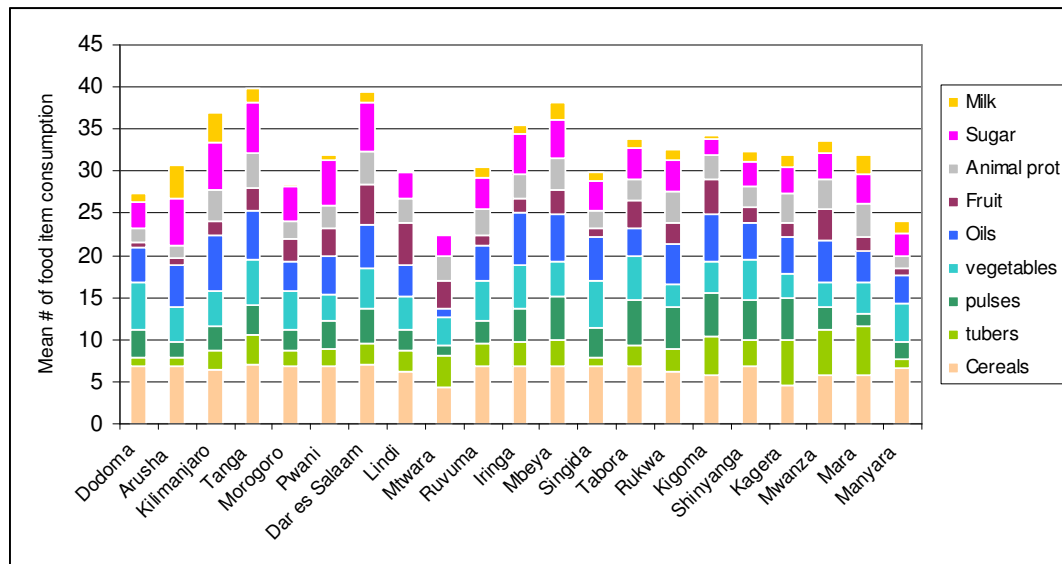
Fig 30: Food item consumption per region
(Source: 2009/2010 CFSVA)

Food sources

For each of the food items consumed, households were asked to list their primary and secondary source. Examining both the frequency of consumption and the sources relied upon, it is possible to estimate the relative importance of various food sources to the overall diet of the household. Figure 31 shows comparisons of food sources by both livelihood groups and region. Overall, food purchase, and therefore markets, appear to be the key source for the majority of food consumed. This is true for all livelihood profiles and regions with the exception of Kigoma and Kagera which were about evenly split between own production and purchase as sources of food.

While at least 60 percent of food in each livelihood profile was purchased, there were notable variations. As expected, farming households and agro-pastoralists reported between 30 and 40 percent of food from own production while daily workers, small business and salaried workers reported between 20 and 25 percent.

Examining individual food items, the main source for most items was purchase. In fact, purchase was the main source for maize (55.3%), rice (79.7%), sweet potatoes (55.6%), beans/peas (63.5%), groundnuts (52.4%), sunflower (80.8%) and fish/meat (92%). Only bananas and cassava were accessed more through own production rather than purchase (50.4% and 51.5% respectively). Fruits and vegetables were approximately equally divided between own production and purchase. Given the frequency with which households engage in agriculture, heavy reliance on food purchases rather than own production is a little surprising but could be because the survey was carried out during a lean period (November through January), when food stocks from the Musimu and Masika seasons were declining and harvests from the Vuli season were still weeks away. This said, compared with previous findings, the reliance on food purchases has declined somewhat, down from 66 percent reported in the 2005/2006 CFSVA. Higher reliance on food purchases previously, however, might simply be a result of the drought conditions in the middle of the decade.
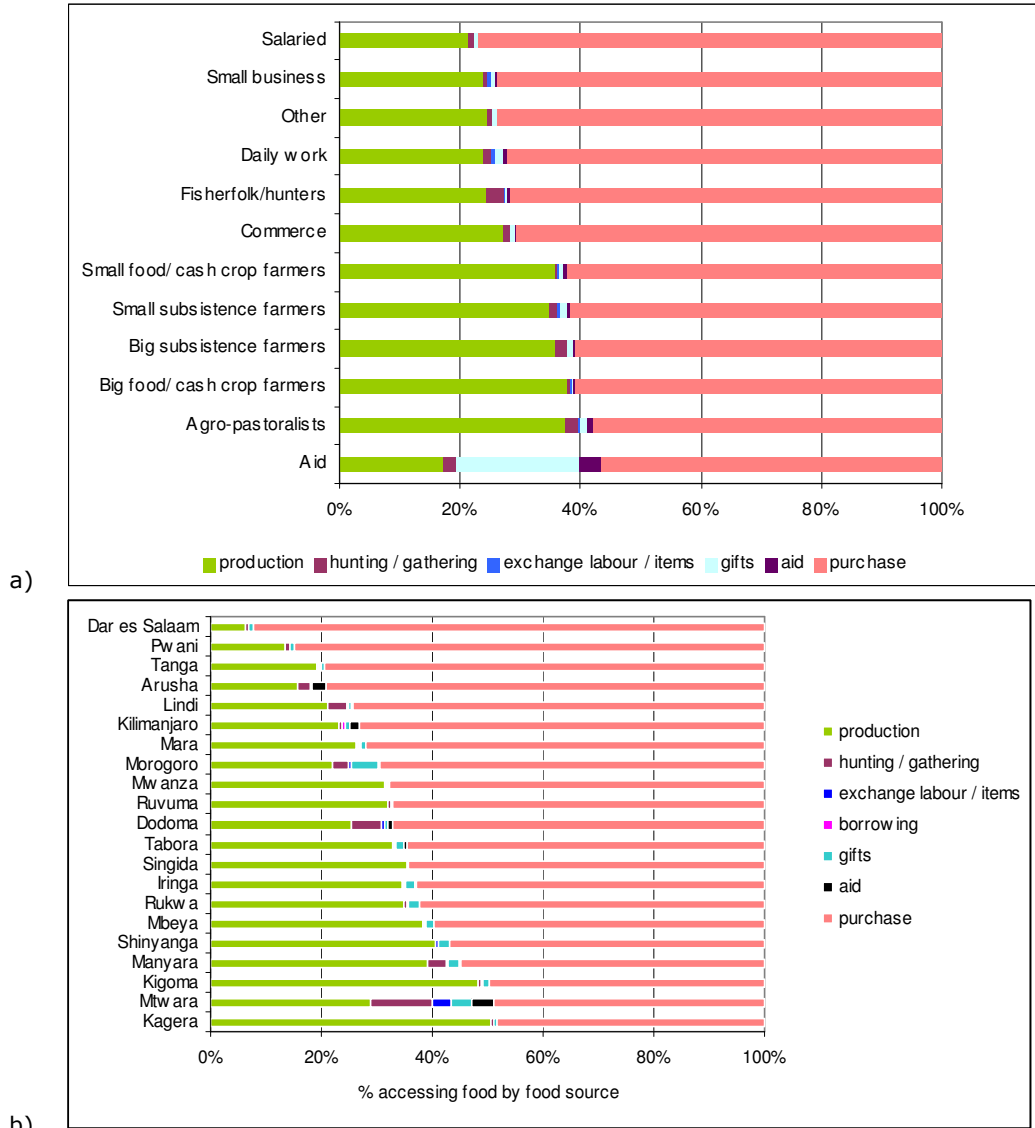
Fig 31: Food sources by livelihood profile and region
a) Source of food by livelihood profile; b) Source of food by region (Source: 2009/2010 CFSVA)

Food Consumption Groups

Household Food Consumption Score

A key indicator in measuring food security in CFSVAs is Food Consumption Scores (FCS), which combine: i) dietary diversity (the number of individual foods consumed over the past week is collected); ii) food frequency (the number of days in the past week that a specific food item has been consumed is collected); and iii) the nutritional importance of the food groups (which are weighted to reflect this). Previous studies have shown dietary diversity to be correlated with nutrient adequacy, kilocalorie intake, children's and women's anthropometry and socio-economic status. As such, the FCS is an effective proxy indicator of food access and nutrition intake.

The FCS is computed by grouping together food items for which consumption was assessed over a seven day recall period. For each food group, the frequency represents the number of days an item from the group was consumed, with a range from 0 (never) to 7 (every day). A weight is assigned to each group, representing its nutritional value. The food groups and weights are presented in the Table 11. The FCS is the sum across food groups of the product of the weighted frequencies.

Table 11: Food consumption score calculation

Food items	Food group	Weight
Cereals/ Roots and Tubers: corn, wheat, sorghum, rice, bread, manioc, sweet potatoes, banana	Staples	2
Pulses: peanuts and beans	Pulses	3
Vegetables (including green leafy vegetables and shoots)	Vegetables	1
Fruits	Fruits	1
Animal Proteins: fish, meat, eggs	Meat and Fish	4
Milk/Milk Products	Milk	4
Oils and Fats	Oil	0.5
Sugars	Sugar	0.5

Source: Comprehensive Food Security and Vulnerability Analysis Guidelines, January 2009

There are two consumption level thresholds: an FCS of 21 and an FCS of 35. The thresholds define three groups: Poor consumption (≤21), Borderline Consumption (>21 and ≤35), and Acceptable Consumption (>35).

According to the CFSVA, households have an average food consumption score of 51. Categorized by food consumption group, 4.1 percent of households are in the poor food consumption group, 18.8 percent are in the borderline food consumption group and 77 percent are in the adequate food consumption group. The main consumption characteristics of each group can be summarized as follows:

- Households in the poor food consumption group eat cereals five days a week but very little of any other food item. Tubers are eaten just under two days a week on average and vegetables are eaten three days. These households consume virtually no vegetable/animal protein or milk.

- Borderline food consumption households have only a marginally better diet, eating pulses, vegetables and fruits approximately one more day a week than poor consumption households. Consumption of animal proteins and milk is still very limited in this group while sugar and oil/fat are significantly present in the diet.

- Acceptable food consumption households, on the other hand, have an appreciably better diet with an approximately three-fold increase in pulse and fruit consumption and even higher increases in animal protein and milk consumption.

Results are shown in Table 12 and Figure 32. The table presents the average number of days that individual food groups are consumed per week across the three food consumption groups, while the figure depicts the gradual increase in consumption of individual food groups as FCS increases.

Table 12: Food item consumption by food consumption group

FCS	Pop. (%)	Food groups (weekly consumption)									FCS Average
		Cereals	Tubers	Pulses	Vegs	Fruits	Anim.Prot	Oil	Sugar	Milk	
Poor	4.1	5.3	1.6	0.2	3.1	0.2	0.2	1.0	0.8	0.02	18.1
Borderline	18.9	6.3	1.9	1.3	4.4	1.0	0.7	3.4	2.4	0.05	29.1
Acceptable	77.0	6.5	3.3	4.2	4.3	2.8	3.6	5.0	4.4	1.9	60.3

Source: 2009/2010 CFSVA
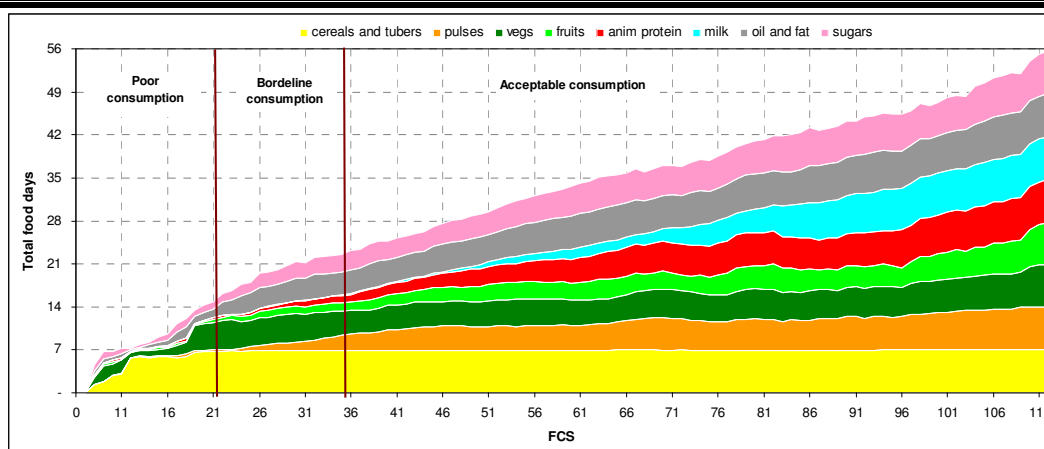
Fig 32: Food item consumption by food consumption score
(Source: 2009/2010 CFSVA)

Geographic distribution of food consumption groups

Figures 33 and 34 show the percentage of households in each food consumption group by region. Important differences can be observed. The regions with more poor food consumption households span from the south eastern regions of Mtwara (20.0%) and Lindi (5.3%) to the central region of Singida (5.4%) and the northern regions of Manyara (17.6%) and Arusha (6.8%). The regions with the highest percentage of households in the borderline food consumption groups include the northern and central regions of Manyara (42.9%), Dodoma (37.8%) and Morogoro (33.8%). Poor and borderline food consumption households form a clear pattern showing an axis of vulnerability which extends from the south eastern coastal regions through the central regions and into the central northern regions. The regions with the highest percentage of acceptable food consumption households, on the other hand, are clustered in the mid to northern coastal regions of Dar es Salaam (94.2%) and Tanga (90.2%) and in the far western or south western regions of Mbeya (94.4%), Rukwa (89.1%) and Kigoma (88.9%).

Overall, Mtwara and Manyara alone account for 35 percent of the households with poor food consumption. The five regions with the highest percentage of poor consumption households account for 52.6 percent of the total of poor food consumption households. The central regions of Dodoma, Morogoro and Singida, where food aid programming is currently targeted, comprise about 15.4 percent of the poor food consumption households.
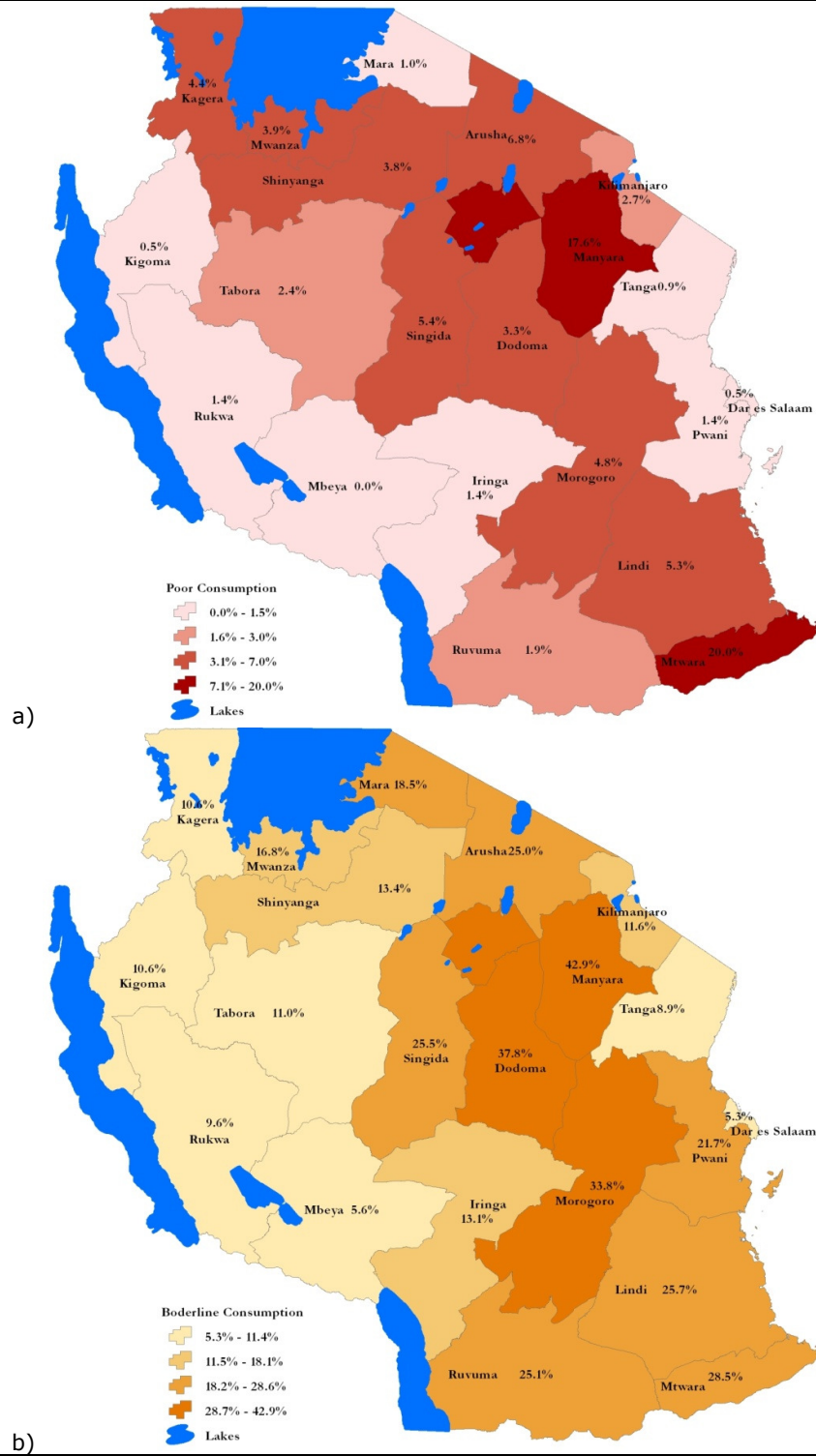
Fig 33: Regional distribution of poor and borderline food consumption households
a) Percentage of households with poor food consumption and b) Percentage of households with borderline food consumption (Source: 2009/2010 CFSVA)
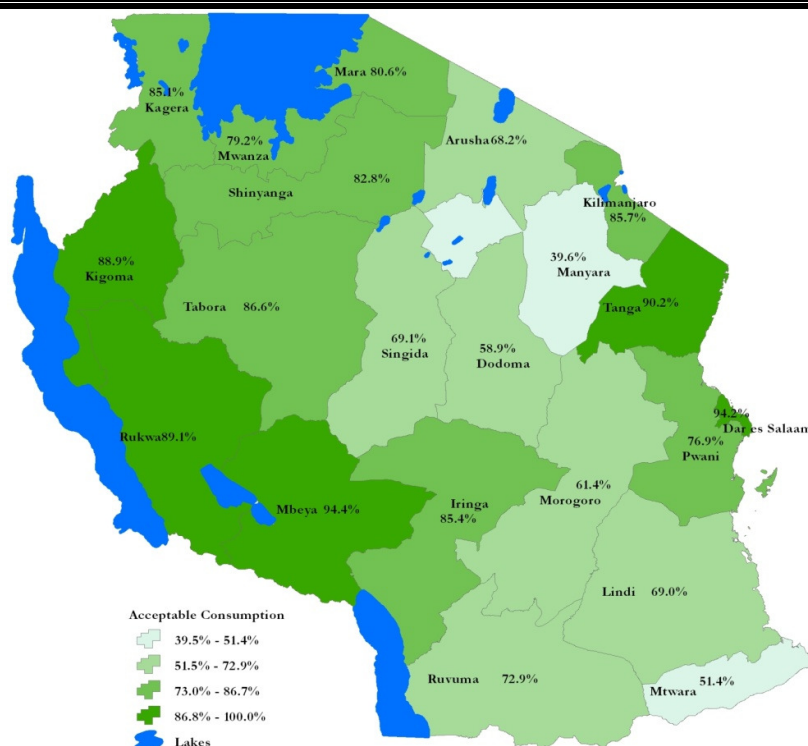
Fig 34: Percentage of households with acceptable food consumption
(Source: 2009/2010 CFSVA)

Changes in food consumption from 2005/2006 to 2009/2010

Comparisons of food consumption data from the 2005/2006[43] and 2009/2010 CFSVAs show slight improvements in the overall prevalence of households with poor food consumption and a notable shift in the epicentres of food insecurity. As Figure 35 shows, overall prevalence of poor food consumption declined slightly from over 5 percent to 4.1 percent. More significantly, the regions with the highest percentage of poor consumption households have shifted completely from the central regions of Tabora, Singida and Dodoma in 2005/2006 to the south eastern region of Mtwara and north central region of Manyara in 2009/2010.

How can the food security situation have changed so dramatically in just four years? There are a few possible explanations. First, the middle of this decade was characterized by intense droughts that disproportionately impacted the central regions of the country (including Dodoma, Morogoro and Singida). Thus, the timing of data collection in the 2005/2006 CFSVA may have coincided with severe food shortages in these regions, which could have easily altered the variety and amount of food available to these households. Second, there were clear indications in the 2005/2006 CFSVA that there were large numbers of vulnerable households in Mtwara, Manyara and Lindi (3 of the 5 regions with highest percentage of poor food consumption). In fact, using the 2005/2006 food security assessment methodology, the CFSVA indicated that 40-50 percent of households in these three regions were "vulnerable" to becoming food insecure. Thus, it is possible that in the years between surveys, households in these regions deteriorated to such an extent that many of the vulnerable households became food insecure. If at the same time improvements of similar magnitudes were seen in the central regions, then a shift such as the one observed is certainly possible.

Finally, a third potential explanation, closely related to the previous two, is that the food assistance provided towards the central regions by WFP and other international agencies has had the intended effects of improving food consumption among the most vulnerable households. If this is true, then it is possible that diverting aid to target other areas could negatively impact food consumption in these regions. Thus, before making any changes in geographic targeting it is

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[43] It is important to note that the 2005/2006 CFSVA used a different methodology to assess food security status. However, the current methodology for measuring food consumption was applied on the 2005/2006 CFSVA data to ensure comparability.

important to take into account the sustainability of food sources available to these households and assess the potential impact of phasing out food support.

a)

b)
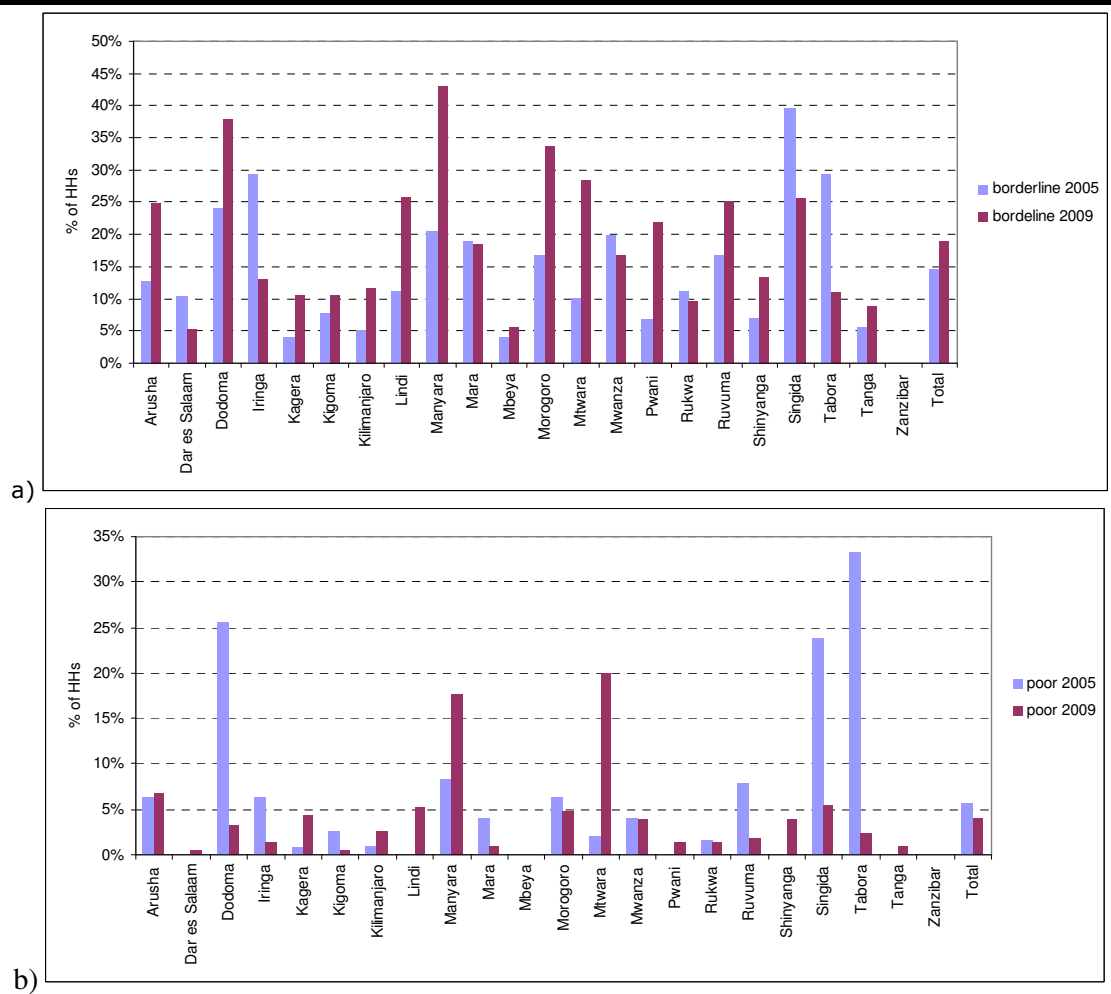
Fig 35: Food consumption comparisons between 2005/2006 and 2009/2010
a) Percentage of households with borderline food consumption from 2005/2006 to 2009/2010; b) Percentage of households with poor food consumption from 2005/2006 to 2009/2010 (Source: 2009/2010 CFSVA)

Food consumption groups and livelihood strategies

Figure 36 examines food consumption groups by livelihood profile. As this figure illustrates, households reliant on aid, daily work, small subsistence farming and agro-pastoralists are most likely to have poor food consumption (7.8%, 6.9%, 5.6% and 5.5% respectively). Assessed as a percentage of all poor food consumption, 69.4 percent relied on one of these livelihoods, meaning that these four livelihoods account for over two-thirds of all low food consumption households.
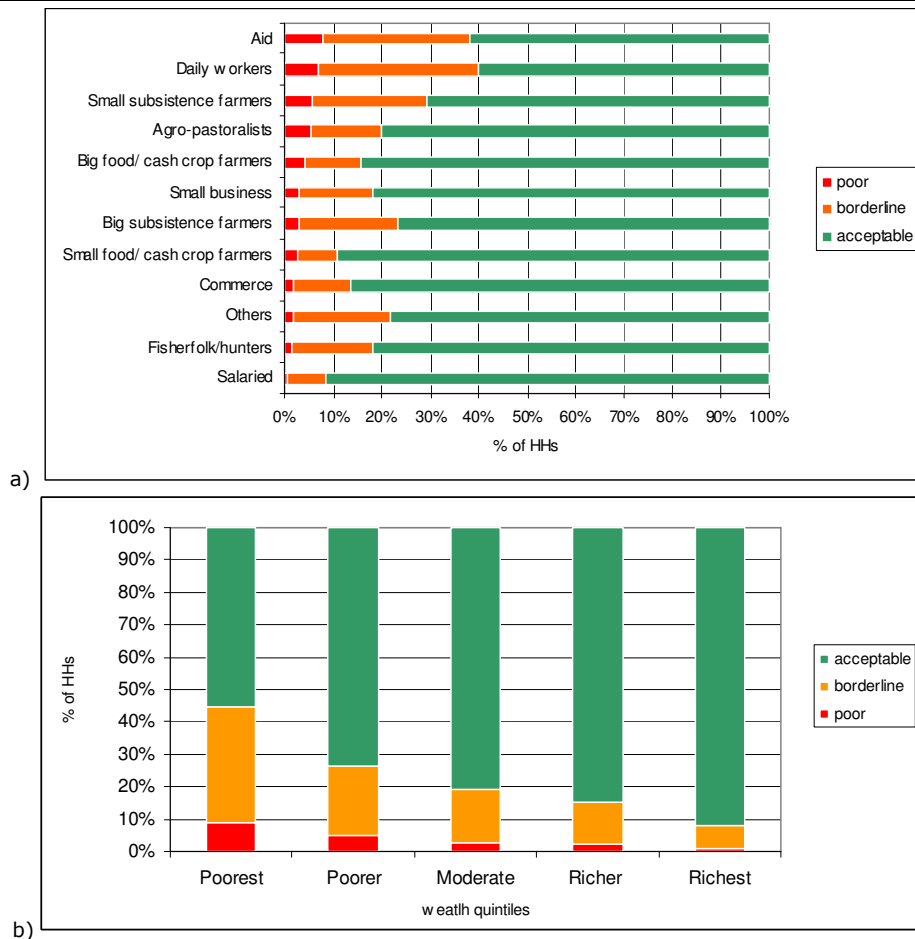
Fig 36: Food consumption by livelihood profiles and wealth quintiles
a) Percentage of poor, borderline and acceptable food consumption groups by livelihoods; b) Percentage of poor, borderline, and acceptable food consumption by wealth quintile (Source: 2009/2010 CFSVA)

When examined by wealth quintiles, the likelihood of acceptable food consumption grew as asset wealth increased. The percentage of poor or borderline households decreased in tandem as well. In the rich and richest quintiles there are virtually no households with poor consumption. Therefore the asset ownership indicators used in the wealth index can be used with confidence in targeting beneficiary households.

In this section, we explored bivariate associations between key household characteristics and food consumption groups. This is intended to provide a preliminary glimpse into what types of household are at greater risk of poor dietary diversity. The results of a multivariate analysis which looked at these issues in greater depth is discussed in a following chapter entitled "Underlying causes of food insecurity and malnutrition".

As Table 13 indicates, almost all household characteristics examined showed strong associations with food consumption. Poor education of household heads, household crowding, asset poverty, lack of diversity in crop production, lack of livestock, fewer income-generating activities and low monthly expenditures were all strongly associated with poor food consumption. The percentage of households headed by women showed some association at the extremes but it was generally not a strong predictor of poor vs borderline food consumption. The only variables that showed no association with food consumption groups were percentage of total expenditures on food, caring for orphans and caring for disabled or chronically ill household members. Interestingly, caring for orphans even showed a slight protective effect, i.e. households with orphans tended to have better food consumption. Though counterintuitive, this finding is not surprising as studies have shown

that it is wealthier households who have been disproportionately affected by the HIV/AIDS epidemic.[44]

Table 13: Household characteristics associated with food consumption

	Poor	Borderline	Acceptable
Percent of HHs headed by women	26.4[*]	28	19.8
HH head has no education	36.2[*]	30.6	18.1
Crowding index	2.5	2.4	2.3
HH care for at least one orphan	11.8[*]	15.5	19.1
HH care for at least one disabled/ chronically ill member	9.3	10.6	10
Percentage of HHs in lowest wealth quintile	45.1[*]	37.8	14.3
Cultivated more than 1 ha	34.7[*]	44.6	45.7
Percent of HHs cultivating four crops	29.7[*]	28.2	42
Percent using natural fertilizer	35.5[*]	26.9	32.5
Percent using chemical fertilizer	8.4[*]	7.7	16.5
TLU	0.9[*]	1.1	1.6
Percent of households with only one income activity	40.4	35.8	32.1
Monthly food expenditures	29,506	35,939	58,788
Monthly non food expenditures	21,089[*]	25,760	59,958
Total HH expenditures (monthly)	50,595[*]	61,699	118,747
Percent of food expenditure	54.4	57.8	53.1

Source: 2009/2010 CFSVA, Asterisks denote significant difference between poor and acceptable food consumption categories (p<0.05).

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[44] Mishra V, Bignami S, Greener R, Vaessen M, Hong R, Ghys P, Boema T, Assche A, Khan S, Rutstein S. A study of the association of HIV infection with wealth status in sub-Saharan Africa, DHS Working Paper, No. 31, January 2007.

Health and Nutrition

The 2009/2010 CFSVA included a maternal health and nutrition module as well as one on child health and nutrition. The maternal health and nutrition module collected information on the educational status, breastfeeding patterns, antenatal care access and general health and nutrition status of mothers and women of reproductive age (15-49 years of age). The child health and nutrition module, on the other hand, collected information on feeding patterns, health and nutrition of children (0-59 months of age). The objective of these modules was to explore relationships and establish links between health, nutrition and household food security status. Information regarding women 15-49 years of age was collected from the primary household respondent while information on children was collected primarily from the mother of each child. If the mother was unavailable, absent or deceased, another adult or caretaker provided the necessary information. Overall, information was collected on 4,886 pregnant and non-pregnant women aged 15 to 49 years and 4,294 children aged 0-59 months.

Maternal and child health

Antenatal care

Regular visits to trained medical providers throughout pregnancy are important in assessing the physical status and health of pregnant women and ensuring that any problems during pregnancy are identified early and treated before becoming critical. The CFSVA obtained information from women on whether they had attended at least one antenatal consultation during their last pregnancy.

Overall, findings indicated that 91 percent of women reported at least one antenatal care visit during their last pregnancy. This was only slightly lower than the figure reported in the 2005/ 2006 CFSVA (93%). A look within regions, revealed very high percentages (90% or higher) of women receiving antenatal care in most regions with only Dar es Salaam and Kagera showing appreciably lower rates (79% and 82% respectively). The regional breakdown differed substantially from the 2004/2005 DHS findings which showed low access in the agro-pastoral regions of Arusha (13.6%), Mbeya (12.2%) and Manyara (9.6%) but near universal access elsewhere. Reasons for these discrepancies were unclear but it could be at least partially because the 2004/2005 DHS included urban areas where services are much better.

The CFSVA also examined whether women received iron/folate tablets, as a part of their antenatal care during their last pregnancy. Overall, 76 percent of women receiving care reported taking iron/folate tablets. This again is comparable but shows a slight drop from the percentage reporting iron/folate supplements in the 2005/ 2006 CFSVA (79%). Analysis by region reveals substantial variation but no clear patterns. Women in Morogoro and Mwanzi appeared less likely to receive iron/folate tablets (at 64% each) while women in Mtwara and Arusha appeared most likely to receive the pills (at 88-87% respectively).

To assess postnatal care access, we looked at vitamin A supplementation in the first two months after last birth. Findings indicated little change since the 2005/2006 CFSVA with 57 percent of women in both surveys reporting supplementation during this period. Regional variation was quite high. Overall, rates were highest in Arusha, with 81 percent receiving supplements and lowest in Lindi at just 36 percent.

Childhood immunization

The 2009/2010 CFSVA did not collect the full set of information regarding the immunization status of children because multiple surveys over the past two decades have examined this issue in depth. Instead the CFSVA only asked whether children 9 months of age or older had received measles immunizations. Information on measles immunization was gathered by examining vaccination cards or, in their absence, by caretaker recall.

Overall immunization rates, taking into account all vaccines, showed little improvement from 1991 to 2005. In both 1991 and 2004/2005, DHS found that 71 percent of children 12-23 months of age

were fully vaccinated.[45] Patterns in measles immunization rates mirrored these overall patterns. In 1991, for instance, 81.1 percent of children (12-23 months of age) were vaccinated against measles while in 2004/2005 79.9 percent were vaccinated. The 2005/2006 and 2009/2010 CFSVAs, however, indicate substantial improvements since 2004/2005. The 2005/2006 CFSVA indicated that 92 percent of children 9-59 months of age had received a measles vaccination while the 2009/2010 CFSVA showed that close to 95 percent (94.2%) of children 12-23 months of age and 95.7 percent of children 9 months of age or older had received a measles vaccination.

Maternal and child morbidity

The CFSVA asked mothers and caretakers a series of questions about maternal and childhood morbidity, specifically whether mothers/caretakers or their children had been ill in the two weeks preceding the survey. Childhood illness was explored in greater depth, with mothers/caretakers asked whether children had experienced fever, diarrhoea or a cough in the two weeks preceding the survey and whether they had received medical treatment as a result of these illnesses.

Findings indicated that 31.5 percent of mothers and 28.9 percent of children were ill in the two weeks preceding the survey. Almost one quarter (23%) reported fever while 16.7 and 9.8 percent reported a cough and diarrhoea respectively. Overall, almost 2 percent reported "another" illness. Examined by region (see Figure 37), illness was most frequent (both in women and children) in Tanga (47.5% and 40.1% respectively) and Mwanza (43.1% and 41.8% respectively). Among children, fever was most frequent in Mwanza (37%), Singida (32.1%) and Tanga (32%) while coughs were most frequently reported in Dodoma (29.6%). Similar regional patterns were observed for diarrhoea, with children in Dodoma (16.2%), Mwanza (15.9%) and Singida (15.9%) most affected.
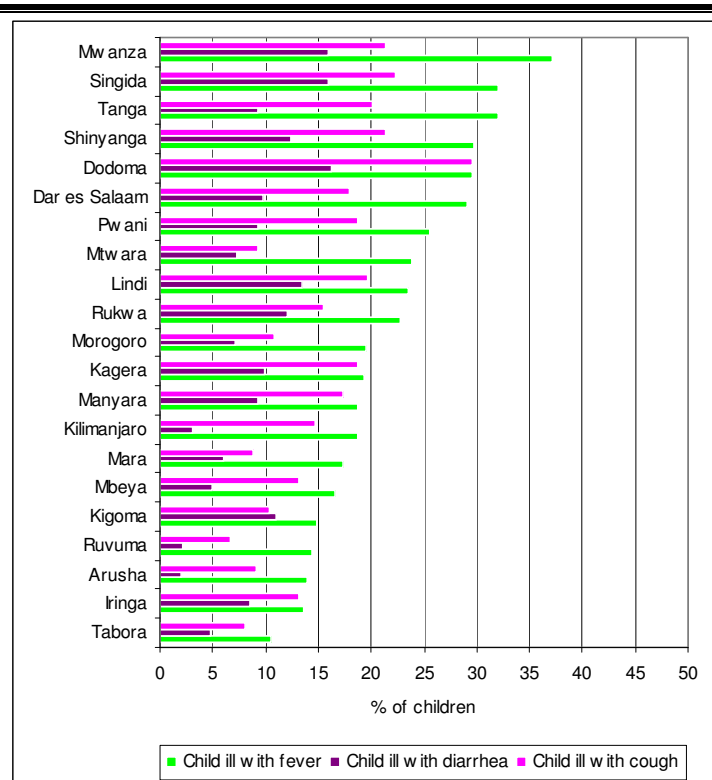
Fig 37: Prevalence of common childhood illness (fever, cough, diarrhoea) by region
(Source: 2009/2010 CFSVA)

Examined by livelihood group, illness was most frequently reported by women in households relying on "other" livelihoods (36.8%) or aid (36.1%) while children were more likely to be ill in households that rely on "other" livelihoods (34.0%) and daily workers (33.8%). Examined by type of illness, similar patterns were seen between households reporting childhood fevers or coughs. In both cases, households reliant on daily work and commerce livelihoods reported childhood fevers (27.2% and 27.0% respectively) and coughs (18.8% and 18.7% respectively) as the most frequent ailments. Households reliant on "other" livelihoods also reported fever frequently (27.5%) while coughs were also frequent among fisherfolk (18.2%). Diarrhoea showed slightly different patterns, with fisherfolk (16.0%) and small food/cash crop farmers (14.5%) most affected.

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[45] Fully vaccinated refers to the receipt of one dose of BCG, three doses of DPT-HB and polio vaccine and one dose of the measles vaccine.

No clear patterns were visible when looking at illness by wealth quintiles or food consumption groups, and illness was neither more nor less likely among poor households or households lacking in dietary diversity. This was true regardless of the type of childhood illness examined, suggesting that fever, coughs and diarrhoea are likely driven by factors other than low dietary diversity or asset wealth.

Finally, response to childhood illness was assessed by asking respondents whether they sought medical assistance at a health facility for their sick child. Almost three quarters (72.8%) of households reported doing so, though percentages varied substantially by region. Overall, households sought medical attention most frequently in Kilimanjaro (92.7%), Pwani (93.5%) and Ruvuma (95.4%) and least frequently in Kigoma (48.6%) and Tabora (51.6%). Fewer differences were seen within livelihood profiles; however it is notable that households reliant on aid were least likely to seek medical attention (62.7%).

Examined by wealth quintile, no clear patterns emerged, indicating that asset wealth was less of a factor in seeking medical care. Looking at food consumption groups, on the other hand, poor food consumption households did appear less likely to seek medical attention than those households in the higher categories. This could be because higher food consumption households have more disposable income so they are more able to spend money on non food items like health care. The examination of expenditures earlier in this report supports this conclusion as monthly non food expenditures of households in the acceptable food consumption group exceeded those of households in the poorer food consumption groups by more than 2:1.

Hygiene and child care practices

Maternal Hygiene

The CFSVA explored the personal hygiene of mothers by asking whether mothers washed their hands before preparing meals, before eating, after going to the toilet, after cleaning a child that has gone to the toilet, whenever they are dirty or never. Mothers were then asked whether they washed their hands with just water or with soap and water. On average, a little under one-third (32.2%) washed their hands before meal preparation while 89.9 percent did so before eating and 78.8 percent after using the toilet. Fewer than one-quarter (23.3%) washed their hands after cleaning a child that had just been to the toilet and 44.5 percent reported washing their hands "when they were dirty". Variations in hand-washing patterns were seen by both region and livelihood group with washing before meal preparation most common in Morogoro (60.1%) and amongst women in households reliant on aid (40.6%). Hand-washing after using the toilet was most common in Lindi (98.2%) and least common in Mbeya (34.9%). Table 14 examines hand-washing by education level, wealth quintile and food consumption group. It shows that hand-washing did not seem to be associated with more educated women or better off households. The only exception to this was in the case of washing hands after going to the toilet. In this case, 87.8 percent of women who had finished primary school (or who had higher education) washed their hands after going to the toilet while only 68.7 percent of those with no schooling did. Similar differentials were observed between women in the poorest and richest wealth quintiles.

Soap use was frequent, though not universal. Overall, 72 percent of respondents reported washing their hands with soap (either homemade or store bought) while the remainder used only water or some other product. Soap use was most common in Kilimanjaro (98.3%) and least common in Manyara (35.2%) and among women in households reliant on aid (54.9%). As shown in Table 14, soap use was strongly associated with the mother's education, wealth status and food consumption groups, with more educated, wealthier women and women in households with better dietary diversity most likely to use it. Overall, a little over half (52.8% and 58.8%) of the poorest women or women with no education reported using soap while close to 85 percent of educated, wealthy women did. Likewise, only 59.3 percent of women in the poor food consumption group used soap while 74.9 percent of women in the acceptable food consumption did.

Table 14: Maternal hygiene practices by education level, wealth and food consumption group

	Wash hands before preparing meals	Before eating	After going to the toilet	After cleaning a child that has been to the bathroom	When they are dirty	Never wash hands	Use soap to wash hands after the toilet
Mother's education							
No schooling	30.9	86.3	68.7	21.8	44.4	2.9	58.8
Some primary school	32.0	90.6	80.0	24.8	45.1	1.4	73.5
Complete primary or higher	34.1	91.8	87.8	20.1	45.5	1.5	84.6
Wealth quintiles							
Poorest	30.3	88.3	68.6	23.2	42.6	1.2	52.8
Poorer	32.3	89.2	75.4	23.3	39.8	1.7	65.8
Moderate	31.3	89.8	80.0	23.0	46.5	1.6	71.9
Richer	33.9	88.6	81.7	23.8	47.1	2.3	78.5
Richest	32.7	92.1	84.7	24.5	46.4	1.9	84.5
Food consumption groups							
Poor	35.8	87.6	75.8	22.6	49.7	1.9	59.3
Borderline	30.4	90.8	78.7	18.7	41.6	1.5	61.3
Acceptable	32.4	89.8	78.9	24.6	45.3	1.8	74.9
Rural Mainland Tanzania	32.2	89.9	78.8	23.5	44.9	1.8	72.0

Source: 2009/2010 CFSVA

Child breastfeeding and care practices

UNICEF and WHO recommend that children be exclusively breastfed during the first six months of life. After six months, a child requires adequate complementary foods, alongside breast milk, for normal growth. Lack of appropriate complementary feeding may lead to malnutrition and growth failure. For optimal growth and proper nourishment, complementary feeding coupled with breast milk should continue until the child reaches two years of age.[46]

Nearly all the children in the sample (98 %) were breastfed at some point during their infancy. Among children below 24 months of age, 69 percent were breastfed within an hour of their birth (early initiation of breastfeeding) and 94 percent were breastfed within the first day. The exclusive breastfeeding rate for children 0-5 months of age was 61.3 percent while the percentage receiving solid food between 6-8 months of age was 83.4 percent. The continued breastfeeding rate at one year (children between 12 and 15 months of age still breastfed) was 85.9 percent.

As Figure 38 indicates, feeding patterns varied substantially by region, with Lindi and Mwanza reporting the lowest rates of early breastfeeding (at 39.8 and 35.5 % respectively) and Arusha reporting the lowest rates of exclusive breastfeeding (35.5%). Manyara (71.6%) and Singida (74.8%) reported the lowest rates of proper introduction of complementary foods (between 6-8 months of age) while Kagera reported the lowest rates of continued breastfeeding at 49.4 percent.

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[46] World Health Organization, Global Strategy for Infant and Young Child Feeding. Geneva, Switzerland, 2003.

a)

b)
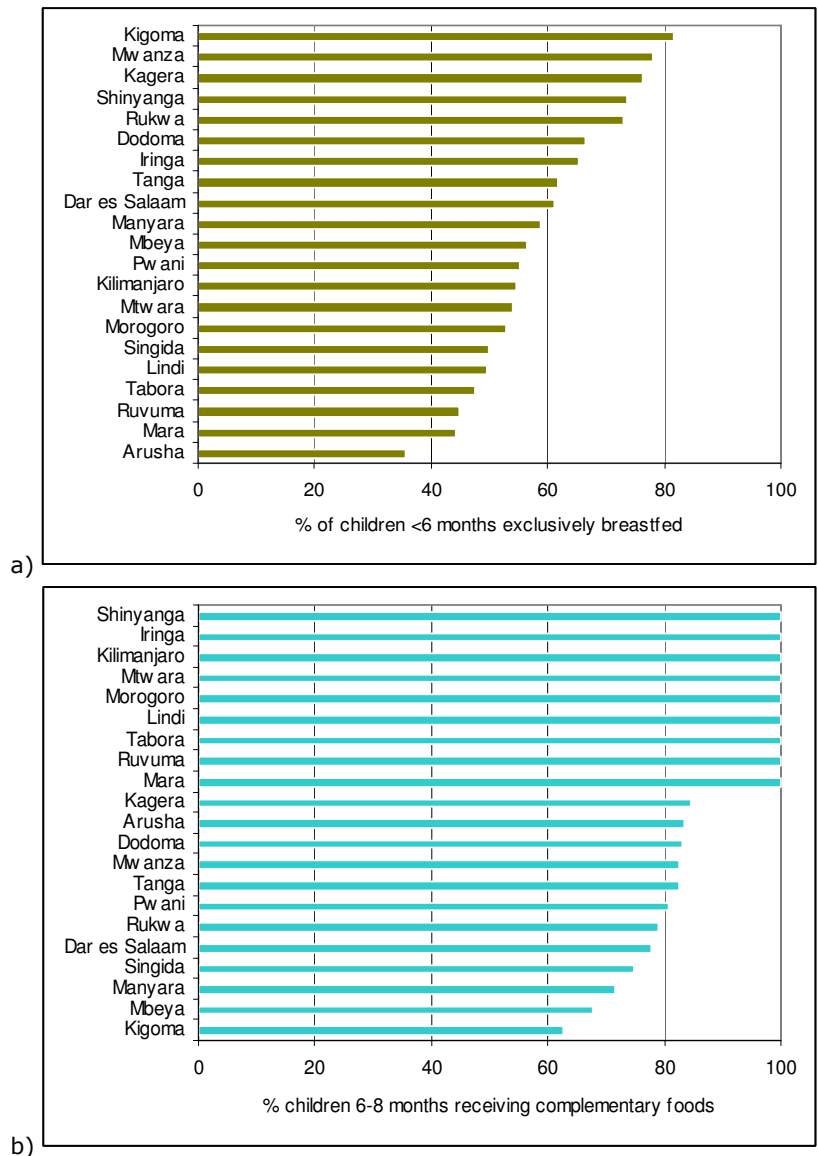
Fig 38: Child feeding patterns
a) Percentage of children <6 exclusively breastfed; b) Percentage of children 6-8 months of age receiving complementary foods (Source: 2009/2010 CFSVA)

When examined by livelihood groups, differences were smaller and few discernible patterns emerged. The early initiation of breastfeeding and timely introduction of complementary foods were most frequently reported by women in households reliant on aid (91.4 and 100% respectively) while exclusive breastfeeding was more frequent in big food/cash crop producing households. Women in households reliant on daily work reported the lowest percentage of exclusive breastfeeding (at 35.7%).

Analysis by wealth quintile and food consumption group generally showed few patterns. It is notable, however, that women in poor food consumption households reported much lower rates of timely introduction of complementary foods. On average, only 67 percent of children between 6-8 months in these households received complementary foods, while over 80 percent of children in better food consumption households did. Similar patterns were seen with continued breastfeeding rates.

Access to supplementation or deworming

Vitamin A deficiency (VAD) is a concern throughout Tanzania, but particularly so in areas with drier climates and less access to fresh fruits and vegetables. Severe VAD causes eye damage (xerophthalmia) and is the leading cause of childhood blindness. It also affects the immune system, increasing the severity of and slowing the recovery from various common childhood infections such as measles and diarrhoea. As such, the CFSVA attempted to measure the percentage of children who benefited vitamin A supplementation programmes throughout the country by asking mothers whether their children had received any supplementation in the six months preceding the survey. On average, 87.9 percent of mothers reported that their child had received a vitamin A supplement during this period. This was only a slight improvement from the 2005/2006 CFSVA which found 83 percent of children had received such a supplement. Regional patterns from the 2009/2010 CFSVA are shown in Figure 39. As this indicates, vitamin A supplementation was reported by over 80 percent of households in all regions, with the exception of Rukwa. Here only 67.8 percent of children had benefited from a vitamin A dose.

Children in Tanzania have a high burden of parasitic worms which affect both short and long term growth. Regular deworming programmes are effective ways of reducing parasitic loads in children. The CFSVA therefore asked whether children had received deworming medication in the six months preceding the survey. Overall, 67 percent of caretakers said that their child had This represents only a slight improvement from the 2005/2006 CFSVA which reported that 60 percent of children had recently been dewormed. Examined by region (see Figure 39) 2009/2010 CFSVA data indicates that children in Arusha and Rukwa were least likely to report being deworming (49.3 and 50.5% respectively) while children in Morogoro were most likely to (87.6%).
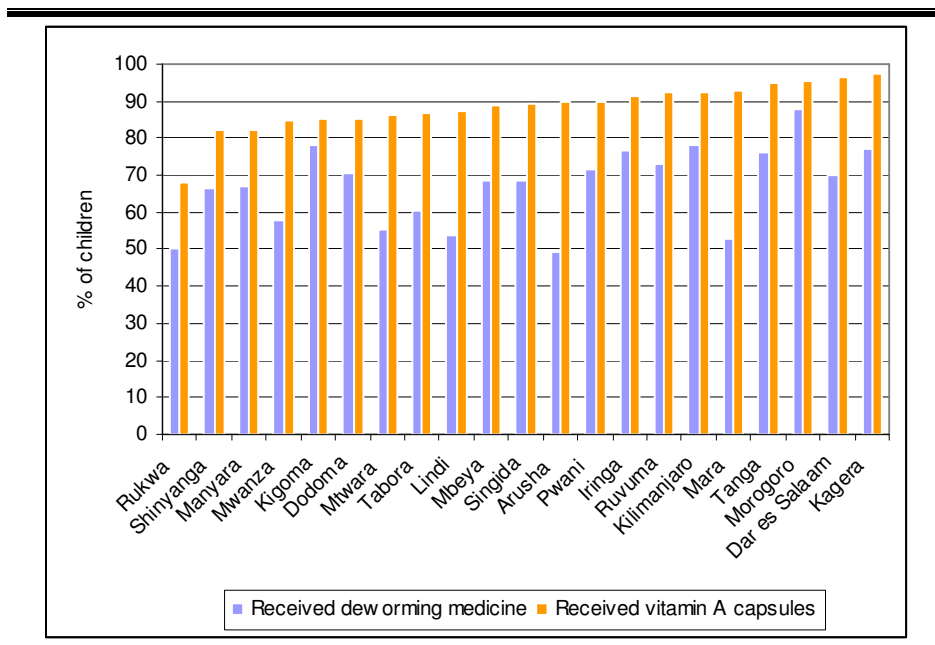
Fig 39: Percentage of children receiving vitamin A supplements and deworming medicines
(Source:2009/2010 CFSVA)

Maternal and child nutrition

To measure maternal and child nutrition, the CFSVA relied on body mass index (BMI) for women and weight-for-height (WHZ), height-for-age (HAZ) and weight-for-age (WAZ) z-scores for children. To calculate women's BMI, the weights and heights were gathered for all 4,452 non pregnant women aged 15-49 in sampled households. Of these, 4,424 were assigned a BMI. Likewise, weights, heights, ages and gender were gathered for all children 0-59 months of age in sampled households. Among the 4,294 children sampled, 3,774 (87.9%) could be assigned a valid WHZ score, 3,775 (87.9%) could be assigned a valid HAZ score and 3,913 (91.1%) could be

assigned a valid WAZ score. Rigorous data cleaning and plausibility checks[47] were employed prior to calculating either maternal or child nutrition indicators.

Women's body mass index

Women's BMI was calculated by dividing weight (in kilograms) by height (in metres) squared. The resulting values were categorized as shown in Table 15.

According to the 2009/2010 CFSVA, 8.9 percent of women had a low BMI (95% CI, 8.1%-9.8%), including 1.0 percent severely thin (95% CI, 0.7%-1.3%), 1.2 percent moderately thin (95% CI, 0.9%-1.5%), and 6.7 percent mildly thin (96% CI, 6.0%-7.4%). This shows very little change from the 2005/2006 CFSVA which found 8.4 percent of women undernourished and only a slight decrease from the 2004/2005 DHS survey which reported 10 percent of women undernourished.

Table 15: BMI Classifications

BMI range	Classification
>18.5 kg/m2	Normal BMI
<18.5 kg/m2*	Low BMI
17.0- 18.49 kg/m2	Mildly undernourished
<16.0 to 16.99 kg/m2	Moderately undernourished
<16.0 kg/m2	Severely malnourished

*This was the overall classification used for further analysis, though the sub-classifications were examined descriptively.

Figure 40 shows the regional patterns in low BMI seen in the 2009/2010 CFSVA. On average, women in Mtwara and Arusha were the most undernourished: over 15 percent of women in each region had low BMI. By contrast, women in Tanga, Ruvuma and Mbeya were the least undernourished with a prevalence below 5 percent in all three regions.
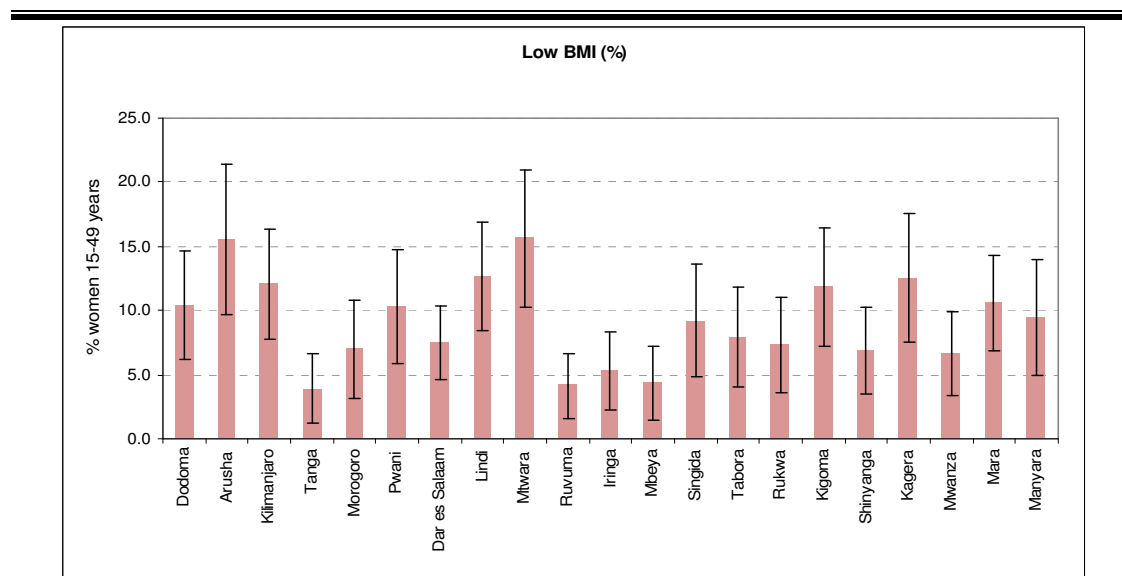
Fig 40: Prevalence of low maternal BMI by region
(Source: 2009/2010 CFSVA)

Examined by livelihood group, women in households reliant on agro-pastoralism (11.2%), daily work (10.6%) and aid (10.6%) were most likely to be undernourished, while women in households reliant on "other" livelihoods were least likely to be undernourished (6.3%). Prevalence in all other livelihood profiles was very similar (8-9%). When examined by wealth quintile and food consumption group (Table 16), maternal undernourishment appeared strongly associated with both variables. Overall, 11.4 percent of women in the poorest wealth quintile were undernourished while only 6.4 percent were in the highest wealth quintile. Likewise, 15.8 percent of women in the

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[47] Plausibility checks differed for women and children. For children, age and sex distribution was compared to expected distributions and heaping of ages, and weights were examined in order to better understand the magnitude and distribution of bias (e.g. in particular areas or teams). Children flagged during the calculation of z-scores by WHO Anthro software were examined on a case by case basis in order to determine which measurement (height, weight or age) led to them being flagged. Upon identification of the offending value, the appropriate anthropometric indices were set to missing (e.g. if weight was incorrect, then weight for height and weight for age was set to missing while height for age was not). For women, plausibility checks included examining heights and weights for heaping or extreme values.

poorest food consumption group were undernourished while only 8.3 percent of those in the acceptable group were.

Children's nutritional status

After data cleaning and plausibility checks, WHO Anthro was used to compute the weight-for-height, height-for-age and weight-for-age z-scores of children 0-59 months of age.[48] These three indicators are intended to classify each child's nutritional status in a standardized fashion, by indicating how many standard deviations each child's weight and height are away from the mean weight and height for a child of that age and sex. Then, each child is classified as "wasted", "stunted" or "underweight" if they fall below -2 standard deviations from the mean for the appropriate indices. All other children are classified as "well nourished".

Table 16: Percentage of undernourished women by wealth and food consumption group

	Percent with low BMI
Wealth quintile	
Poorest	11.4
Poorer	9.7
Moderate	9.8
Richer	9
Richest	6.4
Food consumption group	
Poor	15.8
Borderline	10.8
Acceptable	8.3

Source: 2009/2010 CFSVA

The levels of stunting, wasting and underweight among children 0-59 months of age were: 36.6 percent (95% CI, 35.1%-38.1%), 5.7 percent (95% CI, 4.9%-6.4%), and 14.3 percent (95% CI, 13.2%-15.4%), respectively, which (with the notable exception of underweight prevalence) were largely comparable with the results of the 2005/2006 CFSVA. Overall, from 2005/2006 to 2009/2010, wasting prevalence stayed largely the same (5.6% in 2005/2006 to 5.7% in 2009/2010) and stunting prevalence showed a slight increase from 34.3 percent to 36.6 percent. Only underweight prevalence showed substantial decreases from 21.1 percent in 2005/2006 to 14.3 percent in 2009/2010.

Significant regional differences were observed for each nutrition indicator. As Figure 41 shows, Iringa and Mwanza had the lowest wasting prevalence, with only 0.7 percent (95% CI, 0.0%-2.1%) and 1.5 percent (95% CI, 0.2%-2.9%) of children wasted respectively, while the largely agro-pastoral region of Arusha had the highest wasting prevalence (16.6%; 95% CI, 10.9%-22.4%). This is not surprising as agro-pastoral areas in the Horn of Africa often show higher wasting rates than agricultural populations.[49] The reasons for this are not known. The highest prevalence of stunting was seen in Iringa (54.6%; 95% CI, 46.8%-62.3%), Rukwa (50.7%; 95% CI, 42.8%-68.6%) and Kigoma (53.1%; 95% CI, 44.7%-61.5%) while the lowest prevalence was in Kilimanjaro (21.0%; 95% CI, 13.2%-28.7%) and Dar es Salaam (20.9%; CI, 11.2%-30.5%). Reflecting moderately high wasting and stunting burdens, Mtwara and Manyara showed the highest underweight prevalence at 20.7 percent (CI, 12.3%-29.1%) and 19.2 percent (CI, 13.7%-24.8%). By contrast, Mbeya and Mwanza, which both have relatively low levels of wasting and stunting, showed the lowest underweight prevalence at 10.4 percent (CI, 6.4%- 14.3%) and 10.1 percent (6.8%-13.4%) respectively.

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[48] WHO Anthro for personal computers, version 2, 2007: Software for assessing growth and development of the world's children. WHO, Geneva, 2007 (http://www.who.int/childgrowth/software/en/)
[49] Mason J, Chotard S, Dieterich M, Oliphant N, Smith E, Rivers J, Hailey P and Mebrahtu S. Fluctuations in wasting in vulnerable child populations in the Greater Horn of Africa. Working Papers in International Health and Development. No.08-02. New Orleans: Department of International Health and Development, Tulane University, 2008. http://www.sph.tulane.edu/IHD/publications/WP%20Fluctuations%20Mason.pdf
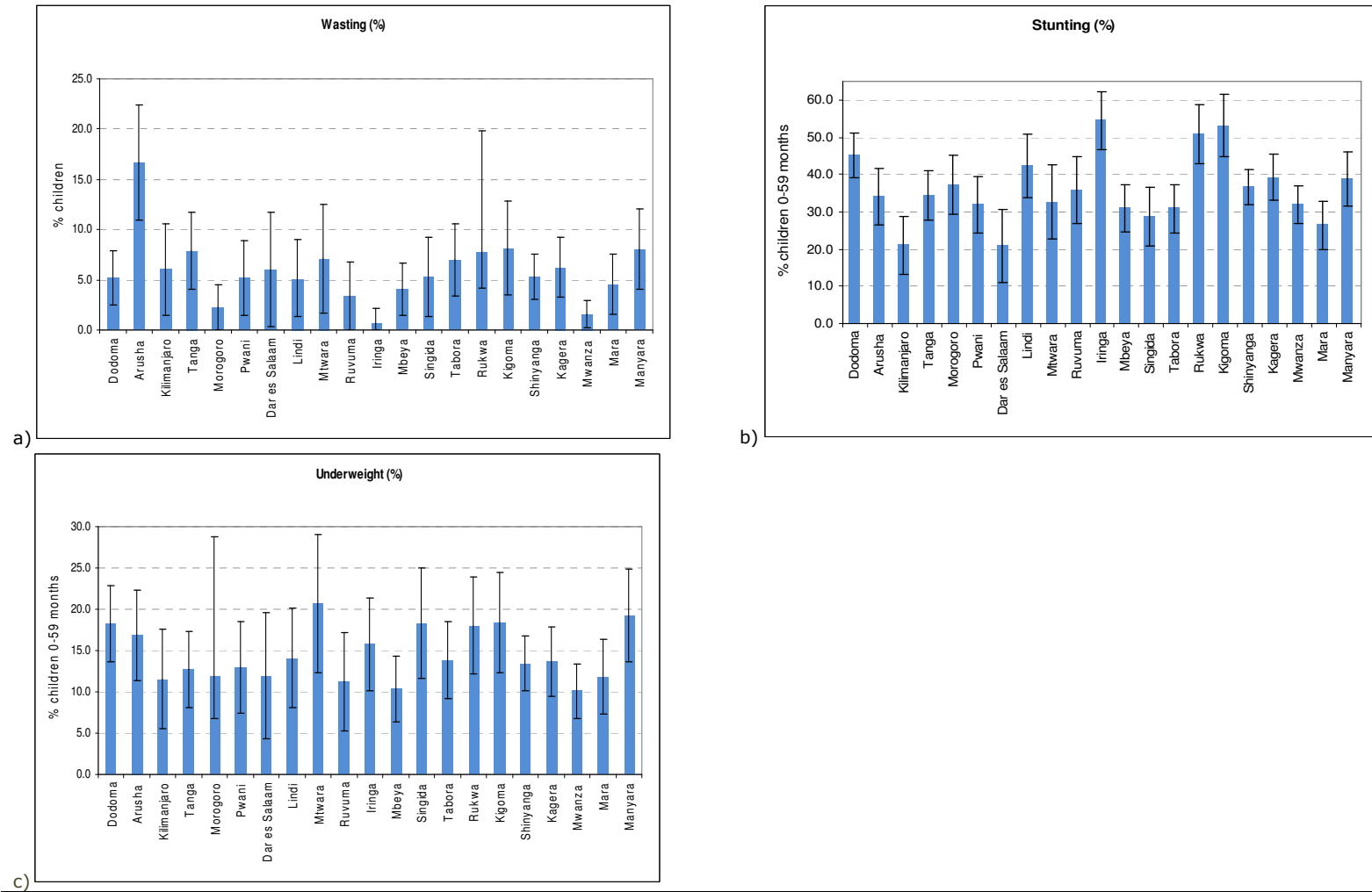
Fig 41: Child nutrition by region

a) Regional distribution of wasting prevalence; b) Regional distribution of stunting prevalence; c) Regional distribution of underweight prevalence (Source: 2009/2010 CFSVA)

Child growth patterns

The CFSVA also examined child growth patterns to better understand periods of nutritional vulnerability during childhood. To do so, mean weight-for-height and height-for-age z-scores were assessed across child age groups (0-5 months, 6-11 months, 12-17 months, 18-23 months, 24-35 months, 36-47 months and 48-59 months). Then the analysis was taken a step further to assess growth patterns after classifying children by whether they resided in an acceptable food consumption household or a poor/borderline household. Figure 42 details the findings.
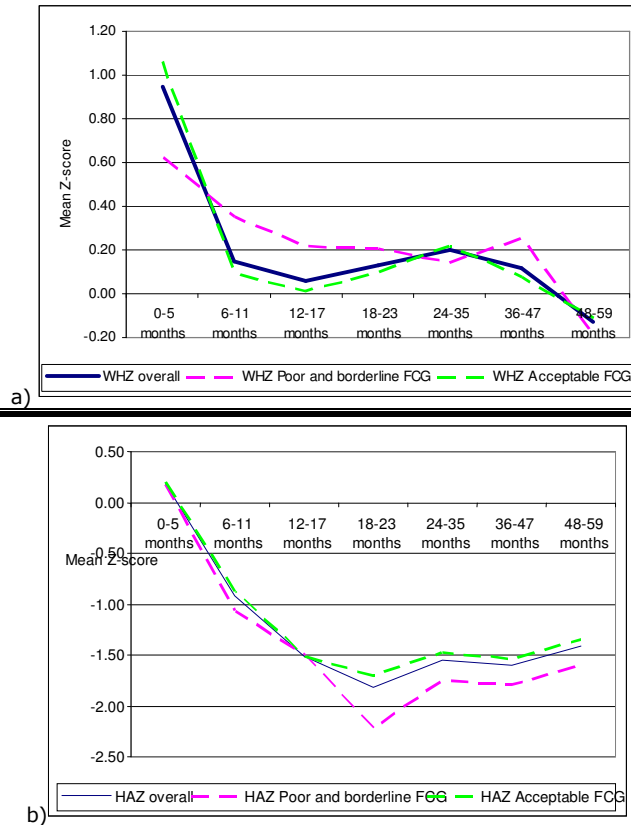
Fig 42: Child growth patterns
a) Child weight for height z-scores by age group; b) Child height for age z-scores by age group

Weight-for-height growth patterns

Looking at weight-for-height growth patterns, children generally showed a large nutritional decline during the first year of life, which is not surprising as children are considered more nutritionally vulnerable during this period (given their increasing exposure to the external environment). However, after bottoming out at 12-17 months of age, children appeared to begin a period of catch up growth (where they begin to make up for nutritional declines) which continues until about 35 months. At this point, however, the children showed a new, less rapid decline that continues through the 59nth month. There is no clear explanation for this decline later in childhood.

Examining growth patterns by food consumption groups, children in poor/borderline households appeared to start off slightly worse than children in acceptable households (0.4 WHZ lower). Between 6 and 17 months of age, however, children in acceptable food consumption households showed a much faster rate of nutritional deterioration than children in poor/ borderline food consumption households, leaving them 0.2 z-scores lower on average at 18 months of age. Growth from 18 to 47 months was largely steady with only slight fluctuations. After 48 months, however, nutritional status seemed to deteriorate quite rapidly once more regardless of food consumption group (though the decline appears to be somewhat quicker amongst children in poor/borderline households)

Differences in WHZ growth patterns across food consumption groups might be explained by child feeding patterns, child illness or the interaction between the two. As Table 17 indicates, illness rates examined by age groups show that children in poor/borderline food consumption households experience less illness in the 6-11 month age range than children in acceptable households. This could be explained by low rates of timely introduction of complementary foods among poor food consumption households. While, at first glance this may seem contradictory (as timely introduction of complementary foods is associated with better nutrition), delaying the

Table 17: Child illness rates by age group

Months of age	% sick in poor/ borderline food consumption HHs	% sick in acceptable food consumption HHs
0-5	35.7	27.2
6-11	27.9	41.4
12-17	40.6	37.5
18-23	21.9	36.9
24-35	29.0	32.1
36-47	18.5	24.8
48-59	28.3	21.3

Source: 2009/2010 CFSVA

introduction of complementary foods also delays the inevitable exposure to the external pathogens that accompany them. Therefore, children from poor food consumption households experience less illness as they are still receiving safe sources of food (i.e. breast milk). As illness is strongly associated with rapid weight loss and wasting, this interaction may provide one potential explanation for these findings. This however does not mean that children in poor food consumption households are at a nutritional advantage. In fact, these children are probably chronically nutrient deficient as breast milk for children 6 months or older does not provide all the nutrients needed for proper growth. As discussed below, this may well help explain the rapid increases in stunting among these children. As further evidence that these differentials in weight-for-height growth patterns may be related to delayed complementary feeding, children from acceptable food consumption households show a 13 percentage point increase in illness from 0-5 months of age to 6-11 months of age which is due, at least in part, to the introduction of complementary foods. Among children in poor and borderline food consumption households, a similar 12 percentage point increase is seen; however, it occurs later, from 6-11 to 12-17 months of age.

Height-for-age growth patterns

Looking at height-for-age growth patterns, children again show significant nutritional declines during the first two years of life (for the reasons discussed above) but these declines stabilize around 24 months of age and children then begin gradual catch up growth that continues through the 59th month. When growth patterns of children in poor/borderline food consumption households were compared with those in acceptable households, feeding patterns again emerged as an important issue. As Figure 42 indicates, children in poor/borderline food consumption households experience a more rapid rate of decline during the first two years of life, ending up nearly 0.4-0.5 HAZ scores lower, on average, than children in acceptable households. After two years of age both groups of children show catch-up growth at similar rates; however, the children in the poor/borderline food consumption groups are not able to catch up completely with the children in the acceptable households.

Lower rates of timely complementary feeding and continued breastfeeding among children in poor/borderline food consumption households may help explain these findings. As stated previously, delaying the introduction of complementary foods (among children 6 months or older) leads to nutritional deficiencies as breast milk does not provide all the nutrients needed for children in this age range. Likewise, stopping breastfeeding before 18 or 24 months of age can affect a child as breast milk is still an important component of these children's diets. Diversity in the types of complementary foods given to children might also help explain these stunting differentials. WHO, for instance, recommends that children 6-23 months of age receive a minimum level of dietary diversity alongside a minimum number of meals to have an "acceptable diet".[50] Since diets in poor and borderline food consumption households are much more limited than those among other households, it is not unreasonable to assume that these differentials are also reflected in the quality of complementary foods offered to children.

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[50] Minimum diversity in complementary foods is defined as consumption of 4+ of the following food groups: 1) grains, roots and tubers; 2) legumes and nuts; 3) dairy products; 4) eggs; 5) vitamin A rich fruits and vegetables; and 6) other fruits and vegetables, in the day prior to the survey. The minimum number of meals is defined as: 2 meals for children 6-8 months, 3 meals for children 9-23 months of age or 4 meals for children 6-23 months of age who are not breastfed.

In summary, analyses of childhood growth suggest that a mix of improper feeding patterns early in life (coupled with resulting childhood illness) are amongst the most important contributors to elevated malnutrition rates in Tanzania, with the timing and type of complementary feeding perhaps the most important factors. While the findings are only suggestive, the data seems to indicate that by improving when complementary foods are introduced as well as the diversity of foods given, stunting rates can be lowered over time. In terms of interventions, nutrition programming for children under 2 years of age should be prioritized with a focus on improving feeding practices.

Bivariate association with wasting, stunting and underweight

The CFSVA also examined to nutritional status variables to explore potential associations with malnutrition. Stunting, wasting and underweight prevalence were first looked at in relation to livelihood profiles, wealth quintiles and food consumption groups (see Table 18). Examining livelihood profiles, prevalence varied significantly. Among children in households reliant on aid, wasting was nonexistent but stunting was the highest at 58 percent, leading to the highest underweight prevalence as well at 22.5 percent. The experience of chronic but not acute malnutrition among children in households receiving food aid may be related to the quality of the rations received. Agro-pastoral children reported the highest levels of wasting (8.7%), elevated but moderate stunting levels (37.1%) and the second highest underweight prevalence at 17.4 percent. Among salaried workers (one of the more affluent livelihood profiles), wasting prevalence was low (3.2%), stunting prevalence was also comparably low (29.5%) and underweight prevalence was amongst the lowest at 8.7 percent.

Table 18: Child nutrition indictors by livelihood, wealth index and food consumption group

	Wasting prevalence	Stunting prevalence	Underweight prevalence
Livelihood profiles			
Small food/ cash crop farmers	5.9	35.8	17.4
Small subsistence farmers	5.1	37.0	14.3
Big food/ cash crop farmers	1.5	38.6	8.2
Big subsistence farmers	6.0	36.6	12.7
Small business	6.4	32.6	15.1
Commerce	5.5	38.8	14.5
Daily work	4.6	39.3	14.7
Agro-pastorals	8.7	37.1	17.4
Fisherfolk/hunters	3.0	33.1	10.7
Aid	0.0	58.8	22.5
Others	6.7	39.8	13.1
Salaried	3.2	29.5	8.7
Wealth Quintiles			
Poorest	7.1	42.4	21.1
Poorer	4.6	40.7	16.5
Moderate	6.1	38.1	12.6
Richer	5.7	34.8	13.3
Richest	4.6	26.8	8.1
Food consumption group			
Poor	8.2	41.0	14.9
Borderline	6.8	42.7	18.9
Acceptable	5.3	34.8	13.2

Source: 2009/2010 CFSVA

Looking at associations between wealth, food consumption and malnutrition, clear patterns emerged. Wealth status, for instance, was clearly associated with stunting and underweight prevalence with consistent declines in stunting seen across wealth quintiles and relatively consistent declines in underweight across wealth quintiles. Small but consistent declines were also

seen in wasting prevalence across food consumption groups and large differences were seen in stunting prevalence between those in acceptable food consumption groups and those in poor and borderline groups.

A quick assessment of child nutritional status by other factors typically associated with malnutrition was also conducted. This included looking at bivariate comparisons between child nutrition and maternal BMI, feeding patterns, child illness and receipt of health interventions (vitamin A supplements, deworming medicines and measles immunizations).

Maternal BMI was significantly associated with wasting and underweight prevalence. As Table 19 shows, 13.6 percent of wasted children had mothers who were undernourished as well, while only 6.7 percent of non wasted children had undernourished mothers (p-value=0.001). Similar differences were observed for underweight prevalence (p-value< 0.000). Maternal BMI was not significantly associated with stunting.

Table 19: Percent of mothers undernourished by child nutritional status

	Wasted		Stunted		Underweight	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**
Percent with low BMI	13.6	6.7	8.2	6.9	12.2	6.4

Source: 2009/2010 CFSVA

Child feeding patterns did appear to impact child nutritional status. As Figure 43 illustrates, exclusive breastfeeding appears to lower the risk of wasting among children under 6 months of age but differences were not significant. By contrast, the introduction of timely complementary foods appeared to significantly reduce the chance of being stunted and in this case findings were significant (p=0.003). Continued breastfeeding appeared to significantly increase the risk of stunting among children 12-15 months of age but this finding was not significant.

Looking at associations between malnutrition and child illness (Figure 44), fever, cough and diarrhoea were not associated with increased stunting or wasting. All three, however, did seem to significantly increase the risk of underweight (fever p=0.023; cough (p=0.041); diarrhoea p=0.041).
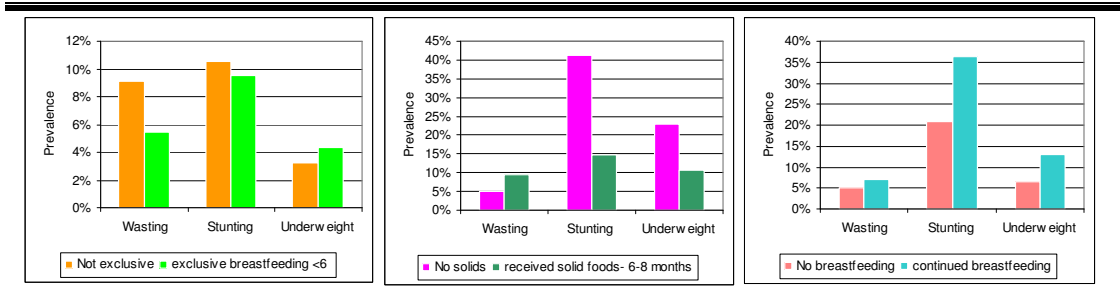
Fig 43: Child nutritional status by feeding patterns
(Source: 2009/2010 CFSVA)
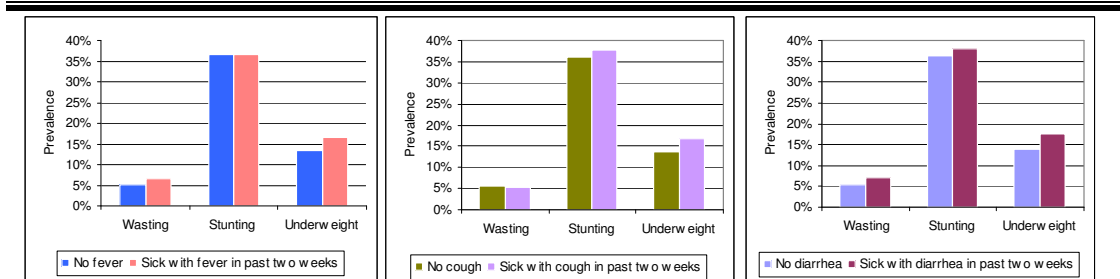
Fig 44: Child nutritional status by childhood illness
(Source: 2009/2010 CFSVA)

As Figure 45 indicates, child nutrition did appear to be impacted by the receipt of certain health interventions, specifically the receipt of deworming medicines within the last 6 months and measles immunizations. Bivariate comparisons revealed that deworming medicines when ingested within the last 6 months were significantly associated with lower wasting levels but increased

stunting levels. At first glance this may seem contradictory, but a one-time dose of deworming medication can immediately improve nutrient intake among children by killing the parasites, thus enabling weight gain (thereby lowering wasting rates on a population basis). But a one-time dose of deworming medication is not sufficient to change chronic malnutrition rates. This would require repeated dosing throughout childhood. It is also likely that one reason behind the differences in stunting prevalence observed between those receiving deworming medicines and those not is simply down to efficient targeting, showing that children receiving deworming medicines are likely targeted because of chronic vulnerability and high malnutrition rates. Likewise, receipt of measles immunizations was significantly associated with decreases in wasting (p=0.010) and underweight prevalence (p<0.000), while showing no impact on stunting prevalence.
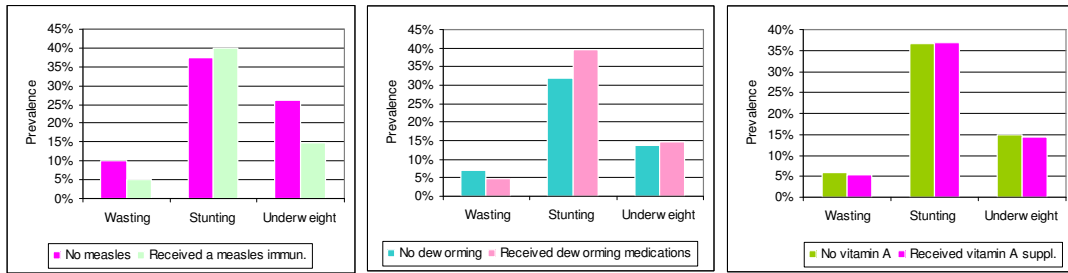
Fig 45: Child nutritional status by receipt of measles vaccines, vitamin A and deworming medications

(Source: 2009/2010 CFSVA)

Risk and Vulnerability Context

Risk and Vulnerability Approach

A household's livelihood strategies and outcomes, including food security, are influenced by the environment people live in. The vulnerability context is framed by critical trends (e.g. population growth, national and international economic trends, governance and technological changes), seasonal cycles (of prices, production, livelihood strategies), and shocks (both natural and man-made).[51] The risk to food insecurity is defined as the interaction between the probability of a given hazard of certain intensity, the vulnerability of the population to that hazard and the population size.

R = **H** x **VULN** x **POP**

R= Risk to food insecurity: Probability of harmful consequences or expected losses (specifically with regards to food security

H= Hazard: Probability of occurrence of a potentially damaging phenomenon within a given time period and area

VULN= Vulnerability of a household to the impact of specific hazard

POP= Population living in the area at risk

The following section provides insight into the general vulnerability context, difficulties experienced and households' capacity to withstand them.

Shocks

Reported shocks

The 2009/2010 CFSVA for Mainland Tanzania asked households how often they had been affected by one of 26 shocks in the five years preceding the survey, and whether they had been impacted by any of these shocks over the last calendar year. Households then ranked the recent shocks by severity and discussed the impacts in terms of income, assets and food. Nationally, 88.4 percent of households reported at least one shock over the past year. In most cases, there was very little variation by region (see Table 20), with between 85 and 100 percent of households reporting a shock. In Shinyanga and Kagera, by contrast, only 28 and 50 percent of households reported a shock. While these two regions may be less prone to shocks related to lack of rainfall, they also seem to have been far less susceptible to high food, fuel and input prices. It was unclear why there was such a difference between these two regions and the rest of Mainland Tanzania.

Among livelihood groups, between 80 and 95 percent of households in each group reported having experienced a shock in the year preceding the survey. Fisherfolk/hunters, households reliant on aid and daily workers were most likely to suffer shocks with between 93 and 95 percent of households experiencing one. Small subsistence farmers were least likely to report a shock, though over 80 percent of them still experienced one. Among wealth quintiles, there was no discernible pattern. Asset wealth, therefore, does not appear to protect against shocks. The pattern was stronger amongst food consumption groups, but differences were still small. Overall, 94 percent of households in the poorest food consumption group had experienced a shock, compared to 87 percent of households in the acceptable group.

The most common shocks included drought (58.4%), then high food prices (53.4%) and finally plant disease/ animal pests (34.7%). Sickness/health care expenditures were reported by almost a quarter of households, while high input costs, high fuel costs and lack of drinking water/quality drinking water were reported by just over one-fifth of households. Less frequent shocks included children being affected by malaria (13%), lack of irrigation (7.7%) and flooding (3.4%).

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[51] DFID (1999) Sustainable Livelihoods Guidance Sheet. Department for International Development.

Table 20: Percent of households exposed to shocks by region

	% with at least one shock in last 5 years	% with at least one shock in last 12 months	Lack of rainfall in last year	flooding in last year	high input costs in last year	malaria in last year	high fuel costs in last year	lack of water/quality water in last year	sickness in last year	high food prices in last year	lack of irrigation in last year	plant disease/ pests in last year
Region												
Dodoma	93.8	91.9	85.2	4.8	10.0	9.0	16.6	15.9	28.8	71.0	2.7	27.4
Arusha	96.4	95.5	90.5	1.4	9.2	0.0	15.0	6.7	3.7	54.2	1.0	4.5
Kilimanjaro	98.5	98.5	87.8	4.4	45.0	4.7	32.0	8.7	26.3	77.3	27.1	20.6
Tanga	100.0	99.0	93.9	1.9	22.7	2.8	20.8	37.8	6.0	59.1	30.1	35.2
Morogoro	100.0	99.4	80.6	0.9	15.4	3.7	5.5	13.4	41.6	55.1	4.2	54.9
Pwani	92.0	90.5	74.8	1.8	5.1	4.5	18.7	16.9	15.1	55.9	6.2	22.9
Dar es Salaam	99.0	98.1	73.8	0.9	11.8	13.2	33.3	32.6	25.5	74.1	21.7	16.8
Lindi	99.5	99.5	88.5	1.0	11.4	40.9	34.2	37.0	35.6	86.3	9.3	83.6
Mtwara	100.0	100.0	88.0	4.6	27.2	4.3	15.7	25.8	8.5	74.8	9.9	66.9
Ruvuma	84.9	84.5	5.7	1.4	46.2	2.9	28.2	2.4	18.2	25.5	0.9	5.0
Iringa	99.1	97.7	31.8	3.4	57.2	4.8	48.3	6.2	28.2	56.9	1.4	19.9
Mbeya	99.6	99.6	39.5	9.0	38.7	4.6	16.8	50.1	29.0	44.8	0.0	10.7
Singida	100.0	100.0	63.0	3.3	19.1	67.0	18.9	53.2	30.9	71.4	9.1	47.8
Tabora	97.0	97.0	42.9	6.3	26.7	14.3	9.5	40.8	26.8	56.6	7.1	52.8
Rukwa	95.6	95.6	0.9	3.1	27.1	25.4	32.1	26.1	29.7	49.8	5.7	27.5
Kigoma	99.0	98.1	32.4	8.2	25.6	36.3	32.8	9.3	29.2	71.7	3.3	78.6
Shinyanga	29.1	28.2	12.4	0.9	0.0	0.0	0.0	1.5	11.1	1.0	0.0	1.9
Kagera	71.1	49.5	25.6	5.6	8.5	3.4	6.1	8.0	18.9	23.6	4.8	24.6
Mwanza	100.0	100.0	72.2	2.4	46.5	26.4	40.9	21.4	40.1	78.1	17.6	63.6
Mara	100.0	100.0	85.7	1.9	9.6	24.7	47.6	35.7	35.0	80.1	0.9	60.9
Manyara	97.6	96.7	80.0	1.9	10.5	11.0	4.3	31.6	11.9	15.8	10.5	29.8
Rural Mainland Tz	90.4	88.4	58.4	3.4	22.3	12.7	21.0	21.5	23.7	53.4	7.7	34.7

Source: 2009/2010 CFSVA

Drought impact at household level

Droughts are the shocks most commonly reported by households. They were most frequent in the northern (Arusha-90.5%; Tanga-93.9%; Manyara-80.0%; Kilimanjaro-87.8%; Mara-85.7%), central (Dodoma-85.2%; Morogoro-80.6%) and south eastern regions (Mtwara-88.0%; Lindi-88.5%). This matches broad rainfall patterns observed in Tanzania, and particularly the lower volumes of rainfall and increasing bimodal tendencies in the more northern regions. This is not surprising as a shorter, moister period (like the Vuli season) is more vulnerable to climate variability.

Over 50 percent of households in each livelihood group reported lack of rainfall/late rainfall as an important shock. Daily workers, agro-pastoralists, fisherfolk/hunters and "others" were the livelihood profiles most impacted by this shock (affecting 66 to 68%of households).

To assess seasonality, the CFSVA asked households to say which month each shock was experienced over the last year. For lack of rainfall/drought, the seasonal pattern varies widely across Tanzania. Figure 46 attempts to group different regions according to broad similarities in the seasonal pattern of drought.

There is a group for whom the shock levels are always low (Figure 46d), which includes the wetter regions where moisture stress hazard is low. There is also a group for whom shock levels are always high and where there is no well-defined seasonal pattern (Figure 46e). This corresponds to

the drier regions. Here moisture stress is a year-round hazard. For the other four groups (Figure 46a,b,c,f), we can see well-defined peaks in the prevalence of drought.

For these other groups, drought seasonality is related to the moisture available for crops. Moisture availability is determined by long term mean rainfall and potential evapotranspiration (a measure of environmental water demand on crops); the ratio between these two parameters gives a moisture index (MI) that summarizes moisture conditions for crops. Typically a MI above 35 percent signals the start of suitable moisture conditions for planting and early crop development, while an extensive crop during grain filling may require an MI in excess of 100 percent. On this basis, we can define the following groups:

For Dodoma and Morogoro (and to a lesser extent Lindi) shown in Figure 46c, the peaks in the drought shock prevalence occur during mid season, when the MI is maximum – see sample graph in Figure 46g for Dodoma. This implies that in these provinces, households are more likely to be affected by moisture stress during this stage, which is usually when the crop yield is also more sensitive to shortfalls in rainfall.

For the regions in Figures 46a,b,f, the peaks in reported drought shocks match the start of the availability of suitable moisture conditions for planting and crop development, i.e. they happen during the planting stages of the crop season – see graph in Figure 46h where drought hazard peaks during the rising phase of moisture availability. In these regions, households feel more vulnerable to rainfall variability preventing a successful planting. Failed plantings affect the households through extra expense, the effort of replanting and by shifting crop development to later stages of the season when dry spells are more frequent and yield likely to be lower. Usually, moisture levels are fairly high during the rest of the season so moisture stress events are less frequent, leading to low drought hazard perceptions by the household.

To summarize, drought hazard in Tanzania can be characterized as follows:

Seasonally low: low hazard all year round as perceived by households. Includes Ruvuma, Rukwa, Kagera, Shinyanga, regions with typically good moisture supply.

Seasonally high: high hazard nearly all year round as perceived by households. Includes Arusha, Tanga and Kilimanjaro, northern areas of lower rainfall and moisture availability.

Peak season hazard: hazard peaks during middle of cropping season, most likely at the flowering and grain-filling stage. Includes Dodoma, Morogoro and to a lesser degree, Lindi. Of the regions that engage in Musimu cropping, these are the ones with the highest February rainfall (year to year) variability.

Planting season hazard: hazard peaks during planting and early crop development stages. Includes Mtwara, Dar es Salaam, Mara, Kigoma, Mwanza, Manyara, Tabora, Singida, Mbeya, Iringa, and Pwani.
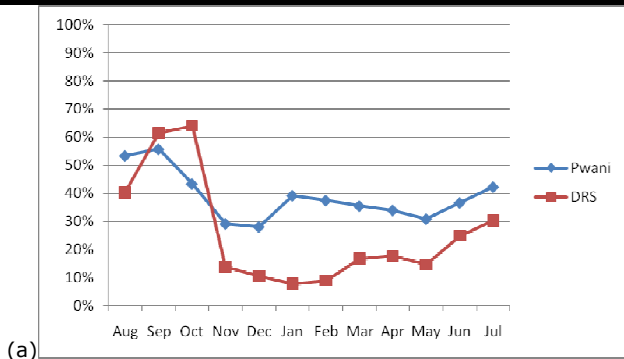
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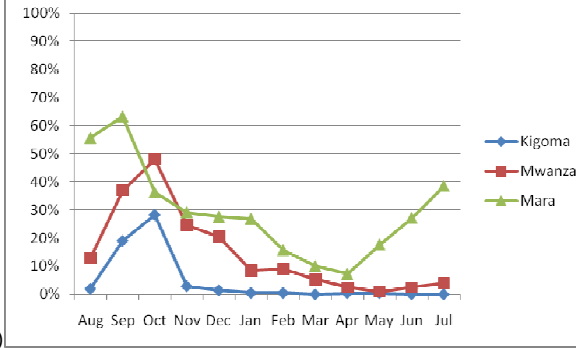
(b)
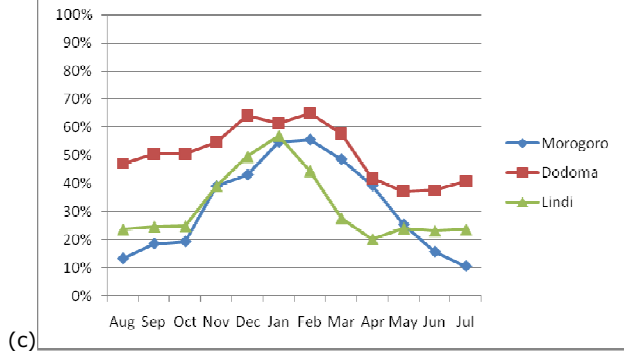
(c)
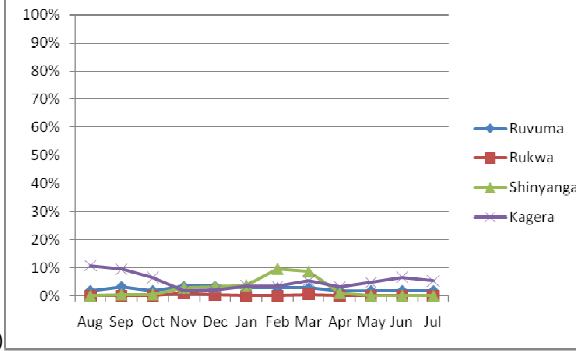
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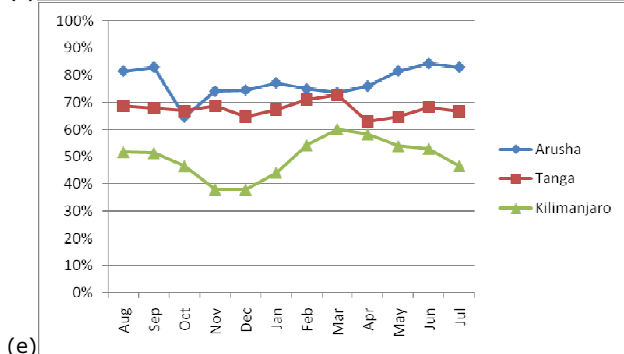
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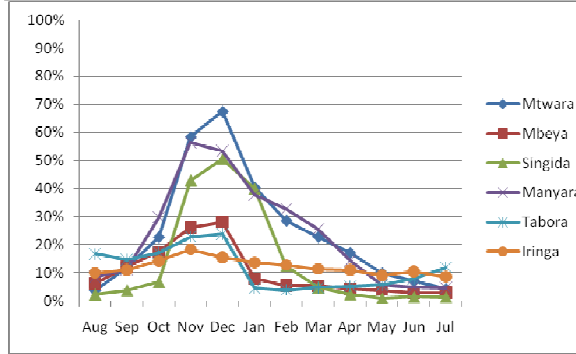
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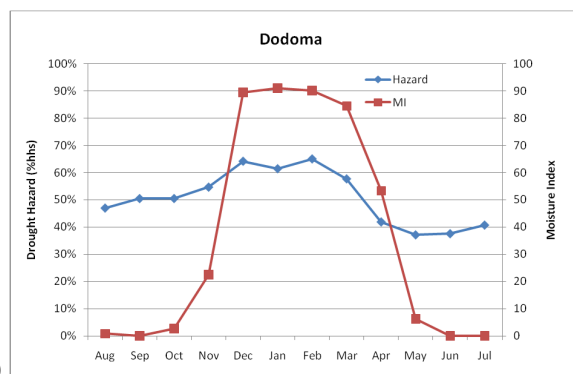
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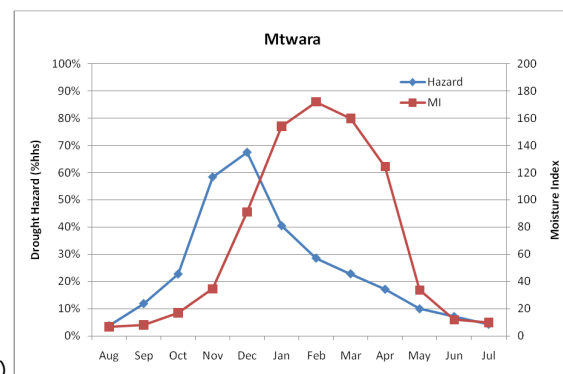
(h)

Fig 46: Seasonal distribution of lack of rainfall/drought shocks

Regions have been grouped by broad similarity of seasonal pattern. 45g and h – Plots showing drought hazard and moisture index seasonalities for selected locations (Dodoma and Mtwara) (Source: 2009/2010 CFSVA)

Households who experienced drought were asked about the impact of the shock. As Table 21 shows, 90.8 percent of households reported a loss of income, 33 percent a loss of assets and 79 percent a negative impact on food access. Over half of all households affected said that they had not recovered from the shock at all. Twelve percent confirmed they had fully recovered and 35 percent reported partial recovery.

Table 21: Impact of drought on household income, assets and food supply

	Income loss due to drought	asset loss due drought	food loss due to drought	Has HH recovered?	
				Total recovery	Partial recovery
Wealth Quintile					
Poorest	88.8	29.2	87.6	5.2	29.1
Poorer	91.7	36.9	81.9	9.5	31.4
Moderate	89.9	32.9	78.4	10.5	34.8
Richer	91.2	35.8	73.1	13.1	43.5
Richest	92.3	32.3	71.6	25.3	40.7
Food consumption groups					
poor	80.0	23.7	90.5	6.0	29.4
borderline	91.6	30.9	82.3	6.5	28.0
acceptable	91.4	35.0	76.9	14.5	38.2
Mainland Tanzania	90.8	33.4	78.9	12.1	35.3

Source: 2009/2010 CFSVA

Drought affects households differently across wealth and food consumption groups; wealthier or more food secure groups feels its impact more on income and assets, while the poorer or less food secure groups suffer it more as loss of food. Another key difference is seen in rates of recovery. Wealthier and more food secure households recover much quicker than poorer, less food secure ones.

Risk Analysis

Rainfall and Vegetation (Variability)

Because drought has more impact during the early stages of the season, we evaluated the magnitude and distribution of the variability in the start of the season.

The analysis used the 10 day Rainfall Estimates (RFE) dataset from 1995 to 2009/2010, available from the USGS FEWS-Net website (http://earlywarning.usgs.gov). For each season, the date of start of the growing period (SGP) was also derived – this represents the date when suitable moisture conditions for planting and early crop development are verified. The FEWS-Net definition (initially developed for Sahelian conditions) was adapted for Tanzania to reflect lower early season water requirements (lower potential evapotranspiration).

The SGP was defined as the date when rainfall first exceeds 15mm in two successive 10 day periods.

The 15mm threshold was chosen based on the general rule of thumb that suitable moisture conditions for crop development occur when rainfall exceeds 35 percent of potential evapotranspiration (a parameter that represents the water demand imposed on crops and vegetation by the environment). For Tanzania, this rule of thumb yields approximately 15mm (the calculations come from data in FAO-published climatological datasets[52]).

Based on this definition, SGP date maps were prepared for the available seasons (1995-96 to 2008-09). We calculated an average SGP date and mapped the standard deviation of the dates in

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[52] NewLocClim, Environmental and Natural Resources Working Paper No 20.

order to determine how variable the SGP is across Tanzania.[53] Results are presented in Figure 47. Note that the data only allows derivation of SGP corresponding to Musimu season.[54]

The SGP tends to occur earliest in the north western areas and later in the central and northern areas of Tanzania. This corresponds well with average rainfall patterns because later starts are associated with smaller seasonal totals.

In terms of variability, the map in Figure 47(b) shows a clear pattern, with north and north western regions displaying large variability in SGP dates. These are the regions that reported more frequent and severe drought shocks throughout the year. Since the end of the season date is typically less variable than its start, the above map also indicates the likely pattern of variability in the length of the season.

This geographic pattern is also evident in the variability of the seasonal total rainfall and the variability of maximum vegetation development. Variability in these parameters was assessed using the coefficient of variation (ratio of standard deviation to its mean). For seasonal rainfall, the FEWS-Net RFE August to July totals were calculated and their mean and CV derived. For vegetation, the August-July maximum NDVI (from the SPOT-VGT 10 day NDVI dataset) for each season was calculated and its mean and CV derived.

The maps show that rainfall varies both in timing and duration and that this translates into greater variability in seasonal vegetation development. The vegetation variability offers a lot more detail both thanks to better dataset resolution but also to the topographic and landscape diversity in these regions. Note that where natural vegetation dominates, the variability for crops is higher because crops are more sensitive to water stress.

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[53] Estimating mean and standard deviation of dates was done based on circular (or directional) statistics.
[54] The FEWS RFE dataset underestimate rainfall amounts in Oct-Dec and hence Vuli season timings cannot be analysed. The Masika season is not sufficiently differentiated from Musimu in moisture terms.
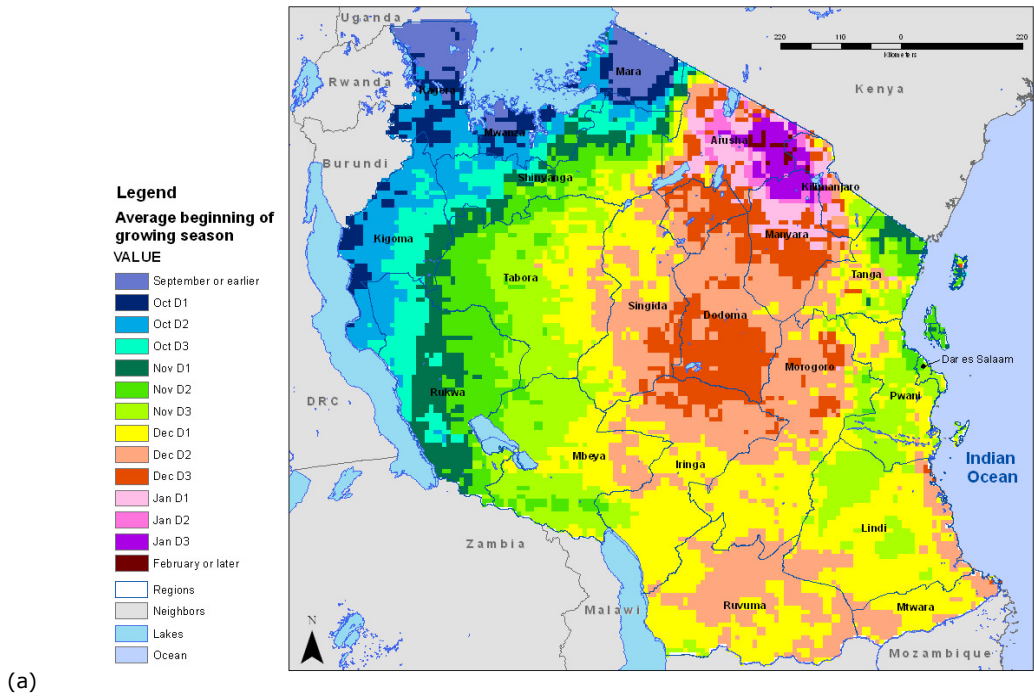
(a)
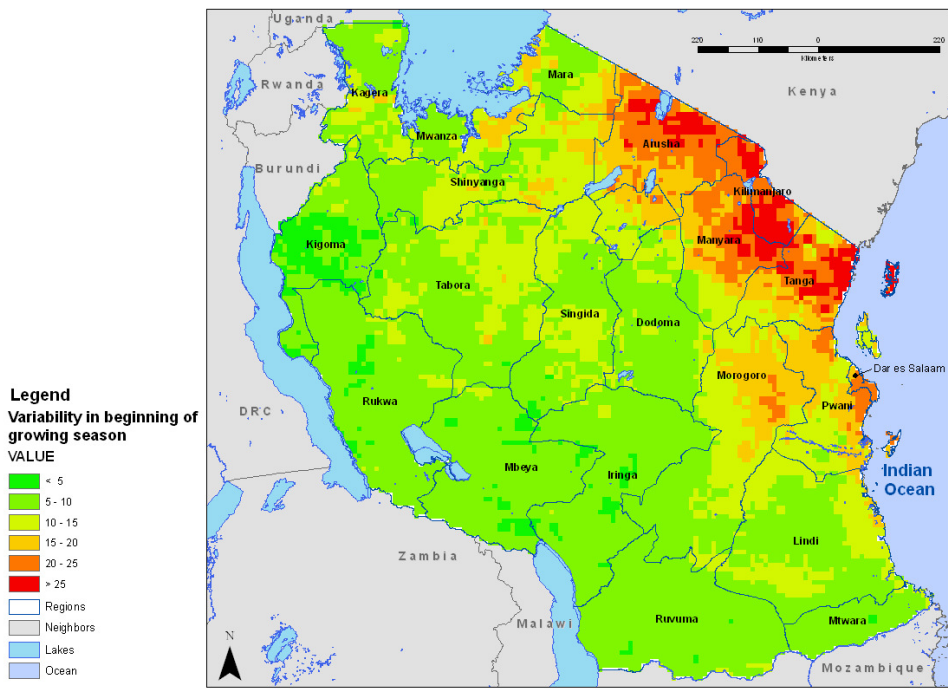
(b)

Fig 47: Start of growing period in Tanzania
(a) Average date and (b) variability in days

(a)

(b)
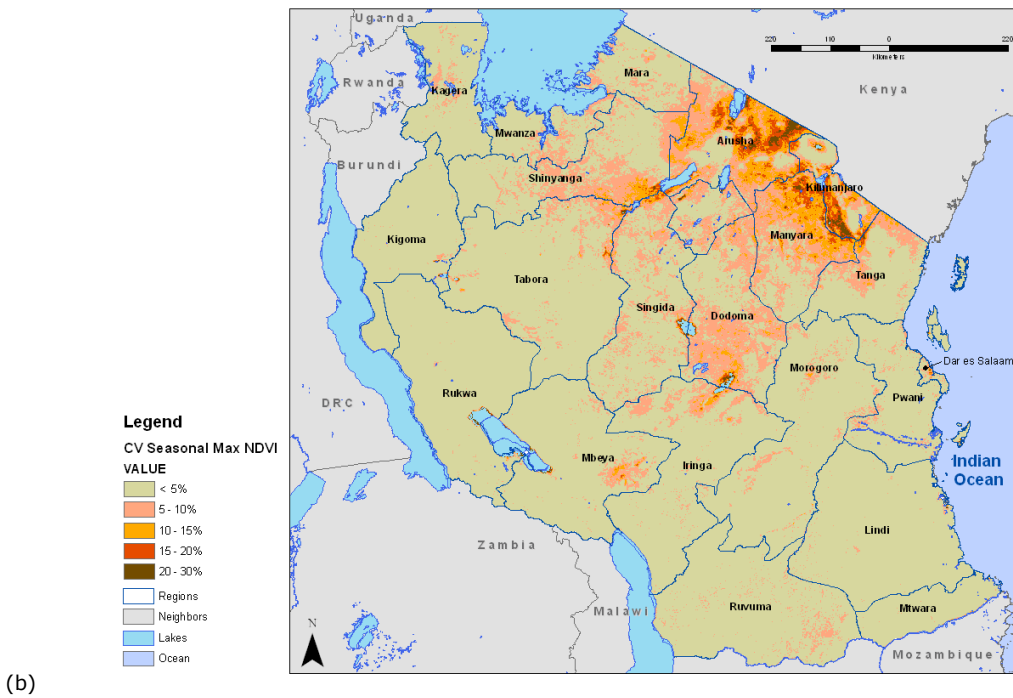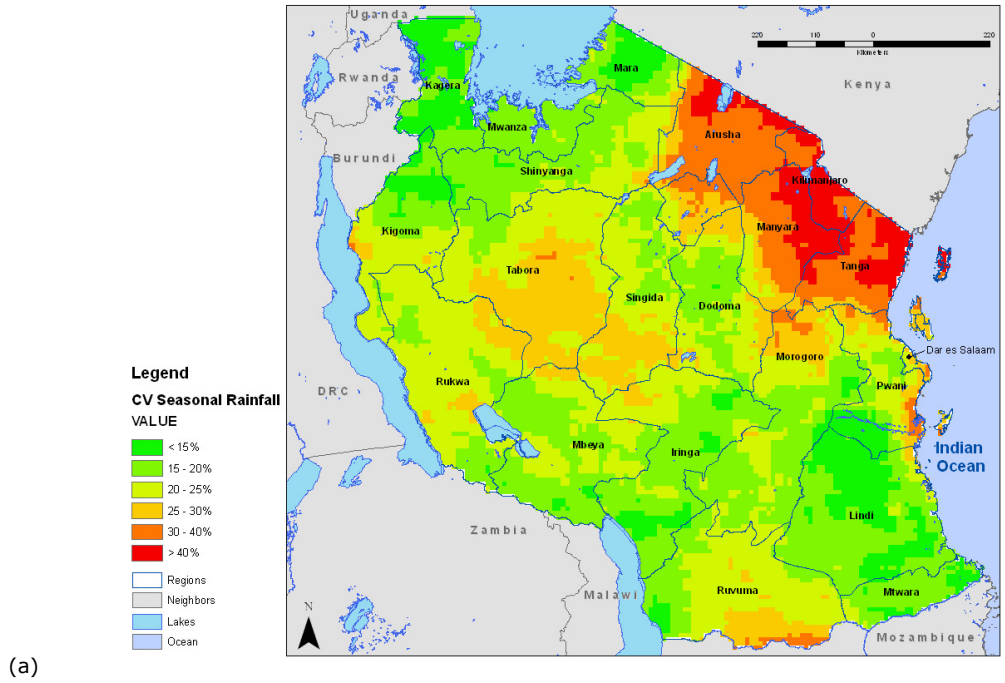
Fig 48: Variability (% CV) of seasonal rainfall totals

An analysis was also carried out based on the performance of a crop water use indicator (WRSI, Water Resources Satisfaction Index) over the period 1996 to 2009/2010. This index reaches a maximum of 100 percent denoting full satisfaction of crop water requirements. For values of 50 percent or lower (only half the requirements met) crop failure is expected.

For each year in this period, we calculated a seasonal map of WRSI and derived their average. If we define good crop conditions as when the index is over 80 percent of the mean value, we can

understand how often good crop conditions occur. The result is shown in Figure 49, for the maize crop in the Musimu season (No Data regions indicate areas where the model considers no Musimu crop growing takes place). Of the regions under Musimu cropping, the areas with lower incidence of good crop performance are Manyara, Singida, parts of Tabora and Shinyanga.
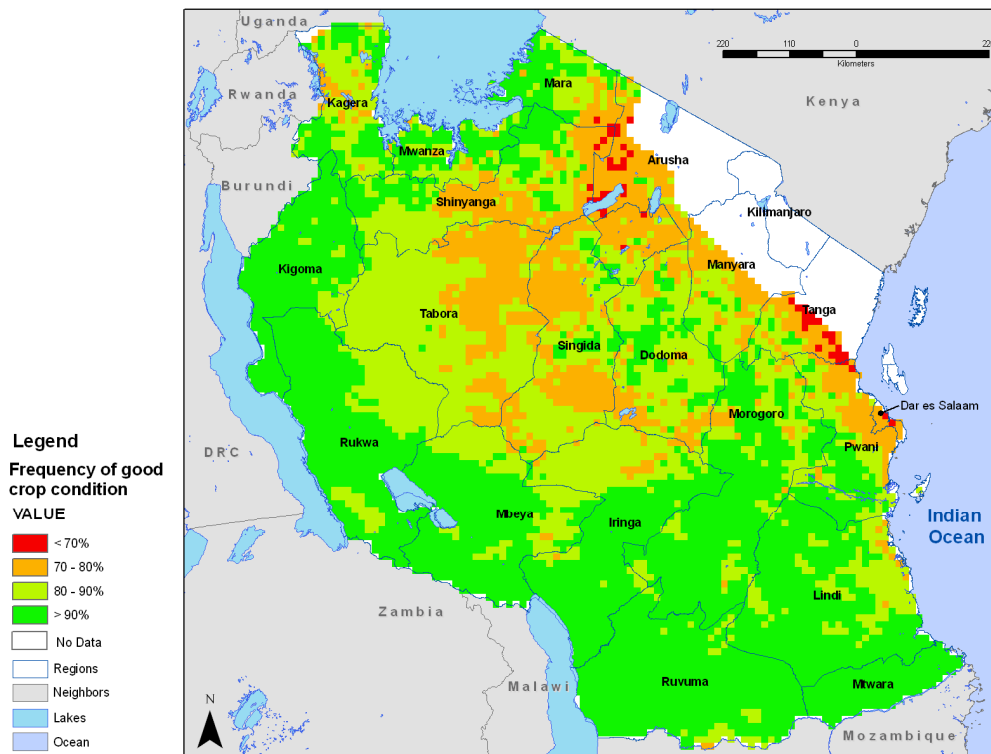
Fig 49: Frequency of seasons with good crop conditions in Musimu season, 1996-2009

Crops

Rainfall is not the only determinant of crop growth and production, and rainfall data and vegetation data may not necessarily capture the full dimensions of crop production. We therefore created a simplified analysis for maize production in Tanzania.

The data used in the analysis came from the official statistics from the Ministry of Agriculture of the United Republic of Tanzania. These consist of region-level aggregated values of area planted (ha), production (tonnes) and yield (ton/ha) for most crops planted in the country.

The analysis focused on maize because it is the key crop for food security and availability for rural households. The analysis defined and mapped:

the average values of the three maize variables in the last 5 years (2004/5-2008/9);

the variability in the three variables within the period 1991/2 to 2008/9; and

the trends in the three variables within the period 1991/2 to 2008/9.

The results are shown in Figures 50, 51 and 52 below. The trend in maize statistics during 1992-2009 was not the object of formal statistical analysis (e.g. with Mann-Kendall tests for significance of the trend). Instead, the objective was to map out broad patterns and evaluate signs in the trend.

The maize averages for the past five years (Figure 50) show the south western regions (Ruvuma, Iringa, Mbeya, Rukwa) to be the most productive in the country, accounting for close to 30 percent of national production (Figure 50a). This comes from being the regions with higher maize yields (Figure 50c) and with reasonable proportions of area planted (Figure 50b). Except in Kigoma and

Kagera, yields are much lower elsewhere, in particular in the central regions of Singida and Dodoma and in the south eastern provinces (Pwani and Lindi). Production is also low as a result.

Variability in maize statistics was evaluated by calculating the coefficient of variation (CV, ratio of standard deviation to the mean) over the period 1992-2009 – this is shown in Figure 51a,b,c. For some regions, this variability includes a trend component shown in Figure 52a,b,c. Yield is highly variable in the more northern regions, especially in Arusha, Dodoma, Shinyanga, Tanga, Kilimanjaro and Singida. Here, the variability contains a decreasing tendency (Figure 52c) – rural households may face problems because of year-to-year uncertainty and falling productivity. Other central areas also show decreasing trend in yields, though at more moderate rates. Falling yields may be caused by a complex mixture of factors, including reduced fertility due to low input usage, expansion into more marginal lands and worsening agro-meteorological conditions (difficult to evaluate with the available data, although recent studies have identified unfavourable trends in the timing and length of growing seasons in central Tanzania). The exceptions are the western and south western regions where maize yields show increasing tendency.

Aggregated area planted (Figure 52b) shows increasing trends in most regions, perhaps because of increasing population, or perhaps households are planting bigger areas to compensate for decreasing yields. At this stage, there are no explanations for the huge differences in planted area increases between, for instance, Singida-Arusha (no increase) and Dodoma-Kilimanjaro (large increase). Where noticeable trends in area planted exist, they seem to spring from sharp increases from 2003 onwards, which led the national total maize planted area to increase by 50 percent from pre-2003 to post 2003 levels.

A combination of decreasing yields and increasing area has culminated in regional production (Figure 52a) remaining approximately constant (or increasing slightly) in most northern and central provinces. By contrast, increases in both area and yield have led to higher production in the west and southwest of the country.
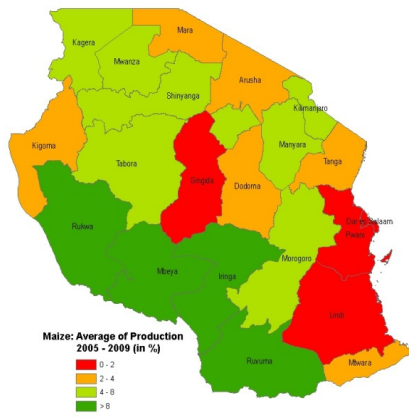
(a)　　　　　　　　　　　　　　　　　　　　　　　(b)
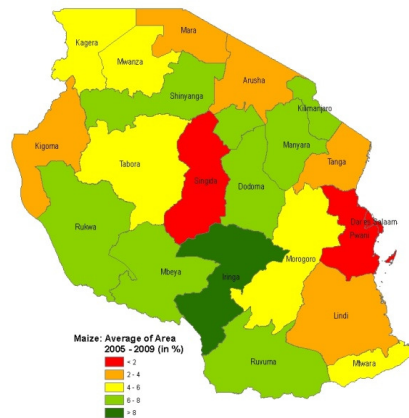
(c)
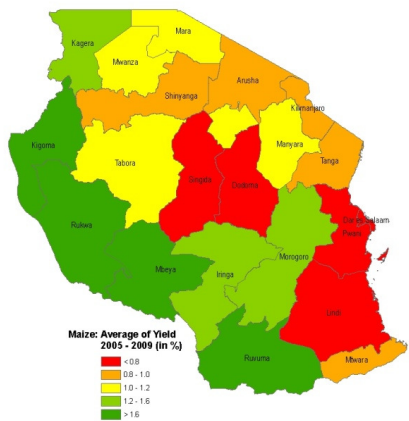
Fig 50: Maize statistics by region, averages for 2005-2009
(a) Production, (b) Area planted and (c) Yield
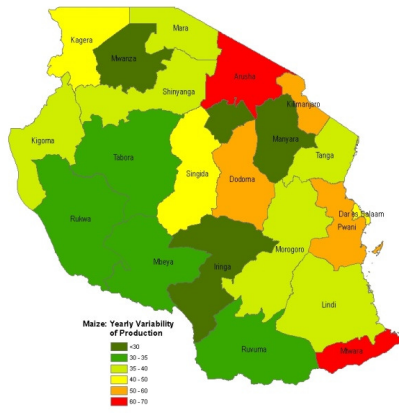
(a)   (b)
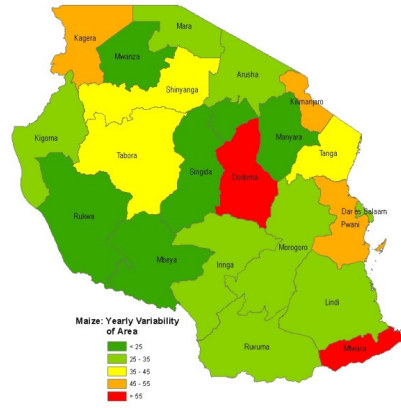
(c)
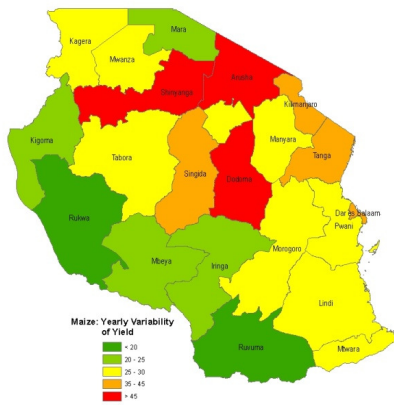
Fig 51: Maize variability by region (CV) between 1992 and 2009
  (a) Production ; (b) Area planted; (c) Yield
(Source: Ministry of Agriculture)

(a)
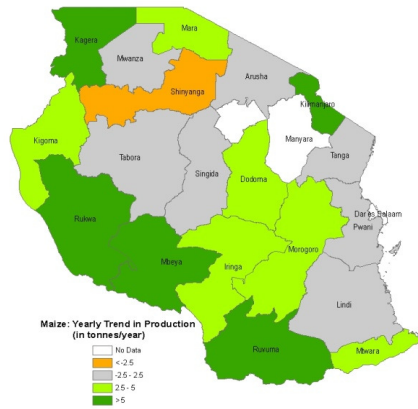
(b)
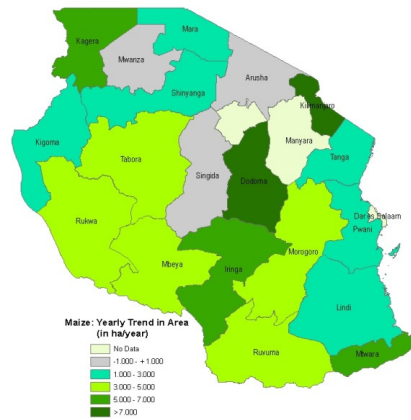
(c)
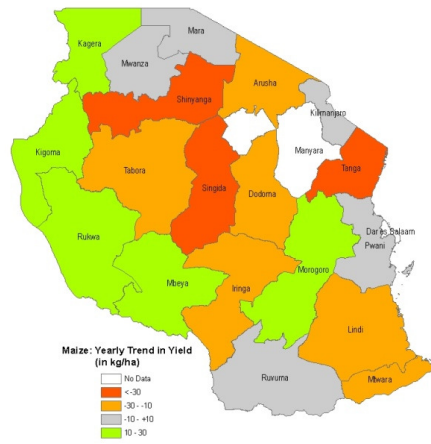
(d)
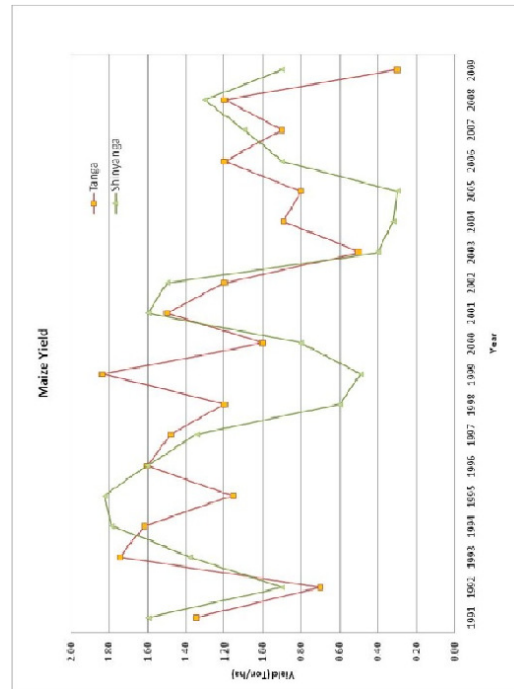
Fig 52: Maize trends over 1992-2009
(a) Production, (b) Area planted and (c) Yield. (d) Maize yield variations within 1991-2009 for the two provinces with the strongest decreasing trend

High food prices

High food prices were cited by 53 percent of households as one of the primary shocks experienced in the year preceding the survey. Prices were a problem in many parts of the country, with high percentages of households in northern (Kilimanjaro-77.3%; Mara-80.1%), central (Dodoma-71.3%; Singida-71.4%) and southern regions (Lindi-86.3%; Mtwara-74.8%) reporting this shock. Only households in western regions mentioned this shock less frequently. Examined by livelihood profile, high food prices disproportionately impacted daily workers (62.5%), fisherfolk/hunters (69.0%), households reliant on aid (60.8%) and "others" (68.4%). Large food/cash crop producers were least affected (at just 43.8%).

Food prices were probably more of a concern in 2009 than in other years because of the lingering effects of the 2008 food price crisis which was compounded by the 2009 financial crisis. Maize prices released by the Ministry of Industry, Trade and Marketing show generalized increases from January 2006 to January 2008, in multiple markets across Tanzania. Maize price increases in Dar es Salaam are even more dramatic during this period.

In terms of seasonal fluctuations in food prices, respondents to the CFSVA indicated that food prices are most problematic in January and most acceptable in May or June. Only a couple regions (like Arusha) reported this shock at similar levels throughout the year preceding the survey.

Plant disease and animal/other pests

Plant disease and animal pests are perennial problems for farmers. Overall, 34 percent of households reported this shock. The most affected regions included Lindi (83.6%), Kigoma (78.6%), Mtwara (66.9%), Mwanza (63.6%) and Mara (60.9). The regions least affected were Shinyanga (1.9%), Ruvuma (5.0%) and Arusha (4.5%). Large subsistence farmers and "others" were most affected (around 42% of households).

Concerns about plant disease and animal pests peak in January/February, coinciding with the beginning months of the Musimu rains in unimodal parts of the country and with the Vuli harvest and the land preparation period for the imminent Masika rains in the bimodal parts of the country.

Coping Strategies

To understand how households cope, the CFSVA asked them how often they had used a list of five coping strategies in the seven days prior to the survey. The information was used to compute a reduced coping strategy index (CSI), which takes into account both the frequency and gravity of the mechanism used.[55]

As Table 22 indicates, the most commonly reported coping strategies were relying on less preferred or less expensive food and reducing the number of meals eaten a day. Both strategies were employed almost twice (1.9 times) per household in the seven days preceding the survey. The next most common strategies were to cut the size of meals (1.2 times a week) and to borrow food or rely on friends for food (1.1 times a week). The least common strategy was to restrict adult consumption to preserve children's consumption. Overall, the average CSI was 9.8.[56]

Examined by region, there were significant variations in mean CSI score. Households in Iringa and Lindi reported the score at 24.1 and 19.9 respectively. The regions with the lowest CSI score included Singida, Manyara and Morogoro (between 4 and 5).

Among livelihood groups, CSI scores were highest among households reliant on aid (13.3) and fisherfolk/hunters (11.7). Salaried workers reported the lowest CSI score at 5. Generally, CSI scores decreased with wealth and with improved food consumption, although the association was not strong in either case. Similar patterns were observed when the uses of individual coping mechanisms were examined by food consumption groups or wealth. The most frequent coping mechanisms used by households in either the lowest wealth quintile or in the lowest food consumption group mirrored the national averages.

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[55] "Eating less-preferred/expensive foods", "limiting portion size at mealtime" and "reducing the number of meals per day" have a severity score of 1. "Borrowing food or rely on help of friends/relatives" and "limit adult intake in order for small children to eat" have a severity score of 2 and 3 respectively.
[56] The CSI can reach a maximum of 56.

Table 22: Number of times per week each coping strategy is used and mean Reduced CSI

	rely on less preferred / cheaper food	borrow food / rely on help friends	limit portion size	restrict adult consumption to preserve children's consumption	reduce number meals in a day	CSI reduced
Region						
Dodoma	1.5	0.4	1.3	1.4	3.2	10.9
Arusha	2.0	1.3	1.0	1.0	2.2	10.6
Kilimanjaro	3.2	1.9	1.7	1.1	2.8	14.9
Tanga	2.2	2.0	2.3	1.5	2.6	15.8
Morogoro	0.4	0.4	0.2	0.0	3.0	4.5
Pwani	1.4	1.3	1.8	1.0	2.3	11.1
Dar es Salaam	1.4	0.9	0.7	0.6	2.1	7.8
Lindi	3.1	1.6	3.3	2.2	3.7	19.9
Mtwara	1.9	1.9	0.1	0.1	2.2	8.4
Ruvuma	3.2	0.3	2.3	1.0	1.9	11.1
Iringa	3.8	1.9	3.8	2.9	4.1	24.1
Mbeya	2.7	0.7	0.4	0.1	0.7	5.7
Singida	0.7	1.4	0.1	0.3	0.0	4.4
Tabora	2.4	0.9	2.2	0.8	1.8	10.6
Rukwa	1.6	0.5	0.6	1.0	1.3	7.4
Kigoma	1.0	1.2	0.2	0.3	0.4	4.8
Shinyanga	0.9	0.9	0.9	0.5	3.3	8.4
Kagera	0.8	0.7	1.1	0.5	1.0	5.9
Mwanza	1.1	0.8	0.8	0.7	0.7	6.4
Mara	2.3	1.1	0.6	1.3	0.9	10.0
Manyara	0.8	1.1	0.0	0.3	0.5	4.2
Livelihood						
Small food/ cash crop farmers	1.9	1.1	0.7	0.6	1.2	7.7
Small subsistence farmers	1.8	1.1	1.1	0.8	1.8	9.4
Big food/ cash crop farmers	2.7	1.3	1.1	1.0	1.4	10.7
Big subsistence farmers	1.9	1.2	1.1	0.7	1.2	8.6
Small business	2.0	0.9	1.3	1.1	2.1	10.5
Commerce	1.8	0.7	1.6	1.4	1.9	10.8
Daily workers	2.0	0.8	1.2	0.8	2.9	10.1
Agro-pastoralists	2.2	0.8	1.2	1.1	2.0	10.2
Fisherfolk/hunters	1.5	1.3	1.2	1.5	1.9	11.7
Aid	1.4	3.0	1.1	0.7	2.7	13.3
Others	1.8	1.2	1.3	0.9	2.1	10.4
Salaried	1.0	0.4	1.1	0.2	1.3	5.0
Wealth Quintile						
Poorest	2.0	1.3	1.4	0.9	2.4	11.0
Poorer	1.9	1.0	1.2	0.9	1.9	9.9
Moderate	1.7	1.0	0.8	0.8	1.5	8.4
Richer	2.1	0.9	1.1	1.1	1.7	10.0
Richest	1.4	0.8	0.8	0.7	1.3	7.2
Food consumption group						
Poor	1.8	1.3	1.4	1.0	1.9	10.9
Borderline	2.1	1.1	1.5	1.1	2.4	11.3
Acceptable	1.8	1.0	1.0	0.8	1.7	9.0
Rural Mainland Tanzania	1.9	1.1	1.2	0.9	1.9	9.8

Source: 2009/2010 CFSVA

In addition to the reduced coping strategy index, the CFSVA assessed how households respond to the main shocks: lack of/late rainfall, high food prices and plant disease or animal pests. With regard to lack of/late rainfall, households most commonly reported spending savings (16%) or relying on less preferred food (13.6%). As shown in Table 23, the types of strategies differed depending on wealth. Households in the poorest wealth quintile first relied on less preferred food (17.5%), then worked for food only (13.2%) and only then reduced the number of meals a day (11.8%). By contrast, households in the wealthiest quintile first spent savings (27.5%) and then sold animals (13.0%) before choosing coping mechanisms that directly impacted food consumption. This same pattern was observed between high and low food consumption groups.

Table 23: Coping mechanisms in response to lack of rainfall / drought

	Rely on less preferred food	Borrow food/get help from relatives	Reduce size of meals for all	Reduce number of meals a day	Spend savings	Sell small animals	Sell big animals	Work for food only	Extend working hours	Sell/rent land	Purchase food on credit/ borrow money	Reduce size of meals for adults	Skip meals for whole days	Sell HH assets/land	Sell HH agric assets	Consume seed stock
Wealth Quintiles.																
Poorest	17.5	6.4	5.5	11.8	9.0	8.8	5.2	13.2	6.2	1.9	2.4	2.3	4.4	2.0	0.4	3.0
Poorer	18.0	4.4	6.1	11.1	10.1	9.3	3.2	13.1	6.8	1.2	4.8	2.6	1.9	3.2	0.9	3.3
Moderate	9.0	4.3	7.3	12.6	17.2	9.9	3.5	11.2	9.0	2.4	6.1	2.0	1.7	1.5	0.0	2.4
Richer	12.4	5.9	4.6	7.6	19.0	12.1	6.3	9.2	7.7	2.2	5.8	0.8	0.6	3.7	1.2	1.2
Richest	9.8	4.1	3.7	5.0	27.5	13.0	8.6	7.9	7.0	1.4	7.9	0.6	1.2	1.6	0.0	0.9
FCGs																
Poor	21.1	5.2	5.0	15.6	4.7	6.1	6.4	14.1	4.6	1.5	3.7	2.3	5.1	1.1	0.0	3.7
Borderline	14.6	5.8	6.1	10.3	12.8	9.4	3.2	11.5	6.8	3.0	4.1	2.0	2.8	3.8	0.6	3.1
Acceptable	12.6	4.9	5.3	9.2	18.1	11.2	5.7	10.9	7.5	1.6	5.7	1.6	1.5	1.9	0.5	1.9
Rural Mainland Tz	13.6	5.1	5.5	9.9	16.0	10.4	5.2	11.2	7.1	1.9	5.2	1.7	2.0	2.3	0.5	2.3

Source: 2009/2010 CFSVA

Table 24: Coping mechanisms in response to high food prices

	Rely on less preferred food	Borrow food/get help from relatives	Reduce size of meals for all	Reduce number of meals a day	Spend savings	Sell small animals	Sell big animals	Work for food only	Extend working hours	Sell/rent land	Purchase food on credit/borrow money	Reduce size of meals for adults	Skip meals for whole days	Sell HH assets/land	Sell HH agric assets	Consume seed stock
Wealth Quint.																
Poorest	18.0	3.1	4.4	17.9	12.5	7.5	1.1	12.3	8.4	1.0	3.5	3.8	2.0	1.2	0.0	3.2
Poorer	15.2	1.1	8.1	15.3	12.0	11.0	1.2	13.3	9.5	0.6	4.6	3.7	3.1	0.0	0.6	0.5
Moderate	14.3	3.4	5.2	10.4	19.8	7.9	2.1	12.0	5.4	2.4	6.2	1.5	5.4	1.8	0.8	1.4
Richer	15.4	7.1	4.7	6.7	20.7	10.8	1.0	14.0	7.5	1.4	5.2	1.0	0.6	1.7	1.5	0.7
Richest	9.4	4.5	6.8	5.6	28.6	9.7	2.2	6.7	10.6	1.3	8.0	3.3	0.3	2.1	0.0	0.9
Food Cons. Group																
Poor	20.1	7.2	0.0	27.5	17.9	4.6	5.7	8.3	5.4	0.0	0.0	3.3	0.0	0.0	0.0	0.0
Borderline	10.7	2.8	6.3	13.9	17.5	7.6	1.4	14.9	8.6	0.9	3.6	2.5	3.5	1.6	0.0	4.4
Acceptable	15.3	4.0	5.9	10.1	18.7	10.2	1.4	10.7	8.4	1.5	6.1	2.8	2.2	1.3	0.7	0.7
Rural Mainland Tz	14.5	3.8	5.8	11.4	18.4	9.5	1.5	11.5	8.3	1.3	5.4	2.8	2.4	1.4	0.6	1.5

Source: 2009/2010 CFSVA

Table 25: Coping mechanisms in response to plant disease and pests

	Rely on less preferred food	Borrow food/get help from relatives	Reduce proportion of meals for all	Reduce number of meals a day	Spend savings	Sell small animals	Sell big animals	Work for food only	Extend working hours	Sell/rent land	Purchase food on credit/borrow money	Reduce proportion of meals for adults	Skip days without eating	Sell HH assets/ land	Sell HH agric assets	Consume seed stock
Wealth Quin.																
Poorest	22.9	2.3	4.8	12.8	8.7	5.3	0.0	12.5	12.6	2.0	5.1	1.5	5.5	0.0	0.0	4.1
Poorer	19.2	3.8	5.3	12.8	13.5	8.3	2.0	8.8	12.1	0.0	4.6	2.7	1.6	0.9	0.5	3.9
Moderate	10.2	4.1	5.4	10.1	20.1	5.2	2.8	16.4	11.8	1.4	3.2	2.0	1.5	3.2	2.5	0.0
Richer	15.4	0.5	7.2	1.1	32.3	5.0	4.6	8.1	13.2	0.6	5.1	1.4	1.6	0.4	2.5	0.9
Richest	5.7	0.8	0.8	1.2	39.9	5.5	5.3	13.4	8.6	3.0	8.6	0.9	0.0	2.6	2.2	1.4
Food cons. group																
Poor	20.5	0.0	8.6	24.0	5.5	3.6	2.7	8.3	7.1	0.0	6.3	0.0	3.4	3.5	0.0	6.5
Borderline	17.0	3.3	5.8	10.0	14.5	6.4	1.3	7.9	14.0	0.8	5.1	3.8	6.4	0.9	0.5	2.2
Acceptable	14.4	2.4	4.5	7.0	24.2	5.8	3.1	13.1	11.9	1.4	4.9	1.4	1.2	1.3	1.7	1.7
Rural Mainland Tz	15.1	2.4	4.9	8.4	21.6	5.8	2.7	11.9	12.1	1.3	5.0	1.7	2.2	1.4	1.4	2.0

Source: 2009/2010 CFSVA

Looking at the response to high food prices or to plant diseases/animal pests, the coping mechanisms most commonly employed were again to spend savings (18.4% and 21.6% respectively) and rely on less preferred food (14.5% and 15.1% respectively). As seen with drought, poorer, low food consumption households tended to first adopt coping strategies that directly impact the food eaten (relying on less preferred food, reducing the number of meals per day, etc.) whereas richer, higher food consumption households utilized their greater asset base (in this case, by spending savings) to make up for shortfalls. Tables 24 and 25 detail these findings.

Assistance

Food assistance

Nationally, 23.0 percent of the sampled households reported receiving some sort of food assistance in the 12 months preceding the survey; those receiving assistance were clustered in specific regions including Arusha (79.4%), Kilimanjaro (72.2%), Dodoma (66.6%), Lindi (55.9%) and Manyara (49.7%). Fewer than 20 percent of households in any other region reporting receiving assistance.

Examining food assistance by livelihood profiles, significant differences emerged. The livelihood profile receiving the most food assistance were of course households reliant on aid (57.6%) while daily workers and agro-pastoralists had the next highest proportion (at 30 and 31% respectively). Households reliant on small business reported the lowest proportion of households receiving food assistance (14%).

Looking at food assistance by wealth quintile, there is a clear relationship between declines in wealth and increases in the proportion of households receiving food assistance. It is notable, however, that 18 percent of households in the richest wealth quintile currently report receiving food assistance, most of which comes from generalized food distribution. This would suggest that food aid programming is not adequately targeted the most vulnerable. This same pattern is seen amongst food consumption groups.

Households were asked to specify the main type of programme giving them food assistance. Almost three-quarters (71.9%) reported receiving it through food distributions. Only 3.5 percent received food from school feeding programmes while 2 percent received assistance through food for pregnancy or food for work programmes. A total of 6 percent of households received assistance through food for training programmes.

A look by region revealed clusters of certain programmes. School feeding programmes appeared to be important in Ruvuma and Singida while food for pregnancy programmes were centred in Dar es Salaam. Food for work programmes were prevalent in Ruvuma, Rukwa and Kagera.

Non Food assistance

The CFSVA also asked whether households had received non-food assistance in the 12 months preceding the survey. On average, 18.3 percent of households had. The regions with the highest proportions included Rukwa (62.7%), Mara (54.0%) and Tanga (43.0%). Of those reporting assistance, the most common type was receipt of "other" assistance. Unfortunately, "other" in the context of this question was not defined. The next most common form of assistance was for medical services (at 20%). The relationship between non food assistance and wealth or food consumption group was either non existent or counterintuitive.

Rural Zanzibar 2009/2010 CFSVA Results

Household food security depends on whether a household can meet a basic set of needs that ensure safety, good health, and adequate nutrition (sufficient and nutritious food, clean water and safe sanitation, health care, and access to economic and educational opportunities). Certain assets enjoyed by the household help determine whether it can meet these basic needs. These include: 1) human and social capital; 2) natural capital; 3) physical capital; and 4) economic capital. The CFSVA aims to measure the availability of these capital assets to households in order to understand both the advantages and constraints they experience, helping to identify vulnerability to food security. The following sections detail the findings for rural Zanzibar.

Human and Social Capital

Human and social capital refers to the demographic characteristics (household size, composition, life expectancy, fertility rate, etc.), as well as the educational level and health status of households. Demographics as well as education help determine the economic opportunities available to a household, its position within the community and its overall well-being in terms of health and food security.

Demographics

The 2002 census in Tanzania estimated the population of Zanzibar to be one million people.[57] With an estimated growth rate of 3.1 percent, the current population is believed to be close to 1.3 million, with a population density of 400 inhabitants per square kilometre. Zanzibar spans almost 2,500 km^2, and population density varies significantly across the five administrative regions of Zanzibar. West Urban has the highest population density (1,700 per km^2), whilst rural regions of North and South Unguja have the lowest (291 per km^2 and 111 per km^2 respectively).[58]

CFSVA data indicate that rural Zanzibar, like rural Mainland Tanzania, has a young population (see Table 26): around 16 percent of the population is under 5 years of age and 43 percent is under 15. Half of the population are working age adults (15-59 years of age) and just over 7 percent are elderly. This population distribution is consistent with that observed in the 2004/2005 TDHS.[59] Patterns remain largely consistent across districts, except in Micheweni and Mkoani which have slightly younger populations (with only 45% between the ages of 15 and 59).

Table 26: Age distribution of household members

	0-2 years	3-5 years	6-14 years	15-59 years	60+ years
Male (49.8% of total)	6.8	7.8	25.5	48.2	7.7
Female (50.2% of total)	6.1	7.6	23.6	55.4	6.3
Rural Zanzibar	7.4	8.7	26.4	50.2	7.3

Source: 2009/2010 CFSVA

The percentage of dependents to total household members (i.e. the dependency rate) averaged 49.8 percent, but about 15 percent of households reported dependency rates as high as 70 percent. There was little variation in mean dependency rates per district, with rates ranging from 47 percent in North A to 54 percent in Micheweni and Mkoani. With more dependents than wage earners, households have less labour power and production potential, leaving them less able to cope with illness or disability and less able to help take care of others in emergencies. This weakens social safety nets.

Across the whole of rural Zanzibar, 3.0 percent of households reported an adult death in the preceding six months and 5.2 percent of households reported a disabled or chronically ill adult. As HIV/AIDS is much less common in Zanzibar than in Mainland Tanzania[60], most morbidity and

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[57] National Bureau of Statistics (NBS), Ministry of Planning, Economy and Empowerment (MPEE). United Republic of Tanzania 2002 Census. Volume X. Dar es Salaam, 2006.
[58] National Bureau of Statistics (NBS), Ministry of Planning, Economy and Empowerment (MPEE). United Republic of Tanzania 2002 Census. Volume X. Dar es Salaam, 2006.
[59] National Bureau of Statistics (NBS) [Tanzania] and ORC Macro. 2005. *Tanzania Demographic and Health Survey 2004-05.* Dar es Salaam, Tanzania: National Bureau of Statistics and ORC Macro.
[60] Tanzania Commission for AIDS (TACAIDS), Zanzibar AIDS Commission (ZAC), National Bureau of Statistics (NBS), Office of the Chief Government Statistician (OCGS), and Macro International Inc. 2008. *Tanzania HIV/AIDS and Malaria Indicator Survey 2007-08.* Dar es Salaam, Tanzania: TACAIDS, ZAC, NBS, OCGS, and Macro International Inc.

mortality can be blamed on malaria, which is still the leading cause of illness and death in Zanzibar.
The percentage of households experiencing deaths or caring for chronically ill/disabled adults varies substantially by island and district. Adult deaths and chronic illness were almost twice as common in Pemba than in Unguja. Specifically, households in Micheweni and Mkoani reported the highest percentage of chronically ill adults with 8.6 percent and 8.4 percent of households reporting caring for someone. Likewise, the highest percentage of adult deaths was in Mkoani (5.8%). By contrast, the Unguja districts of Central and South report the lowest rates of chronic illness (at 2.4 and 2.0%) and the districts of North A and Central report the lowest rate of adult deaths (at 1.0 and 1.4%).

Overall, 10.1 percent of households in rural Zanzibar care for orphans. Orphans were most frequently reported in the Unguja district of West (14.1%) and least in the Unguja district of North A (7.3%). Caring for orphans did not vary much by island, with 10.6 percent of households in Pemba reporting an orphan versus 9.8 percent of households in Unguja. However, the percentage of households looking after paternal orphans (7.0%) was triple that of maternal ones (2.3%). Only 0.8 percent of households cared for children who had lost both parents. This pattern was largely consistent across districts.

Table 27: General characteristics of districts in Zanzibar

Districts	Pop. density (*)	Num of HH members (average)	Dependency rate	% of Women HHH	% of HHs with chronically ill/ disabled	% of HHs with orphans
Unguja	**	**5.5**	**47.5**	**18.1**	**4.0**	**9.8**
North A	291	5.6	47.3	16.4	4.8	7.3
North B		5.5	47.7	19.5	4.4	8.3
Central	111	5.5	49.6	22.8	2.4	8.7
South		5.2	49.0	18.6	2.0	10.3
West	1700	5.6	42.9	13.6	6.5	14.1
Pemba	**	**6.0**	**52.8**	**16.1**	**6.9**	**10.6**
Wete	324	6.1	52.2	15.3	5.4	10.4
Micheweni		6.2	54.3	14.8	8.6	10.1
Chake Chake	531	5.7	49.9	18.4	5.3	9.3
Mkoani		6.1	54.2	15.7	8.4	12.8

(*)Source: National Bureau of Statistics (NBS), Ministry of Planning, Economy and Empowerment (MPEE). United Republic of Tanzania 2002 Census. Volume X. Dar es Salaam, 2006.
Note: Population density is only provided on for aggregate areas North Unguja (North A and North B districts), South Unguja (Central and South districts), North Pemba (Wete and Micheweni districts) and South Pemba (Chake Chake and Mkoani districts).

While somewhat lower than Mainland Tanzania, rural Zanzibar has a relatively high percentage of households headed by women (17.3%). The CFSVA found that there are slightly more women heading households in Unguja than in Pemba (18.1% vs 16.1%), with Unguja's Central district reporting the highest percentage at 22.8 percent and Unguja´s West district reporting the lowest (13.6%). Within Pemba itself, the percentage of households headed by women ranges from 14.8 percent in Micheweni to 18.4 percent in Chake Chake.

Examining marital status of household heads, over three-fourths (82.9%) of households are headed by couples, either married (82.6%) or in a partnership (0.3%). The majority of remaining households are either divorced (7.5%) or headed by a widow(er) (8.6%). Only 0.4 percent of household heads said they had never been married.

Marital status of household head varied in certain cases across strata. Generally, marriage was slightly less common in Unguja than in Pemba, with the Unguja districts of Central and North B reporting the lowest levels of married household heads at 74.3 percent and 77.6 percent respectively. Central and North B also reported higher than average divorce rates (13.1 and 9.3% respectively) and more widowed household heads (both reporting 10.2%). In the Pemba district of Micheweni, by contrast, almost 89 percent of household heads were married while only 2.9 percent were divorced. Proportions of widows in Micheweni were in line with national averages.

Overall, the mean age of household head was 47.5. This varied only slightly across districts, with Mkoani reporting the highest mean at 50. West district reported the lowest mean age at 43.3.

Education

The RGoZ has always considered education a fundamental developmental objective. In 1964, the RGoZ provided free and compulsory primary education to all children, which quickly increased enrolment rates across the islands. Subsequently, the RGoZ has continued to make education a key component of the economic development and poverty reduction strategies laid out in MKUZA. In line with the Zanzibar Development Vision 2020 and the Zanzibar Education Master Plan (from 1996-2006), the Education Policy of 2006 (EP06) seeks to increase access to and use of education, thereby ensuring that the human capacity exists to power the nation's development moving forward. The specific objectives of the EP06 are to i) expand access to pre, primary and secondary school and ii) to improve the quality and effectiveness of the education system. In practice, this policy has extended basic education to include two years of preschool, six years of primary school and four years of secondary education.

A situational analysis conducted in 2006 revealed that, despite previous emphasis on education, there is still a long way to go to achieve the intended objectives. According to the 2007 situational analysis, the net enrolment rate for primary school age children in Zanzibar was close to 75.7 percent, with rates in Pemba slightly lower than rates in Unguja. Looked at by district, Micheweni reported the lowest enrolment rates (59.5%) and Unguja's South district reported the highest (90.1%).[61]

CFSVA findings from 2009/2010 show similar patterns: enrolment rates in Pemba were approximately 16 percentage points lower than in Unguja (64 vs 80.4%). Looked at by district, enrolment rates in Pemba ranged from 60 percent to 67 percent, with Mkoani, Chake Chake and Micheweni reporting the lowest. Rates in Unguja were significantly higher, ranging from 77 percent to 86 percent (see Figure 53). As in 2007, Unguja's South district had the highest enrolment rates at 86 percent. Overall enrolment in Zanzibar is slightly lower now (73.3%) than the rates reported in 2007; however this slight decrease should be interpreted carefully as the age ranges of comparisons differed between years.[62] The 2007 situational analysis reported net enrolment of 7-13 years old children and the 2009 CFSVA of 7-14 years old children. It is therefore possible that the differences observed are driven by higher drop-out rates among 14 year-old children. Finally, it is notable that enrolment did not differ significantly between boys or girls in either the 2009/2010 CFSVA or the 2007 Education Situation Analysis.
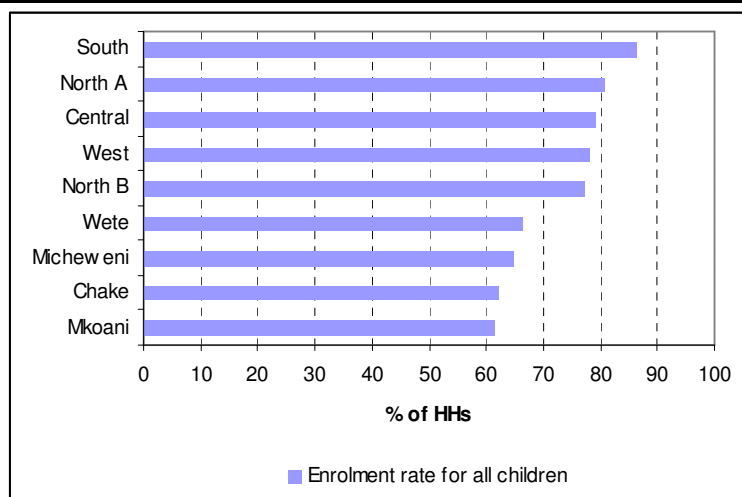
Fig 53: Net enrolment rate by district in Zanzibar
(Source: 2009/2010 CFSVA)

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[61] Ministry of Education and Vocational Training and Zanzibar Education Development Consortium (ZEDCO), 2007. *Education Situation Analysis 2007: Volume I Main Text*.
[62] The 2007 Education Situation Analysis reported net enrolment rates for children 7-13 years of age while the 2009/2010 CFSVA reported enrolment rates for children 7-14 years of age. Given the way the data was collected in 2009/2010, it was not possible to adjust it to make it comparable to the 2007 Education Situation Analysis findings.

To understand why children missed school, the CFSVA collected information on school absenteeism. The findings revealed that only 4.5 percent of children had missed a week of school in the past 6 months. Those who had often cited refusal to go, sickness and costs as the main reasons. In particular, 42 percent of boys and 12.4 percent of girls reported refusing to go to school while 24.9 percent of boys and 12.8 percent of girls said sickness was the main reason. School expenses, on the other hand, were cited by 9.7 percent of boys and 6.0 percent of girls. Geographically, Unguja and Pemba showed similar rates of absenteeism (4.3% vs 4.7%) and there was little variation by district with only North A, Central and Micheweni reporting slightly lower absenteeism rates compared to the national averages.

The 2009/2010 CFSVA collected additional information on education, including literacy rates and the educational attainment of household heads and their spouses. As Table 28 indicates, approximately 62 percent of household heads were found to be literate[63], with more literate household heads in Unguja than in Pemba (69.1% versus 51.8%). Examined by district, Micheweni in Pemba reported the lowest literacy rates; only 39.2 percent of household heads there were able to read or write a simple sentence. By contrast, 84.4 percent of household heads were literate in Unguja's West district.

Patterns in household head education levels largely mirrored literacy rates. Overall, 37.8 percent of household heads reported no education while 50.1 percent said they had completed primary or were attending further school. Again, education levels were generally higher in Unguja than in Pemba, with 30.7 percent of household heads having no education in Unguja versus 47.9 percent in Pemba. Likewise, close to 55 percent of household heads in Unguja have completed primary or attended higher levels of school while only 43.6 percent in Pemba have done so. Similar patterns were observed for the spouses' education, though notably the disparity between Pemba and Unguja was even greater (because in Pemba, spouses are much less educated than household heads).

Examined by district, Unguja's South and West districts reported the highest levels of education among both household heads and their spouses; in both districts fewer than 20 percent reported having no education. By contrast, Micheweni district in Pemba had the highest percentage of household heads and spouses without any education (at 60.8% and 71.9% respectively).

Table 28: Education levels of household head and spouse of household head by district

	% Literate HH head[*]	education level of HH head			education level of spouse of HH head		
		None	**Some primary**	**Completed primary or higher**	**None**	**Some primary**	**Completed primary or higher**
Unguja	**69.1**	**30.7**	**14.5**	**54.7**	**32.3**	**11.7**	**56.0**
North A	49.3	49.8	11.6	38.6	57.6	9.0	33.3
North B	58.5	42.0	17.1	41.0	44.0	10.1	45.9
Central	70.4	29.6	12.1	58.3	30.3	14.2	55.5
South	80.9	18.6	15.2	66.2	12.1	10.9	77.0
West	84.4	15.6	16.1	68.3	19.5	14.4	66.1
Pemba	**51.8**	**47.9**	**8.6**	**43.6**	**57.0**	**8.8**	**34.2**
Wete	56.9	42.6	9.9	47.5	50.0	15.7	34.3
Micheweni	39.2	60.8	6.7	32.5	71.9	3.8	24.3
Chake Chake	58.0	41.5	10.1	48.3	48.6	8.7	42.8
Mkoani	52.9	46.6	7.3	46.1	57.0	7.0	36.1
Rural Zanzibar	**61.9**	**37.8**	**12.0**	**50.1**	**42.8**	**10.5**	**46.7**

*Note: Literacy is defined by the ability of the household head to read/ write a simple sentence in any language.
Source: 2009/2010 CFSVA

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[63] Literacy is defined as the "household head being able to read or write a simple message in any language".

Health

Historically Zanzibar has suffered from high levels of infectious and vector-borne disease. By recognizing health as a key developmental outcome in the National Strategy for Growth and Poverty Reduction (MKUZA), however, RGoZ is beginning to make significant inroads in lowering morbidity and mortality burdens. Particularly effective has been the implementation of the Zanzibar Malaria Control programme, which has lowered parasitic burdens from historic levels of 70 percent to current levels of approximately 1 percent.[64] Illustrating improvements in infectious disease and malaria control, Zanzibar has also seen significant declines in infant and particularly post neonatal mortality rates. As Figure 54 indicates, post neonatal mortality rates have declined by over 15 percent, from 40.7/1000 per year in 1995 to 33/1000 in 2004/2005.[65-66] At the same time, Zanzibar has observed increases in the life expectancy of its population from 47 in 1988 to 57 in 2002.
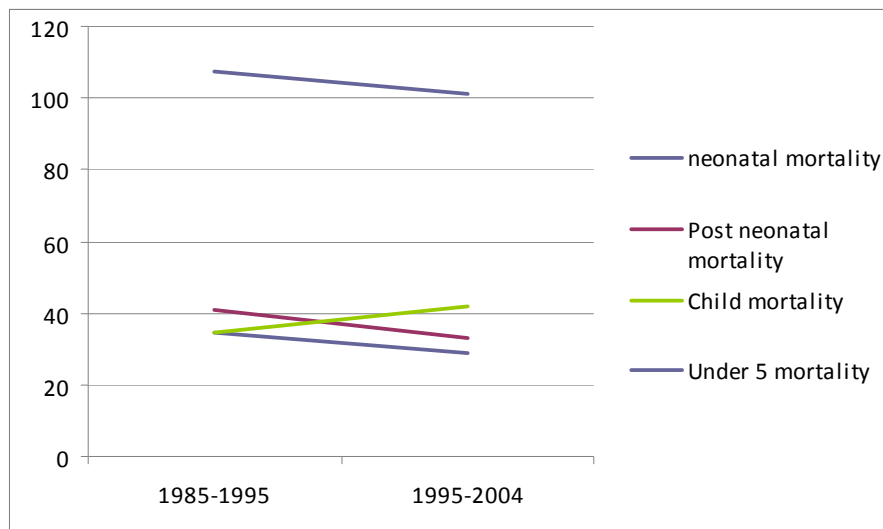
Fig 54: Trends in child mortality
(Source: DHS data, 1990-2004/2005)

Improvements in morbidity and mortality indicators can also be related to the improved access to health facilities and health services. Specifically, since the MKUZA, six primary health care units have been reconstructed and an additional 52 have been rehabilitated, thus ensuring health facilities are available for the population.[67] Simultaneous to this, improvements have been made in the quality of health services delivered by these facilities, as there are now better types of drugs and better diagnostic equipment available. In fact, as a direct result of these improvements, an additional four primary health centres have now been equipped with x-ray services.[68]

As availability of services has increased, the population, at least in certain cases, appears to be accessing services more frequently. Evidence of this is seen when looking at the use of certain maternal and child health care services. The percentage of births attended to by trained medical personal has increased significantly from 37 percent in 1996 to 51 percent in 2004/2005.[69] Also, children are increasingly more likely to receive certain vaccinations, such as DPT-HB$_3$.[70] Alongside this focus on better access and use of quality health services, health officials have also begun building and implementing more robust health management information systems which are

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[64] Zanzibar Malaria Control Program (ZMCP). Malaria Elimination in Zanzibar: A feasibility study. October 2009.
[65] Bureau of Statistics [Tanzania] and Macro International Inc. 1997. *Tanzania Demographic and Health Survey 1996.* Calverton, Maryland: Bureau of Statistics and Macro International.
[66] National Bureau of Statistics (NBS) [Tanzania] and ORC Macro. 2005. *Tanzania Demographic and Health Survey 2004-05.* Dar es Salaam, Tanzania: National Bureau of Statistics and ORC Macro.
[67] Revolutionary Government of Zanzibar (RGoZ). Zanzibar Strategy for Growth and Poverty Reduction (ZSGRP). January 2007.
[68] Revolutionary Government of Zanzibar (RGoZ). Zanzibar Strategy for Growth and Poverty Reduction (ZSGRP). January 2007.
[69] Revolutionary Government of Zanzibar (RGoZ). Zanzibar Strategy for Growth and Poverty Reduction (ZSGRP). January 2007.
[70] Revolutionary Government of Zanzibar (RGoZ). Zanzibar Strategy for Growth and Poverty Reduction (ZSGRP). January 2007.

enabling officials to monitor more closely the incidence of typical infectious diseases, thus providing early warnings and helping to combat outbreaks.[71]

While the focus on health has undoubtedly resulted in improvements in health services and in health status of the population, much work remains to be done. Despite achievements in safe births and child health, maternal mortality rates have remained elevated over the last decade and child mortality rates[72] (see Figure 54) have actually increased slightly from 34.8/1000 in 1996 to 42/1000 in 2004/2005.[73-74] There is therefore a need to continue progress on ensuring safe deliveries and to maintain focus on combating childhood infectious and vector-borne disease. This means that current efforts to combat malaria, which is still the largest contributor to both morbidity and mortality in Zanzibar, need to be continued with equal vigour. The Zanzibar Malaria Strategic Plan (2007-2012) is a good step in this direction with its plans to[75]:

- maintain coverage of ITNs/LLINs at or above 80 percent for pregnant women and children under 5;
- ensure prompt access to parasitological diagnosis;
- maintain coverage of IPTP at or above 80 percent;
- maintain prompt and proper reporting of cases and investigations of outbreaks; and
- assess the possibility of sustainable elimination of malaria.

Secondly, child malnutrition levels, despite improvements, remain unacceptably high. The 2004/2005 DHS survey indicated that almost one-quarter of children under 5 in Zanzibar were stunted and 6 percent of children were wasted. Persistent malnutrition in the form of stunting is associated with long term health and developmental consequences, while acute malnutrition is strongly associated with morbidity and mortality. In fact, moderately high wasting levels and its synergy with disease may help explain why the mortality rates of children 1-5 years of age have not declined since the mid 1990s (but rather have slightly increased). It is also notable that malnutrition rates were significantly higher in Pemba than Unguja (32.1 percent vs 18.0 percent).

Finally, the RGoZ has signaled a need to prepare for emerging epidemics or problems, citing AIDS and tuberculosis which are both on the rise. The MKUZA indicates that strategic plans should be strengthened and the necessary resources set aside to cope effectively with these diseases. It is noteworthy however, that HIV/AIDS prevalence remains significantly lower in Zanzibar than in the Mainland, with the recent surveys indicating a prevalence of only 0.7 percent.[76]

Population Growth and Migration

Rapid population growth and migration are issues of increasing importance and concern in Zanzibar. Sources indicate that migration is a common livelihood strategy, with migrants largely moving from Pemba to Unguja to access work opportunities. These migrations are usually either urban to urban (from a town in Pemba to a town in Unguja) or rural to rural (from Pemba's rural communities to the rich farming areas of Unguja). This flow of people from Pemba to Unguja, alongside the increasing number of tourism-related migrants from the mainland[77], have resulted in population growth rates in certain areas of Zanzibar that are higher than growth rates observed in other parts of Tanzania. In fact, certain urban areas of Unguja are reportedly growing at a rate of 4.66 percent a year.[78] As such, concerns have arisen as to whether this rate of growth is sustainable and whether it will, over time, serve as an obstacle to the achievement of the government's developmental objectives, particularly in relation to the Millennium Development Goals (MDGs).[79]

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[71] Lungo J, Sheikh Y, Igira F, Titlestad O, Mahundi M, Suleiman O, Bakar A and Braa J. (2007) Building Health Management Information System for Zanzibar: Opportunities and Challenges. Paper presented at HELINA 2007: e-health in Africa. (Bamako, Mali, 9th-10th January 2007).
[72] Child mortality rates refers to moratlity among children between the ages of 1 and 5.
[73] Bureau of Statistics [Tanzania] and Macro International Inc. 1997. *Tanzania Demographic and Health Survey 1996.* Calverton, Maryland: Bureau of Statistics and Macro International.
[74] National Bureau of Statistics (NBS) [Tanzania] and ORC Macro. 2005. *Tanzania Demographic and Health Survey 2004-05.* Dar es Salaam, Tanzania: National Bureau of Statistics and ORC Macro.
[75] Zanzibar Malaria Control Program (ZMCP). Malaria Elimination in Zanzibar: A feasibility study. October 2009.
[76] Tanzania Commission for AIDS (TACAIDS), Zanzibar AIDS Commission (ZAC), National Bureau of Statistics (NBS), Office of the Chief Government Statistician (OCGS), and Macro International Inc. 2008. *Tanzania HIV/AIDS and Malaria Indicator Survey 2007-08.* Dar es Salaam, Tanzania: TACAIDS, ZAC, NBS, OCGS, and Macro International Inc.
[77] Gossling S and Schulz U. (2005). Tourism-Related Migration in Zanzibar, Tanzania. Tourism Geographies. Volume 7, Issue 1, February 2005, pp. 43-62.
[78] Bakari MA. Democratisation Process in Zanzibar: A Retarded Transition. Institute of African Affairs, Hamburg African Studies, 2001.
[79] IRIN. High population growth threatens MDGs in Zanzibar. Humanitarian news and analysis. A project of the UN Office for the Coordination of Humanitarian Affairs. July 2007.

To assess the issue of migration, the CFSVA collected information on whether a household member had migrated to another part of Zanzibar or Mainland Tanzania in the three months preceding the survey. Overall, data from the CFSVA tend to support the migratory patterns discussed above. On average, 6 percent of households in Zanzibar reported a member migrating; however, households in Pemba were more than twice as likely to report a migrant than households in Unguja. Almost 50 percent of migrants said they had left the household to explore work opportunities in other areas; 93 percent reported leaving their home district and 55 percent migrating to an urban area outside their home district.

Physical Capital

Physical capital refers to housing structures and facilities, quality of water and sanitation and asset ownership. Housing structures and facilities examine the quality of dwelling units and of lighting and cooking fuel sources. Water and sanitation includes primary and secondary sources of drinking water and the quality of toilet facilities. Asset ownership encompasses productive assets such as hoes and axes, and non-productive assets, like table, chairs and mobile phones. Durable and stable physical capital is important as these assets can boost a household's coping capacity, making it more likely to withstand external shocks.

Housing Amenities

Infrastructure, Housing Materials and Cooking and Energy Sources

Crowding index (the number of people sleeping per room) is an important indicator of vulnerability because a high ratio of household members to household sleeping rooms is often an important predictor of poor hygiene, disease and generalized poverty. Households in rural areas of Zanzibar had an average of 5.7 members and reported a mean crowding index of 2.0. In both Unguja and Pemba, almost 16 percent of households reported three or more people sleeping per room, which is worrying as anything over 2 persons per sleeping room places children's health and school performance at risk.[80] Even so, households and districts with a very low crowding index should not necessarily be considered as better off, because these households may actually be households headed by the elderly or by widows, which are intrinsically more vulnerable to health problems and income shocks.

When examined by island and district, the crowding index varied only slightly. On average, Pemba had a slightly lower crowding index than Unguja, but differences were not significant. The highest crowding index was observed in Unguja's West district (2.10) while the lowest was in Pemba's Chake Chake (1.81).

The CFSVA found that housing structures were made from a mix of permanent and temporary materials. Overall, 64.2 percent of roofs were constructed of galvanized iron while the remainder were in plastic. Half of the houses had concrete floors and half had mud floors. Examined by island, housing materials in Pemba were more likely to be temporary. For instance, in Pemba 67 percent of floors were made of mud compared to only 39 percent in Unguja. Likewise, 44 percent of roofs were constructed of plastic in Pemba versus only 31 percent in Unguja. Looked at by district, there were significant variations but, generally speaking, households in South and West districts in Unguja were the most likely to have permanent housing structures while households in Pemba's Micheweni district were significantly less likely.

The vast majority of households used kerosene lamps as their primary lighting source (83.2%), and only 16.6 percent reported access to electricity. The use of kerosene was more common in Pemba (91%) than in Unguja (78%), while use of electricity was twice as common in Unguja than in Pemba. Examined by district, approximately one-third of households in South and West districts reported access to electricity, while only 3.9 percent of households in Micheweni had access. An analysis of cooking fuel revealed that almost all households (95.9%) reported using wood/charcoal for cooking while only 3 percent used kerosene. In this case, there was no significant variation by island and district.

Water and Sanitation

Ensuring access to improved water is one of the government's top priorities. Historically, demand for water amongst Zanzibar's inhabitants has not always been met, because of lack of resources and often contamination. As such, providing sufficient, good quality drinking water is one of the key objectives of the MKUZA. Multiple water projects have been implemented in recent years, including the digging of wells and the building of water storage tanks.[81] Thanks to these projects, access to proper drinking water sources has improved, with an estimated 89 percent of households having access to improved or "clean" water sources as of 2004/2005.

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80 The United Kingdom Office of the Deputy Prime Minister. "The Impact of Overcrowding on Health & Education: A Review of Evidence and Literature." Office of the Deputy Prime Minister Publications, 2004.
81 Revolutionary Government of Zanzibar (RGoZ). Zanzibar Strategy for Growth and Poverty Reduction (ZSGRP), January 2007.

To examine further progress on this front, the 2009/2010 CFSVA collected information on primary and secondary water sources and on whether households pay for water access. In general, data indicated continued improvements, with an estimated 93 percent of households having access to improved drinking water sources. These including 79.1 percent with access to a public tap/piped water, 2.2 percent with access to a borehole with pump, 11.3 percent with protected wells and 0.1 percent with rainwater. By contrast, only 7 percent of households do not have access to improved drinking water sources, with almost all of these households reliant on unprotected wells. Figure 55 details water access by district. As this figure shows, access to improved drinking water sources did not vary dramatically between districts, ranging from 88 percent in Mkoani to 98 percent in Wete and South districts.

The CFSVA also asked whether households had to pay for access to their drinking water source. Nationally, over one-fifth (20.2%) of households stated that they did. The mean fee was approximately 2,053 Tanzania shillings (TShs) per month. The proportion of households that paid for water was higher in Pemba than Unguja (42.3% vs 4.6%), with Wete (43.6%), Chake Chake (54.6%) and Mkoani (41.4%) districts most affected.

Over half of all households (55.3%) reported relying on an alternative water source at some point during the year, either in conjunction with main water sources (37.9%) or as a replacement when the main water source was not usable (17.7%). Interestingly, reliance on dual sources of water was far more common in Pemba (84.1%) than in Unguja (34.9%). Secondary water sources were also much less protected than main water sources, with 40.5 percent of households citing unprotected wells as their secondary water source compared to just 7 percent who reported it as their primary water source.

Improvements in access to proper sanitation services have been another key development objective in Zanzibar. Numerous sanitation projects have been carried out, including a revamping of the Stone Town's sewage system, the construction of 300 latrines in Jambiani and improvements in overall solid waste management.[82] Data from 2004/2005 indicated considerable improvement over the previous two decades in the number of households who had access to adequate sanitation, from 43.9 percent in 1991 to 67.9 percent in 2004/2005.[83-84] Notably, 2004/2005 data found that only 50 percent of rural households in Zanzibar had access to improved sanitation. Data from the 2009 CFSVA show considerable improvement from this level, with 65.6 percent of rural households now having access to improved sanitation. This includes 61.6 percent with access to traditional or ventilated pit latrines and 3.9 percent with flush toilets. Of the remaining 34.4 percent who did not have improved sanitation, 29.7 percent had no access to sanitation facilities at all and 4.7 percent used open pits. As Figure 55 shows, districts in Pemba had significantly less access to improved sanitation services than those in Unguja. In fact, on average, households in Unguja were almost twice as likely to have access to improved sanitation than households in Pemba. Notably, households in Micheweni district had the least access to improved sanitation facilities with over 75 percent relying on unimproved toilets, while the districts of South and West (in Unguja) had the best access, with 94.0 percent and 92.8 percent of households having access to improved sanitation respectively.

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[82] Revolutionary Government of Zanzibar (RGoZ). Zanzibar Strategy for Growth and Poverty Reduction (ZSGRP), January 2007.

[83] National Bureau of Statistics (NBS) [Tanzania] and ORC Macro. 2005. *Tanzania Demographic and Health Survey 2004-05.* Dar es Salaam, Tanzania: National Bureau of Statistics and ORC Macro.

[84] National Bureau of Statistics (NBS) [Tanzania] and ORC Macro. 1993. *Tanzania Demographic and Health Survey 1991/1992.* Dar es Salaam, Tanzania: National Bureau of Statistics and ORC Macro.
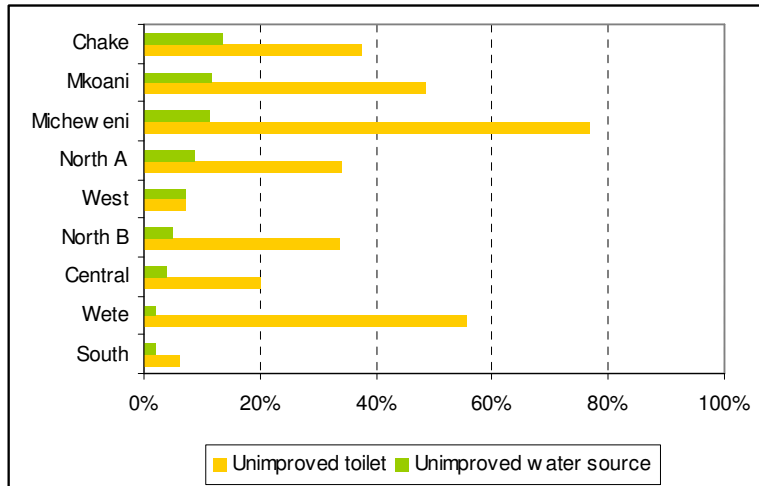
Fig 55: The percentage of households without access to improved drinking water or sanitation
(Source: 2009/2010 CFSVA)

Asset ownership and wealth index

To examine household wealth, the Zanzibar CFSVA asked households if they owned a series of 21 pre-determined productive and non productive assets. Responses to these questions were used with information on other physical capital items to compute a household wealth index. After careful screening, a Principal Component Analysis (PCA) was conducted using the following set of wealth-related variables[85]:

    Material of the roof and floor
    Type of toilet
    Ownership of mobile phone/landline
    Ownership of mattress
    Ownership of lantern
    Ownership of tape player/CD
    Ownerships of bicycle

After completing the PCA, the first factor was selected as the wealth index and to ease interpretation, wealth quintiles were computed into five categories, ranging from poorest to richest.

Geographic distribution of households in the poorest wealth quintile

An examination of the percentage of households in the poorest wealth quintile by island and district revealed some striking wealth differentials. As Figure 56 shows, Pemba had almost three times as many households in the poorest wealth quintile than Unguja. Overall, 29.5 percent of households in Pemba were in the poorest wealth quintile versus only 11.3 percent of households in Unguja. Examined by district, the poorest were clearly Micheweni and Wete districts, where 43.8 percent and 32.0 percent of households fell into the poorest wealth quintile. The wealthiest districts were South and West, where only 3.1 percent and 5.5 percent of household were in the poorest wealth quintile.

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[85] Productive assets were excluded from the Wealth Index computation because the ownership of these assets reflects the livelihood activities of households rather than wealth. The variables with a poor contribution (i.e. component loading) were excluded from the final PCA.
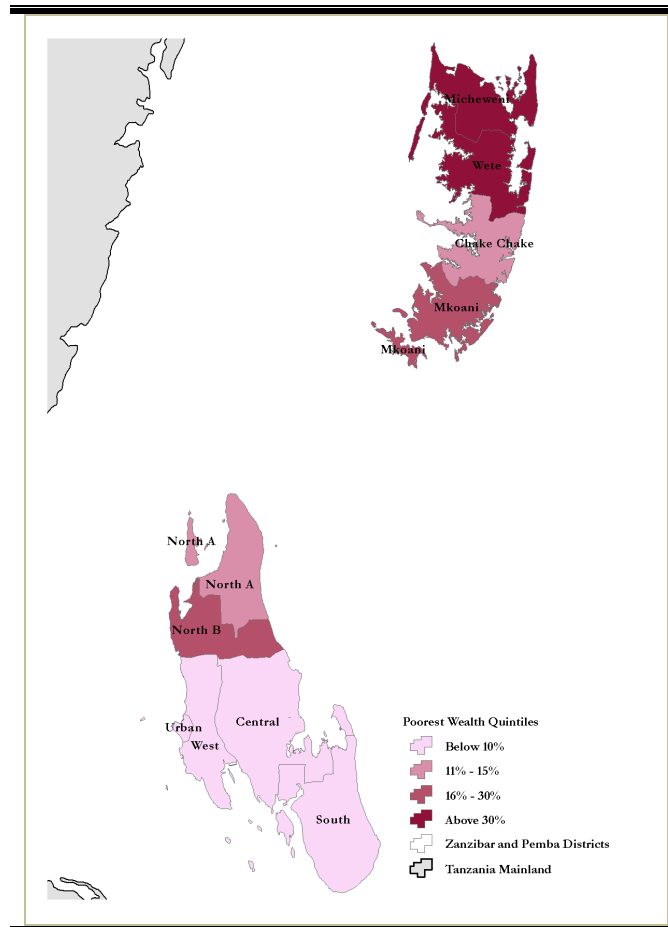
Fig 56: District level distribution of households in the poorest wealth quintile
(Source: 2009/2010 CFSVA)

Figure 57 below examines the associations between asset ownership and the wealth index for those variables included in the index. The proportion of households using good roofing and flooring materials increased across wealth quintiles. Similarly, asset ownership (for all assets) increased across wealth quintiles. Examined more closely, assets such as a tape or CD player were common only amongst the higher wealth quintiles, with fewer than 10 percent of households in the moderate, poorer and poorest wealth quintiles possessing these things. Lanterns, bikes, mattresses and phones (whether mobile or landline), on the other hand, were owned not just by wealthier households but also by a sizeable proportion of households in the poorest and poorer quintiles.

The CFSVA also assessed how well the wealth index correlated with key demographic and housing variables not included in the computation of the wealth index, such as access to good sources of drinking water, gender of household head, education level of household head, presence of orphan, and presence of disabled or chronically ill member. Results are shown in Figure 57. Overall, wealth was found to be significantly (p=0.05) associated with the proportion of: (1) households headed by women, (2) illiterate household heads and (3) households using poor sources of water. All these variables decreased as wealth increased.
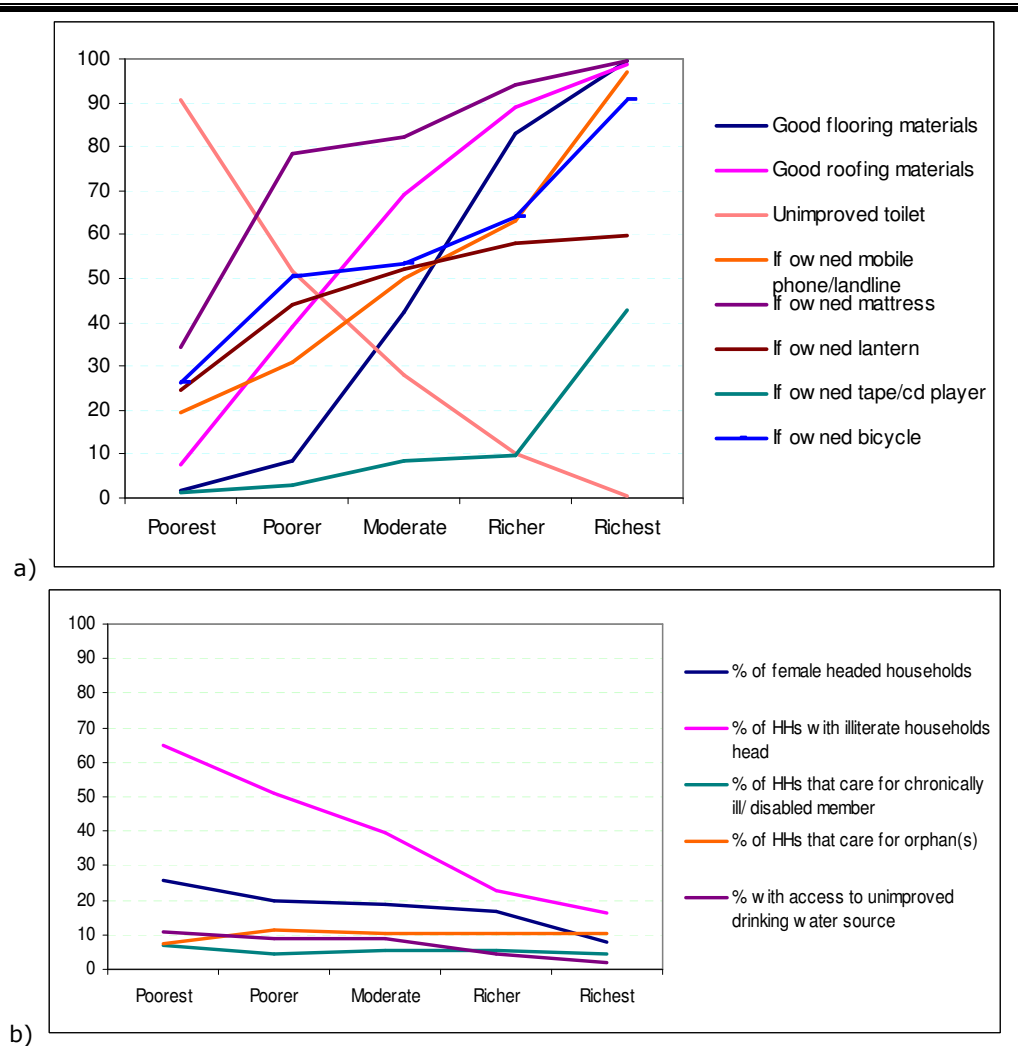
Fig 57: Association between wealth quintiles and indicators of wealth/vulnerability
a) Association between wealth quintiles and asset ownership (variables included in the wealth index); b) Association between wealth quintiles and key demographic and housing indicators (Source: 2009/2010 CFSVA)

Economic Capital and Livelihood Strategies

Economic capital refers to a household's livelihoods[86] and financial resources, including income, expenses, debts and access to credit.

Income and activities

Knowledge of livelihood strategies and of how households access income is crucial in determining the sustainability of household food security status. It also helps identify populations at risk when a shock occurs (i.e., severe droughts/floods, sharp increase in agricultural inputs, food prices). To capture this dynamic, the CFSVA asked households to detail up to four income-generating activities that contributed to the livelihoods of the household. For each activity, the household was then asked 1) how much of its outputs were directly consumed as food, 2) the total income derived from the activity and 3) the relative contribution of each activity to overall household livelihood.

On average, households in Zanzibar engaged in two livelihood activities, with 27.4 percent of households reporting one activity, 53.3 percent reporting two and 16.7 percent reporting three. Only about 3 percent reported four activities.

According to government estimates, agriculture accounts for 50 percent of GDP and employs upwards of 70 percent of the population.[87] As such, it is not surprising that agriculture was the most common activity with 80.1 percent of households reporting it as one of the four livelihood activities and 55.3 percent reporting it as their main activity.[88] Examined by island and district, agriculture was listed as a major activity by 70.8 percent of households in Unguja and 93.2 percent of households in Pemba. Mkoani and Wete reported the highest percentage of households involved in agriculture, with 97.4 and 92.6 percent reporting this activity as one of their main four. Agriculture was reported least often in West district. Here, barely half of all households (only 51.8%) reported conducting any agricultural activity.

The second most common activity was small business, which was reported by approximately one-quarter of households. The next most common activities were fishing (20.1%), livestock (14.5%) and finally civil service (10.9%). All other activities were reported as one of the main four livelihood activities less than 10 percent of the time. More details on the geographical distribution of livelihood activities will be reported under "livelihood strategy profiles" on page 115.

Seasonality and distribution of activities

In order to determine seasonal fluctuations in livelihood activities, the CFSVA also asked which months households participated in each activity. Figure 58 details the analysis for the main activities (agriculture, small business and fishing). It is important to note that due to difficulties in the data collection process, the seasonality data presented for small business and fishing was not of sufficient quality to draw concrete conclusions, which is why both patterns are de-emphasized in Figure 58.[89]

As the graph shows, there appear to be two high seasons for agricultural activities; this is to be expected given the bimodal rainfall distribution in Zanzibar. The first high season runs from October through November, peaking in November with about 65 percent of agriculturally active households at work. This roughly coincides with the end of land preparation and the beginning of the planting periods for the Vuli season. The next, even busier high season occurs between March and June, peaking in May with over 90 percent of agriculturally active households engaged at work. This coincides with the end of land preparation and the beginning of planting for the Masika season. Agricultural low seasons extend from December through February, and from July through August. February is actually the month when the fewest number of households are involved in agricultural activities. At this time, fewer than 20 percent of households (that reported agricultural activities as a livelihood activity) were engaged in agriculture.

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[86] Livelihood strategies, as defined by DFIDs sustainable livelihood framework, are the range and combination of activities and choices (including productive activities, investment strategies, etc.) made by households in order to achieve livelihood outcomes such as food security

[87] Bakari MA. Democratisation Process in Zanzibar: A Retarded Transition. Institute of African Affairs, Hamburg African Studies, 2001.

[88] "Agriculture" includes both farming and selling of garden/agricultural products, but selling has limited importance.

[89] Livestock production seasonality was not of sufficient quality to include in Figure 58.

Despite difficulties in the data collection process, the seasonality of small business and fishing activities is presented below. This is only intended to provide a rough estimate as to when these activities are conducted throughout the year. As Figure 58 shows, small business is conducted most intensively in March, and from July through October. These periods correspond perfectly to the "marketing" period for both the Vuli and Masika harvests (see Figure 61, page 122). This suggests that much of the small business activity is related to agriculture.

Fishing shows a similar seasonal pattern, although much less marked. Generally-speaking, fishing is carried out in most heavily from September to February, which corresponds to the half of the year when fewer households are engaged in agriculture. It is important to note that this may also be related to the times of year when fishing is most productive, given climate or sea conditions. At its peak in November, more than 80 percent of fishing households are engaged in this activity.
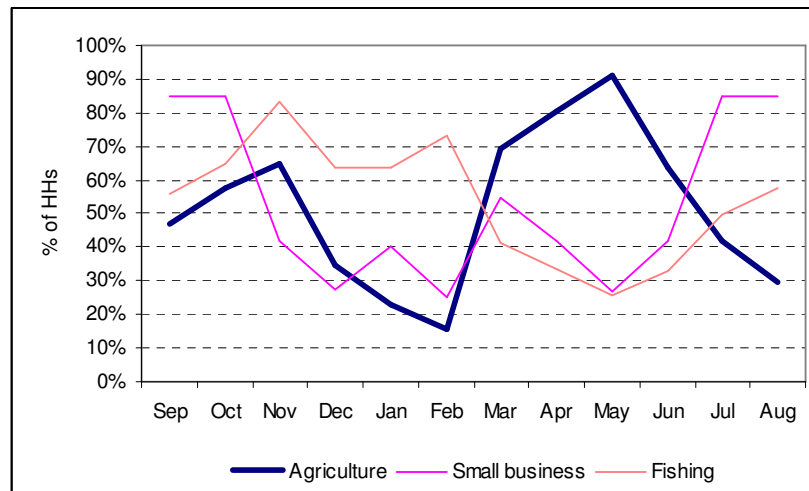
Fig 58: Seasonality of main livelihood activities
(Source: 2009/2010 CFSVA)

The CFSVA also aimed to understand better the division of labour within households by asking which household members were engaged in the main livelihood activities. For agricultural activities, 26.8 percent of households said that both the household head and the spouse were involved. Almost 21 percent reported the sole involvement of the household head, while 5.8 percent reported the sole involvement of the spouse. Very few children were involved. In fact, only 1.4 and 0.2 percent of households said that women and children, or only children, were primarily involved and 5.7 percent reported that men and children only were involved.

Household member involvement in small business, fishing and livestock deviated quite significantly from this pattern. For small business activities, close to 40 percent was handled by household head alone while an additional 23.3 percent was handled only by the spouse of household head. Close to 12 percent of households reported that only adults handle this activity. In regards to fishing, household heads conducted 88.7 percent of all activities, so women and children did not play a large role. Livestock production was usually handled by the household head (43.4% of the time), the men of the household or the adults of the household.

Migration and remittances

Given the importance of work migration and remittances in the context of Zanzibar, the CFSVA explored both seasonal and prolonged migratory patterns were in greater detail. Overall, 8.4 percent of households reported having one family member working away from the household. This included 2.7 percent with seasonal migrants only, 4.2 percent with prolonged migrants only and 1.5 percent with both.

Island and district level differences were not significant. Overall, 9.7 percent of households in Pemba reported a work migrant while 7.7 percent of households in Unguja did. Differences in migrant types were also not significant, though Pemba showed a slightly higher percentage of households with both a seasonal and prolonged migrant (2.4% vs 1.0%). The districts with the

highest percentages of reported work migrants included Wete (12.9%), South (10.3%) and North B (at 10.2%), many of whom were prolonged migrants. Notably, work migration was at its lowest in North B, with only 4.3 percent of households reporting a migrant.

Data on the destination of migrant workers indicate that a plurality travelled to another town to work (42.1%), while over one-third travelled to another region (34.4%) and slightly under one-third (31.2%) went to Dar es Salaam. Only 14.2 percent reported staying within the same region. Reflecting economic realities, households in Pemba were over five times more likely to seek work outside of their region than households in Unguja. They were over 3 times more likely to look for work in Dar es Salaam. Travel outside the country for work was not commonly reported: only 3.5 percent of households reported a migrant worker leaving the household for another country to go abroad. Travelling abroad was most commonly reported in Unguja (5.4%).

Seasonal migrations remained relatively constant throughout the year, ranging from 43 percent in May to 58 percent in August. It is interesting that migratory patterns do not tend to follow agricultural seasons. This suggests that agriculture alone is not driving these migrations.

Overall, 73.2 percent of households reported receiving money from seasonal migrants, with 19.7 percent reporting one payment per year and 52.7 percent two to four payments. More than one-quarter of households (27.6%) reported four or more payments per year. In terms of the amount of money sent back to households, only 12 percent received between 0-50,000 TShs, over 40 percent received 50,000 to 100,000 TShs and 47.3 percent received 100,000 TShs or more. Examined by island and district, significant variations existed but no discernible patterns were detected. Generally-speaking, remittances were higher in Pemba than Unguja, and particularly high in Chake Chake and Wete.

Prolonged migrants were slightly more likely to send back remittances than seasonal migrants; their payments were fewer but in more substantial sums. Overall, 85.9 percent of prolonged migrants sent remittances, with 16.8 percent sending one payment per year, 67.2 percent sending 2-4 payments per year and 16.0 percent sending back payments 4 times or more. Prolonged migrant remittances amounted to 0-50,000 TShs for 10.7 percent of households, between 50,000 to 100,000 TShs for 23.7 percent, while 65.3 percent of households received over 100,000 TShs.

Livelihood strategy profiles

Principal component and cluster analysis was used to group together households that show similarities in the types of livelihood activities and the relative importance of these to overall livelihood. The final analysis resulted in the creation of nine livelihood profiles, including: 1) agriculturalists, 2) fisherfolk, 3) small business, 4) salaried workers, 5) casual labourers, 6) commerce, 7) aid, 8) others and 9) agro-pastoralists. Table 29 provides an in-depth description of each livelihood profile and details the percentage of the population belonging to each profile.

Table 29: Description of livelihood profiles

Livelihood group and percentage of total	Description (based on average characteristics of the group)
Agriculturalists **32%**	Agriculturalists depend on agriculture for nearly 60% of their livelihood, with other activities (such as livestock production, fishing and small business) also contributing slightly (the relative contribution of these activities individually is less than 10%).
Fisherfolk **15.7%**	Fisherfolk build their livelihoods on a combination of fishing (45%) and agriculture (37%).
Small business **12.7%**	Small business households depend on a mix of small business activities (52%) and agricultural activities (34.6%).
Salaried **10.8%**	Salaried workers depend on a mix of civil servant (37.7%) and agricultural work (34.3%). Other significant activities include salary earning (7.4%), small business (7.2%) and livestock production (5.4%).
Casual labourers **8.3%**	Casual labourers earn their living through a mix of agriculture work (32.3%), daily work (29.9%) and daily work paid in kind (22.6%). Small business activities also contribute 7.4 percent of the household livelihood.
Commerce **3.9%**	These households rely on business and entrepreneur work for 54 percent of their livelihoods; agriculture is also important, accounting for 31.8 percent.
Aid **4.5%**	Households depend on a mix of aid/gifts-in-kind or food (42.7%), non food aid/gifts (11.1%) and agriculture (31%).
Others (not specified) **3.9%**	Households are not easily classified as they depend 26.8 percent on agriculture, 22.9 percent on "other" work and 18.2 percent on artisanal work. Other activities such as small business and transport also contribute significantly to these livelihoods.
Agro-pastoralists **8.2%**	Households depend on an equal mix of agricultural (38.4%) and livestock (39.2%) production. Notably small business contributes 7 percent to livelihoods.

Source: 2009/2010 CFSVA

Overall, the four most common livelihood profiles were agriculturalists, fisherfolk, small business and salaried workers.

Table 30 shows bivariate comparisons between livelihood profiles and key characteristics that are typically associated with economic well being or food insecurity vulnerability. As this shows, three livelihood profiles are consistently more vulnerable: 1) households reliant on aid, 2) agriculturalists and 3) fisherfolk. As the table shows, agriculturalists and households reliant on aid have amongst the highest percentage of households headed by women, while all three have amongst the highest percentage of uneducated household heads, households with unimproved toilet facilities and households in the lowest wealth quintile. Those reliant on aid, however, seem particularly vulnerable as household heads tend to be much older (aged 60 on average), uneducated (74%), female (58%) and poor (with 30% in the lowest wealth quintile).

Table 30: Comparisons of indicators of vulnerability and livelihood profiles

	Demographic				Water & sanitation		Economic/ Livelihood		
	% HHs headed by women	% with uneducated head	age HH head	crowding index	% with unimproved water	% with unimproved toilet	% in poorest wealth quintile	number of activities	% with access to cattle
Agriculturalists	24.4	51.7	50.7	2.1	9.8	39.2	20.7	1.7	48.9
Fisherfolk	3.8	45.5	43.5	2.1	7.5	50.7	28.3	2.1	37.6
Small business	24.3	31.2	46.3	2.0	8.3	24.5	12.3	1.9	34.6
Salaried	5.2	11.9	45.6	1.8	2.0	10.4	3.6	2.2	47.2
Casual labourers	5.5	26.8	39.9	2.2	2.8	37.8	19.4	1.9	44.9
Commerce	16.6	27.1	42.3	1.8	4.2	25.4	11.2	2.2	42.2
Aid	57.8	74.0	59.5	1.6	1.1	37.5	29.8	1.9	32.7
Others	20.9	32.6	46.4	1.9	4.2	23.7	9.0	1.9	41.7
Agro-pastoralists	6.6	44.3	48.6	2.1	10.0	32.9	21.2	2.4	78.9
Rural Zanzibar	**17.3**	**41.8**	**47.5**	**2.0**	**7.0**	**34.2**	**18.5**	**2.0**	**49.4**

Source: 2009/2010 CFSVA

Geographically, agriculturalist households are found throughout Zanzibar (see Figure 59) but are particularly concentrated in Pemba (36.5% versus 28.8% in Unguja). Within Pemba, agriculturalists were common in Chake Chake (42.9%) and Mkoani (39.9%), and least common in Micheweni (27.1%). Within Unguja, agriculturalists are most common in Central (49.3%) and least common West (16.2%) and South (16.7%). Fisherfolk and salaried workers, unlike agriculturalists, were evenly spread across both Pemba and Unguja. North A and West districts in Unguja reported the largest concentration of fisherfolk and salaried workers: 30.2 and 16.8 percent of households respectively. By contrast, Chake Chake and Central districts reported the lowest proportion of fisherfolk (2.9%) and salaried workers (3.9%). Small business households were more concentrated in Unguja (17.1%) than in Pemba (6.5%), with North B district reporting the highest percentage (21.3%) and Mkaoni reported the lowest (3.7%).

Fig 59: District level distribution of main agricultural livelihood profiles
a) agriculturalists; b) fisherfolk; c) small business; and d) salaried workers (Source: 2009/2010 CFSVA)

Expenditures

Food and non food expenditures, and expenditure quintiles

The 2009/2010 CFSVA collected information on cash and credit expenditures at the household level for 15 food items and 17 non-food items. Food expenditures and certain non food expenditures were collected using a 30-day recall period. Expenditures on an additional 10 non food items were collected using a 6-month recall. To standardize reporting, however, all expenditures were converted to monthly expenditures, creating the following variables: 1) total household food expenditure per month, 2) total household non food expenditure per month, 3) per capita monthly expenditure and 4) expenditure quintiles. CFSVAs are not meant to be comprehensive expenditure surveys, so the absolute values for each type of expenditure should be interpreted with care. Yet, regional and livelihood-based comparisons can be used with confidence to explore differences in purchasing power and to identify expenditure patterns.

Table 31: Food and non food expenditures by district

	per capita exp	Total food expenditure	Total non food expenditures	% monthly food exp
Unguja	**32,078**	**86,824**	**70,601**	**60.7**
North A	28,509	80,640	55,511	64.3
North B	35,363	85,061	82,149	55.5
Central	28,714	80,566	56,871	63.2
South	30,203	85,061	61,332	63.1
West	36,983	101,205	94,496	58.1
Pemba	**23,437**	**71,914**	**52,734**	**59.8**
Wete	22,256	72,820	51,194	60.5
Micheweni	20,512	69,813	46,940	61.4
Chake Chake	28,481	80,295	59,857	59.6
Mkoani	22,395	63,907	52,960	57.6
Rural Zanzibar	**28,503**	**80,656**	**63,210**	**60.4**

Source: 2009/2010 CFSVA

Table 31 shows the total food and non food expenditures as well as per capita expenditures overall and by district. Households in rural Zanzibar had a mean per capita monthly expenditure of 28,503 TShs and total food and non food expenditures of 80,656 and 63,210 TShs a month. Over 93 percent of these were aid in cash rather than credit. Per capita expenditures were highest amongst households in Unguja (approx 32,078 TShs) particularly in the districts of West (approx 36,983 TShs) and North B (35,363 TShs). The lowest expenditures were reported by households in the Pemba districts of Micheweni, Wete and Mkoani, where per capita expenditure ranged from 20,000 to 22,000 TShs. Across Zanzibar, households reported that 60.4 percent of their monthly expenditures were spent on food products. This varied only slightly by district, from a low of 55.5 percent in North B to a high of 64.3 percent in North A.

A closer look at aggregate food and non food expenditures (see Figure 60) reveals that the highest non food expenditures were for clothing, transport and soap, with transport and soap consuming about 5 percent of total expenditures and clothing about 10 percent. The highest food expenditures went on rice (25.5%), meat (10.4%), sugar (5.8%), maize (5%) and finally bread (4.3%). Compared to nationwide data from the 2005/2006 CFSVA, it appears that overall percentage expenditure on food now is just slightly higher than the national averages measured then (58%). This is not surprising for two reasons: 1) the staple food in Zanzibar is rice which is more expensive than maize – the staple food for the rest of the country and 2) food purchases are a far more important source of food than own production in Zanzibar.
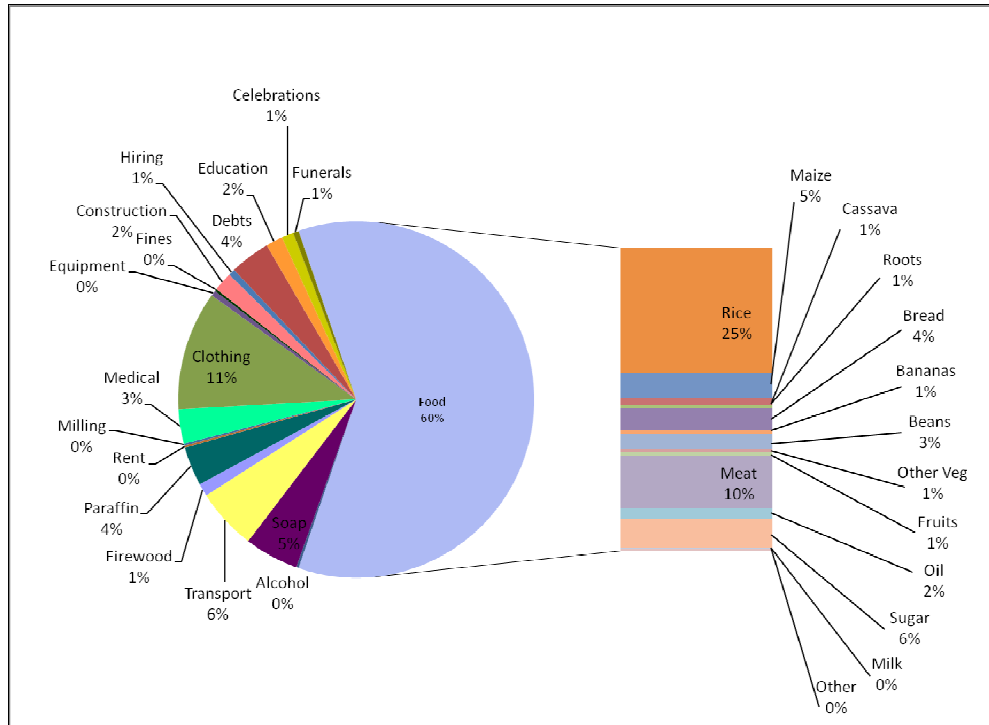
Fig 60: Composition of total and food expenditures
(Source: 2009/2010 CFSVA)

Table 32 examines expenditures and expenditure quintiles by livelihood profiles and wealth quintiles. Overall, salaried workers and households reliant on commerce reported the largest per capita expenditures, spending close to 38,000 and 37,000 TShs per person per month respectively. This is not surprising because these groups are amongst the least likely to engage in agriculture. The lowest per capita spending was seen amongst households reliant on aid and fisherfolk, two poor and vulnerable livelihood profiles. These households spent less than 25,000 TShs per person per month. Casual labourers and households reliant on "other" livelihoods reported the highest percentage expenditure on food at close to 63 and 66 percent respectively. Notably, salaried workers, who reported the highest per capita expenditures, simultaneously reported the lowest percentage expenditure on food at 55.5 percent. The finding that poorer livelihoods spend a larger percentage of their income on food, while not surprising, is a point of concern as these households are both less able to invest in building their asset base and more likely to suffer disproportionately from shocks such as rapid increases in food prices.

A look at expenditures by wealth quintiles revealed strong correlations between the two. Per capita total expenditures and percentages of households in the high/highest expenditure quintiles both increased stepwise across wealth quintiles, from poorest to richest. Similarly, percentage expenditure on food decreased across wealth quintiles. This means that that as wealth increases, households spend more money overall (including on food) but the share of total expenditures spent on food declines as non food expenditures begin to build the asset base of the household.

As shown in Table 32, poor livelihoods such as agriculturalists, households reliant on aid and fisherfolk all have few households in the high or highest expenditure quintiles. It is the most well off livelihood profile, salaried workers, which has the highest percentage of households in these quintiles. Expenditures quintiles were then used to assess the association between expenditures and various indicators of vulnerability or household well-being. These indicators, as shown in Table 33, also seem to decrease across expenditure quintiles, from low to high. Specifically, the percentage of uneducated household heads, crowding, and the percentage with poor drinking water sources/toilets all decrease as expenditures increase.

Table 32: Food and non food expenditures by wealth and livelihoods profiles

	Per capita monthly exp (TShs)	% monthly food exp	% in high/ highest expenditure quintile
Livelihoods			
Agriculturalists	26,173	60.7	32.2
Fisherfolk	24,375	61.5	29.1
Small business	31,657	60.2	52.2
Salaried	37,786	55.5	55.7
Casual labourers	29,796	62.8	47.7
Commerce	36,824	59.0	58.3
Aid	24,790	61.6	36.8
Others	28,573	66.2	46.2
Agro-pastoralist	25,737	57.2	33.6
Wealth quintiles			
Poorest	21,823	63.9	21.5
Poorer	26,032	62.0	34.7
Moderate	26,821	60.9	36.5
Richer	31,424	58.9	48.9
Richest	34,612	56.8	54.2

Source: 2009/2010 CFSVA

Table 33: Characteristics of expenditure quintiles

	% with women HH	% with uneducated head	age HH head	crowding index	% with unimproved water	% with unimproved toilet	number of activities	% with access to cattle
Lowest expenditures	18.0	53.7	51	2.4	9.5	56.4	1.9	57.6
Low expenditures	17.8	48.5	48	2.1	9.1	43.1	2.0	46.6
Moderate expenditures	14.7	41.0	48	2.0	6.1	33.7	2.1	51.2
High expenditures	19.1	36.8	46	1.9	6.4	23.3	1.9	46.2
Highest expenditures	16.8	28.2	45	1.5	4.1	15.0	1.8	43.7

Source: 2009/2010 CFSVA

Credit, Cash and Exchange

While credit comprises less than 7 percent of all expenditures, 39 percent of households report having access to it and of these, 12.6 percent reported actually receiving a loan in the past year. The main sources of credit were family/friends outside of Tanzania (43.2%), traders (27.1%) and local landowners (13.0%). Households most often reported using credit for food purchases (31.0%), business investments (18.3%) and home purchase or construction (10.5%). The median loan was 100,000 TShs and the mean length of time for repayment was 12 months. Approximately 46.0 percent of households anticipated being able to repay the full loan, while 52.3 percent expected to be able to pay back at least half of it. Only 1.8 percent of households indicated that they would be unable to pay back even half of the loan and 3 percent said they would not be able to pay back any of the loan at all.

Access to and use of credit varied by livelihood group. Wealthier livelihood profiles, including salaried workers, reported more access to loans, with approximately 65.6 percent of households reporting access. Households in marginal livelihood groups like those reliant on aid had very limited access to credit. In fact, only 15.3 percent of households in this livelihood profile reported access. Examining uses of credit, salaried workers reported using most of the loans for house purchases (36.2%), food (24.2%) and house improvement (11.1%). Households reliant on aid by contrast reported spending three-quarters of the loan on food purchases.

Natural Capital

This chapter presents findings on climate, productive land, irrigation, major crops and agricultural inputs, utilization and duration of harvest, and access to livestock.

Agricultural Production

Climate

The climate of Zanzibar is characterized by tropical, high humidity conditions that vary according to the trade winds of the tropical monsoon system. The mean annual rainfall is estimated to be approximately 1900 mm.[90] The islands experience a bimodal rainfall regime, with a short rainy season (the Vuli rains) extending from October to early January and a longer rainy season (the Masika rains) extending from mid March to the end of June. However, one-fifth of all rain is inter-monsoonal, meaning it falls between rainy seasons.[91]

The cropping calendar follows the bimodal nature of the rainfall, with households throughout Zanzibar experiencing two cropping seasons (see Figure 61). Pre-planting and land preparation activities for the Masika season begin in mid January and continue until mid March. Planting occurs thereafter (mid March to mid May), with harvesting beginning in July and continuing to September. Marketing of this harvest largely corresponds with the harvesting season but extends slightly further, until mid October. Pre-planting and land preparation activities for the Vuli season begin in September, one month before the rains usually begin. Planting then begins in October and carries on through November. Harvesting starts in mid January and continues to mid march. Marketing of this crop starts in mid February and continues to the end of March.

As this cropping calendar demonstrates there are two high seasons for agricultural activities annually, with the first period from mid January and to the end of March and the second period from July to September. This is because land preparation activities for the upcoming harvests, harvesting of crops from previous season and marketing of previous season harvests all occur at roughly the same time of year.
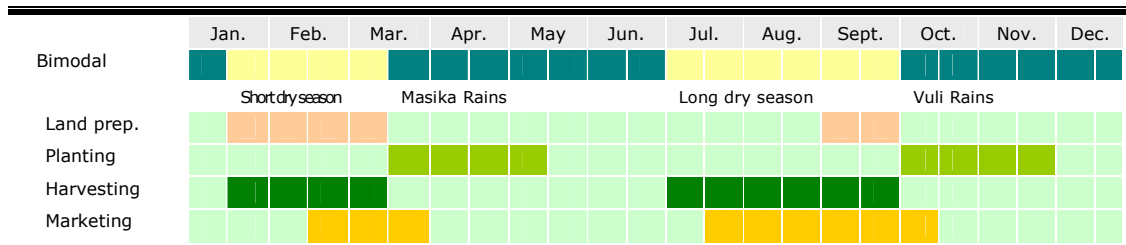
Fig 61: Cropping seasons calendar
(Source: WFP, Vulnerability Analysis and Mapping Unit)

Productive Land

Since agriculture accounts for 50 percent of Zanzibar's GDP (and employs nearly 70 percent of the workforce), access to land remains a crucial issue throughout the country, especially given the relatively high population density on the islands. To examine land access, the CFSVA collected information on how many households farm in both the Masika and Vuli seasons, how much land was farmed each season and whether the land farmed was owned by the household.

Overall, 76.2 percent of households cultivated crops during the Masika season and 67.3 percent cultivated crops during the Vuli season. As Table 34 indicates, most households relied on smallholder farming (<0.5 ha) during each season, and fewer than 3 percent of households engaged in large scale farming (>2 ha).

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[90] Revolutionary Government of Zanzibar, MDG Centre, UNDP and World Agroforestry Centre. An Assessment of Rainwater Harvesting Potential in Zanzibar. May 2007.
[91] Komba YH, Juma S, Fakih S, Abass T and Oliver D [Department of Commercial Crops, Fruits and Forestry: Zanzibar]. (2004). Vegetation Reconnaissance Survey of Kiwengwa Forest Reserve of Zanzibar - Tanzania.

Table 34: Distribution of farm sizes per cropping season

	Masika	Vuli
< 0.5ha	61.9	72.1
0.5-1ha	23.2	16.5
1-2 ha	12.1	9.2
> 2ha	2.9	2.3

Source: 2009/2010 CFSVA

Examined by district, the percentage of households engaging in small scale farming during the Masika season ranged from 46.4 percent (in South) to 69 percent (in Wete). In each district, the percentage was slightly higher during the Vuli season than the Masika season. Overall, the highest percentages of small scale farming during the Vuli season were in Mkoani (82.2%) and Micheweni (81.8%), while the lowest were in North B (60.8%). Large scale farming was rare in all districts but the highest percentage in both the Masika and Vuli seasons were reported in West (7.7 and 6.2% respectively) and North B (4 and 8% respectively).

Overall, regardless of cropping season, most households reported having a legal title for the land farmed (64-65%).

Crop Production

District crop production patterns

Historically Zanzibar –the spice island– has been an important producer of cloves, nutmeg, cinnamon and other spices. Even though clove production has been declining, cloves are still the main foreign exchange earner, representing 90 percent of export profits.[92] Other important cash crops and agricultural products include copra, seaweed, fish products, vegetables, coconut palm, rice, sugar and cassava.

To examine production patterns, the CFSVA collected information on the four main crops. Although over three-quarters of households (82.7%) cultivated crops, the types and diversity of crops varied considerably by district (see Figure 62). Across Zanzibar, the most common crops cultivated were cassava (93.1%), sweet bananas (65.1%), rice (58.3%) and sweet potatoes (28.2%).[93] Maize (14.5%) and cow peas (11.5%) were also grown by sizeable percentages of households. All other crops were grown by less than 6 percent of households.

The most common crop, cassava, is grown slightly more often in Pemba (97.5%) than Unguja (89.1%). Lower cultivation of cassava in Unguja is largely driven by lower cultivation in North B and Central districts (at 80.3 and 86.6% respectively). Chake Chake and Mkoani districts in Pemba report the highest cassava cultivation with 97.9 and 97.8 percent of households reporting cultivation.

Cultivation of sweet bananas and rice followed similar patterns to those of cassava. Overall, both crops were produced more in Pemba (80.9 and 77.7% respectively) than Unguja (50.1 and 40.7%). Sweet bananas were grown most in the districts of Mkoani and Wete (90.8 and 86.1% of households). Rice was most frequently cultivated in Mkoani (88.6%) and Chake Chake (82.8%). Households in Wete also produced rice with over 80 percent reporting cultivation. Sweet bananas were least common in North B and West, with only slightly more than one-third of households reporting cultivation (34.4 and 38.8% respectively). Likewise, rice was least commonly produced in South and West district, with almost no production reported in South (0.7%) and under one-third of households reporting cultivation in West.

Unlike the patterns seen above, maize and sweet potato production was more common in Unguja than in Pemba. Overall, 21.2 and 35.9 percent of households in Unguja cultivated these crops, while only 7.1 and 19.7 percent of households in Pemba did so. Maize production was highest in North A and South districts. Here, 42.0 and 26.3 percent of households grew maize. More than 45 percent of households in North B, Central, South and Micheweni districts produced sweet potatoes. Maize production was least common in Micheweni (4.6%) and Wete (5.3%) while sweet potato production was least common in Mkoani (7.0%) and Chake Chake (6.3%).

Cow peas, like cassava, were more common in Pemba rather than Unguja. Overall, 18.5 percent of households in Pemba and only 5.5 percent of households in Unguja cultivated cow peas. The

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[92] Bakari MA. Democratisation Process in Zanzibar: A Retarded Transition. Institute of African Affairs, Hamburg African Studies, 2001.
[93] Results generated by using the multiple response option.

districts that grew the most cow peas included Chake Chake (25.5%) and Wete (23.5%) while the districts that reported the lowest cow pea production included Central (2.8%) and North B (3.8%).

(a)

(b)

(c)

(d)

(e)   (f)
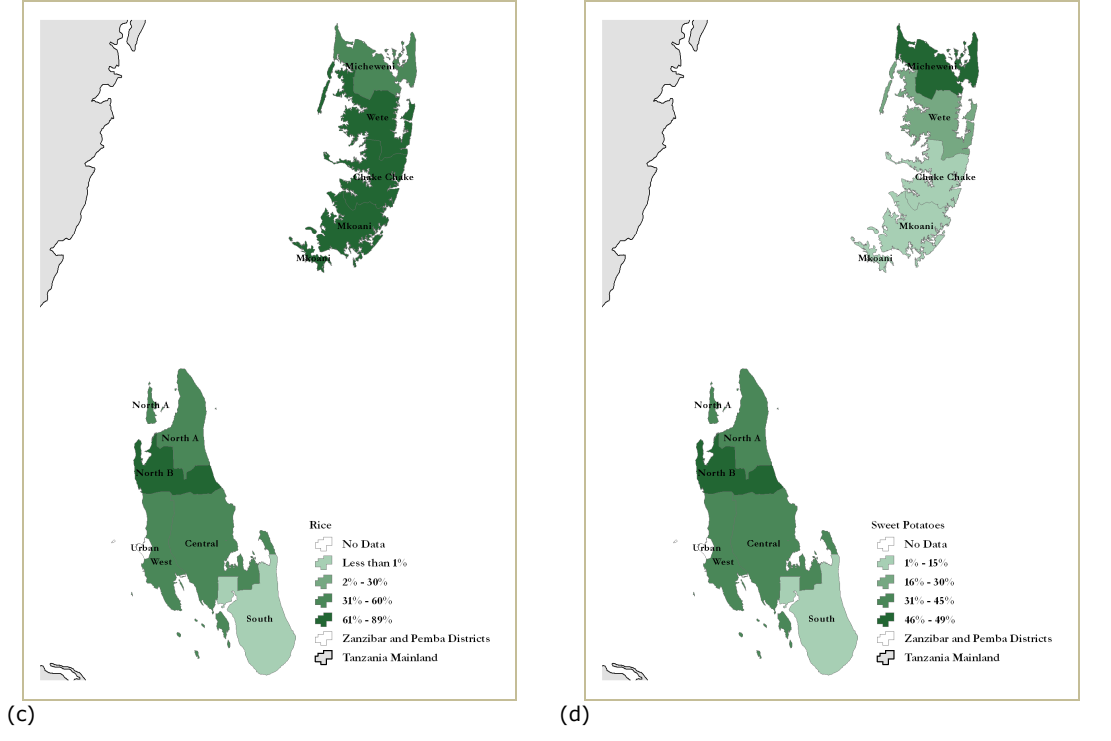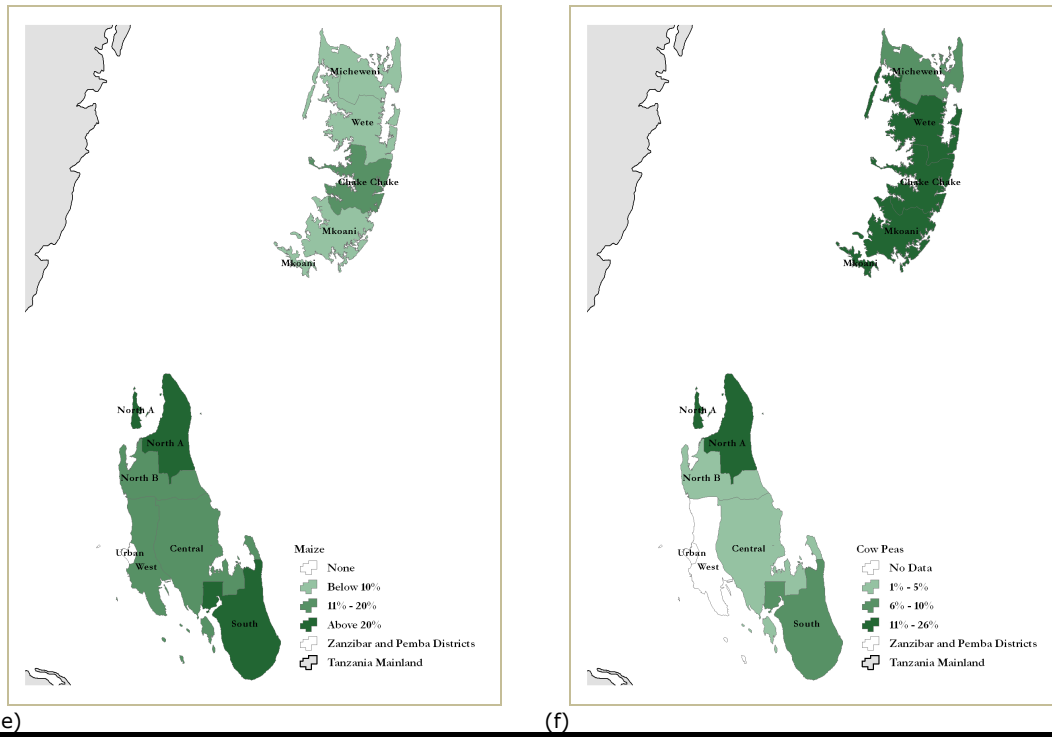
Fig 62: Zanzibar crop prevalence: (a) cassava, (b) sweet bananas, (c) rice, (d) sweet potato, (e) maize, (f) cow peas
(Source: 2009/2010 CFSVA)

As for crop diversity, as many as 48.1 percent of households cultivated at least four crops. In order to illustrate geographic variation in crop diversity, we mapped the proportion of households planting four or more crops in each district. The result is shown in Figure 63.
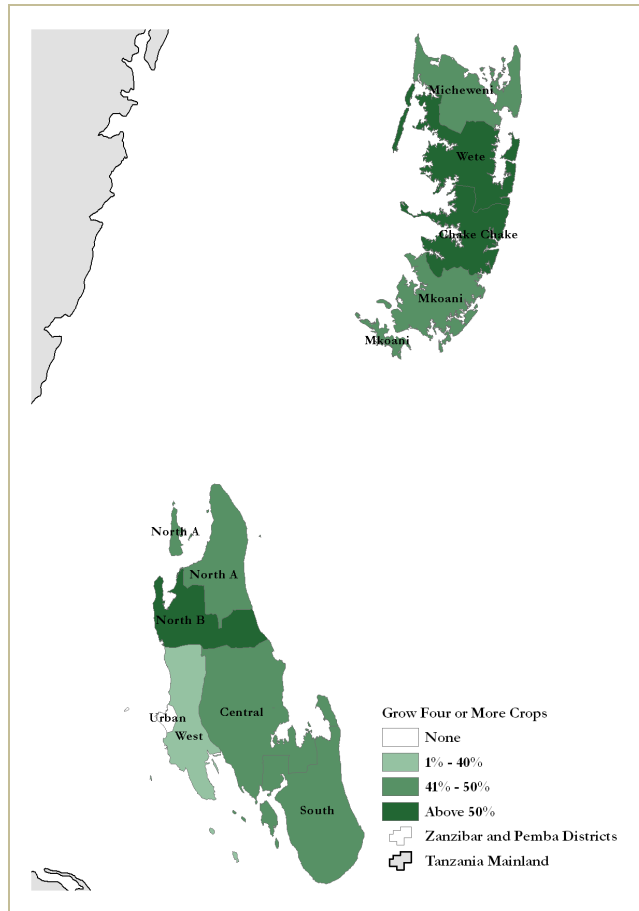
Fig 63: Proportion of households planting 4 or more crops
(Source: 2009/2010 CFSVA)

Assessed by island, there was little difference in the levels of households planting four or more crops: Pemba was only slightly higher than Unguja (51.6 to 46.5%). Examined by district, however, Unguja's North B reported the highest percentage of households planting 4 or more crops at 65.8 percent. The districts with the second highest diversity included Wete (54.5%) and Chake Chake (54.2%) while those with the lowest included West. Here, only 36.4 percent of households cultivated four or more crops.

Crop production patterns by livelihood profiles

There were few notable differences in the patterns of crop production across livelihood profiles. Generally-speaking, in almost all livelihood profiles, cassava was the most commonly cultivated crop followed by sweet bananas, rice and finally sweet potatoes.[94] The only exception to this was in the case of agriculturalists, who cultivated rice more often than sweet bananas. it is also worth mentioning that among the four main livelihood profiles, households reliant on small business reported the lowest percentages of cassava (25.3%), rice (13.5%) and sweet potatoes (5.2%) cultivation. Fisherfolk reported the lowest cultivation of sweet bananas (17.2%). Figure 64 details these findings below.

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[94] Multiple response analysis has been conducted and response percentages have been taken into consideration (instead of percentages of cases) in the attempt to control for the number of crops cultivated.
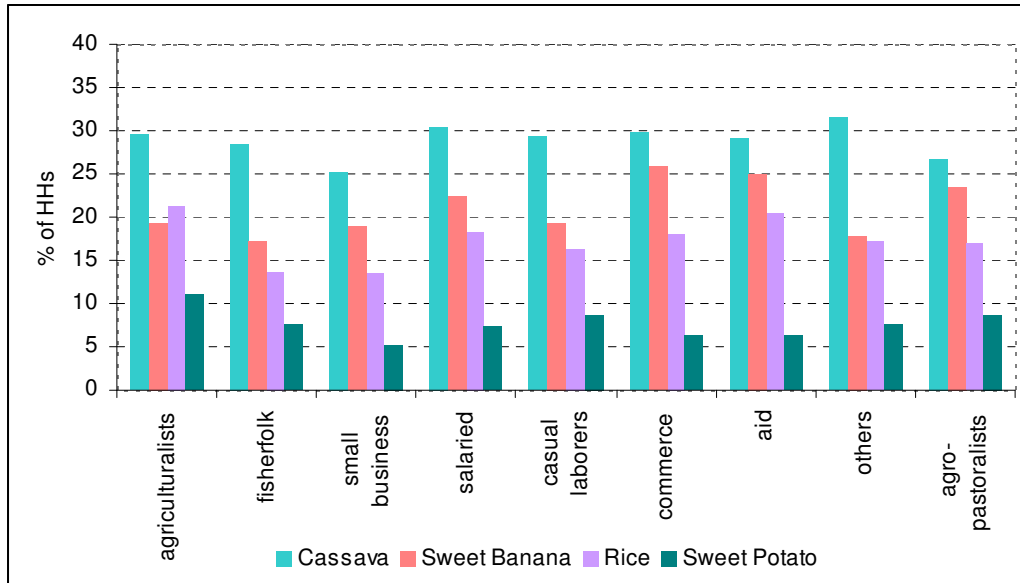
Fig 64: Crop production by livelihood profiles
(Source: 2009/2010 CFSVA)

Duration of harvest

Agricultural household were asked to specify how long their harvest lasted for each season in which they cultivated crops.

On average, harvests from the Masika and Vuli seasons lasted 3.0 and 2.8 months. Combining data on the duration of harvest and cropping calendar, Figure 65 seeks to estimate the proportion of households with remaining food stocks at a given point over the year. As this figure indicates, July was taken as the first month of harvest for the Masika season while January was considered the first month for the Vuli season.

This figure shows that reserves from the Masika and Vuli harvests tend to decline at a similar rate, with both showing less than 10 percent of households having reserve stock after six months. In practical terms, this means that the cropping seasons preceding the survey provided harvests large enough for households to maintain stock only until the harvest of the next season. Therefore, smaller than normal harvests or failed harvests could result in food shortages months before the next harvest. This concern is valid even though households in Zanzibar rely primarily on purchase rather than own production for food. Food shortages would inevitably lead to large price increases, restricting access for poorer households.
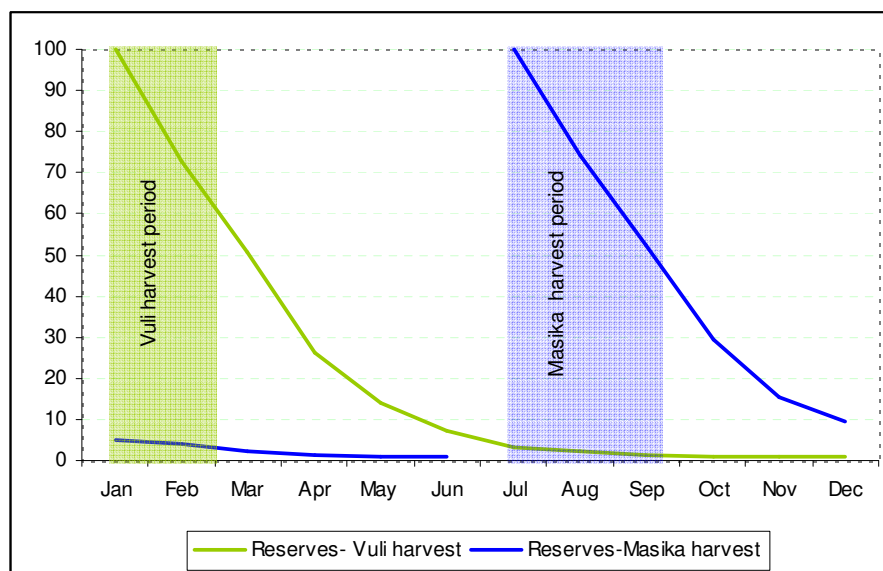
Fig 65: Percentage of households with reserves from previous harvest, by month and season
(Source: 2009/2010 CFSVA)

Duration of harvest by livelihood profiles

Finally, harvest duration was also examined by livelihood profile. Overall, harvests were shortest for households reliant on aid and commerce, regardless of cropping season. Also, the duration of the Masika harvest was low for fisherfolk. By contrast, harvests lasted the longest for agriculturalists, small business workers and agro-pastoralists. Table 35 shows the average duration of harvests by season and livelihood profile.

Table 35: Duration of harvest by season and livelihood profile

	duration of harvest (average no. months)	
	Masika season	**Vuli Season**
Agriculturalists	3.1	2.8
Fisherfolk	2.6	2.7
Small business	3.2	3.2
Salaried workers	2.9	2.8
Casual labourers	2.8	2.9
Commerce	2.5	2.0
Aid	2.6	1.9
Others	2.7	2.8
Agro-pastoralists	3.1	3.0

Source: 2009/2010 CFSVA

Seeds and agricultural inputs

In Zanzibar, there is little use of agricultural inputs, lower than national averages. Findings from the CFSVA show that only 8.1 percent of cultivating households reported using chemical fertilizers and only 22.5 percent used of natural fertilizers. Interestingly, the 2009/2010 CFSVA shows a slight decrease in the percentage of households using chemical fertilizers (down from 13.7% in 2005/2006) but use of natural fertilizers has changed little (from 16 to 24 percent in 2005/2006).

As Figure 66 shows, the use of both chemical and natural fertilizers varied substantially by island and district. The use of chemical fertilizer in Unguja is double that of Pemba (11.1% versus 4.7%) and the rate of natural fertilizer use is 2.5 times that of Pemba (31.5% versus 12.6%). Unguja's West district reports the highest rate of chemical fertilizer use (over one-quarter of households) while Micheweni and Wete districts in Pemba reported the lowest (3.0 and 4.8% respectively). Other districts that reported higher than average chemical fertilizer usage include South (10.5%) and Central (9.5%) districts in Unguja.

Natural fertilizer use follows the same pattern. The districts reporting highest use include Central, West and South districts in Unguja where 39.7, 36.4 and 35.5 percent of households use these inputs. The districts reporting the least use were Wete (10.7%) and Micheweni (12.7%).

a)

b)
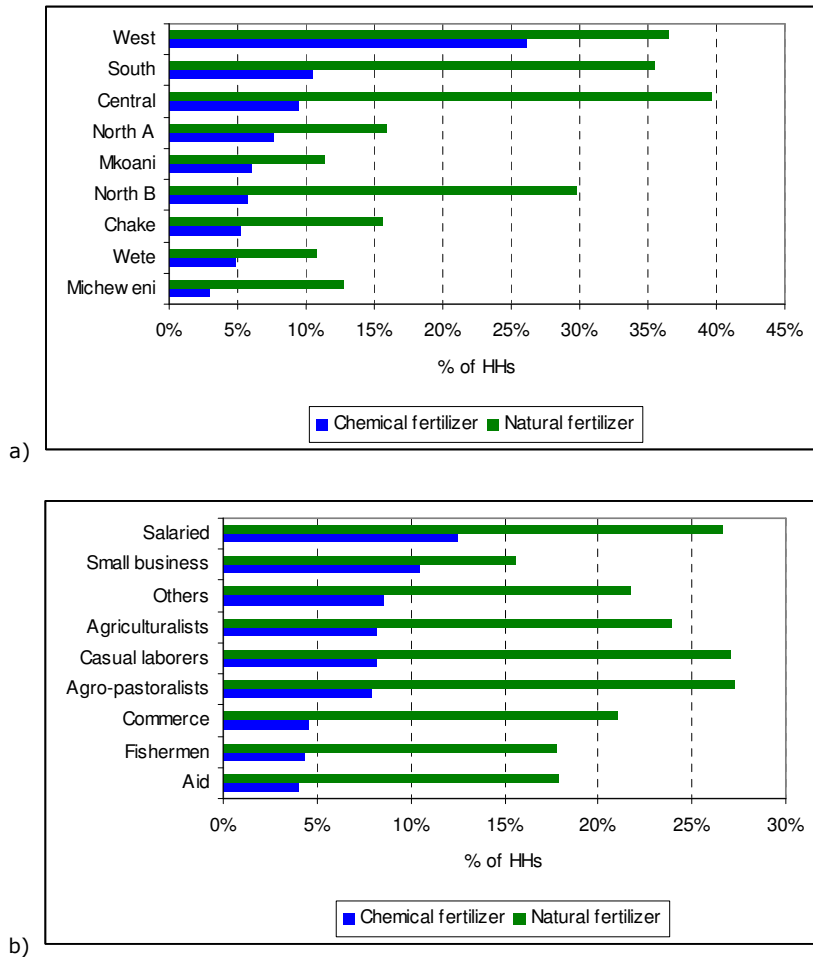
Fig 66: Use of chemical and natural fertilizers by a) district and b) livelihood profile
(Source: 2009/2010 CFSVA)

Figure 66 examines fertilizer use by livelihood profile. Overall, salaried and small business households use chemical fertilizer most frequently, (with 12.5% and 10.5% of households). Households reliant on aid, fishing and commerce had the lowest use of chemical fertilizer with fewer than 5 percent of households reporting this. Patterns in use of natural fertilizer, however, differed substantially from this. Agro-pastoralists, casual labourers and salaried workers all reported more frequent use of natural fertilizers. On average, 27.3 percent of agro-pastoral households, 27.1 percent of casual labourers and 26.6 percent of salaried households reported using this type of fertilizer. Agriculturalists were the next most likely to use natural fertilizers (23.9 percent).

The CFSVA also assessed the sources of seeds for the most frequently cultivated crops. Reserves from previous harvests were by far the most frequent source of seeds (81.3% of households), with the next most frequent being exchange with farmers (10.3%). Only 6 percent of households reported purchasing seeds. Fewer than 2 percent of households reported any other seed source.

The same pattern was seen in the two main crops, cassava and sweet bananas. Overall, reserves from the previous harvest were the main seed source for 81.9 and 83.8 percent of households. Trade with farmers was reported by 15.2 and 11.3 percent of households respectively, while purchase was reported by less than 5 percent.

Post-harvest loss is believed to be a major problem in Tanzania but there is scarcity of data on the topic. Almost all the available data relates to cereal grains and grain legumes, where overall losses are estimated at 30-35 percent.[95] To address this gap, the CFSVA asked households how much of their last harvest was lost, for whatever reason. Unfortunately, due to challenges in the data collection process, the CFSVA is not able to provide precise estimates. Nonetheless, data was used to classify households according to whether 20 percent or more of their last harvest was spoiled for whatever reason. As Figure 67 indicates, the percentage of households who lost 20 percent or more of their last harvest varied significantly by island and district. Crop loss was more of a problem in Pemba than in Unguja, with 21.4 percent of households reporting the loss of at least 2 percent of their crop. By contrast, only 10.4 percent of households in Unguja reported similar losses. Given this, it was not surprising that the districts most affected by crop loss were in Pemba. These districts included Micheweni (26.9%), Mkoani (27.0%) and Wete (23.0%). Crop loss was least often reported in Unguja's Central district (4.5%).
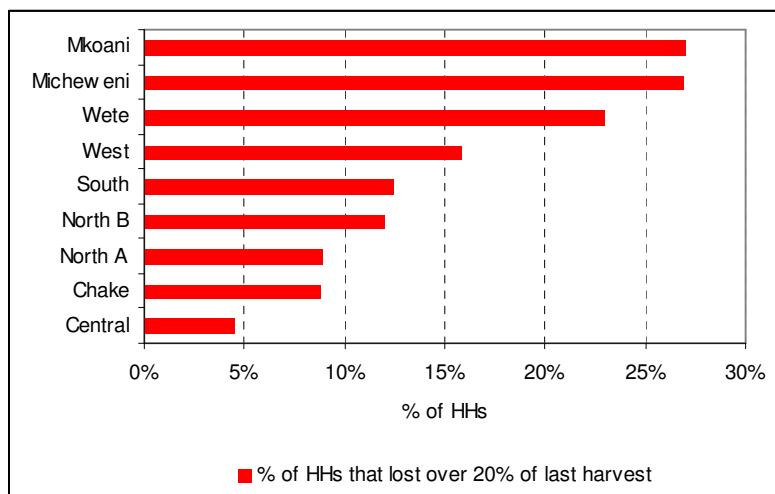
Fig 67: Percentage of households who lost over 20% of last harvest
(Source: 2009/2010 CFSVA)

Access to livestock

Livestock is commonly accessible in Zanzibar. Findings from the CFSVA indicate that 46.1 percent of households have access to livestock.[96] Chickens were the most common animals reported, with over 37.4 percent of households reporting access to at least one. Cattle and goats were the next most common, with 22.9 and 7.6 percent of households having access to at least one. Sheep, ducks, pigs and donkeys were the least common with fewer than 5 percent households reporting access.

Examined by island and district, households in Pemba were more likely to have livestock than households in Unguja. Overall, 56.2 percent of households in Pemba reported livestock access compared to only 38.9 percent in Unguja. This pattern persisted when examined by type of livestock, with households in Pemba over twice as likely to report access to cattle and 1.5 times

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[95] PASS (2002). Investment Potential of the Horticultural Industry in Tanzania. Private Agricultural Sector Support Ltd.
[96] Having access to livestock was defined as managing or owning at least one of the following animals; chickens, goats, pigs, cattle, sheep, ducks or donkeys.

more likely to report access to chickens. Examined by district, Micheweni (59.3%), Mkoani (58.1%), and Chake Chake (54.6%) were most likely to report access to livestock, and again patterns persisted when examined by type. The districts least likely to have access to livestock were North A, South and West districts. Here, only 30.4, 34.8 and 36.2 percent of households reported access to livestock.

Examined by livestock type, access to cattle was especially common in Wete (36.1%), Micheweni (36.4%) and Mkoani (34.6%) while access to chickens was most frequent in Micheweni (52.6%), Chake Chake (48.0%) and Mkoani (48.0%). Figure 68 show the distribution of cattle and chicken access across Zanzibar.
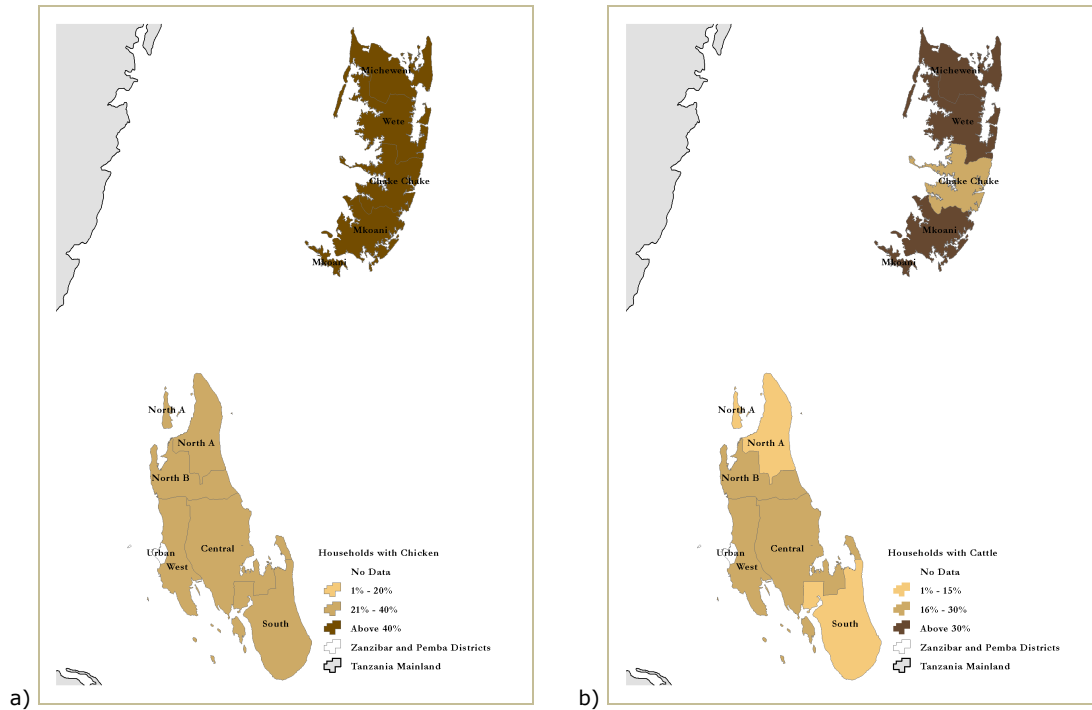
Fig 68: Distribution of households with access to livestock in Zanzibar: a) chicken and b) cattle
(Source: 2009/2010 CFSVA)

Food consumption

This chapter presents findings on dietary diversity, current consumption patterns, household food consumption groups and their geographic distribution.

Dietary Diversity and Food Sources

Dietary diversity

While survey data represent the situation at a given time, seasonality influences food access and availability. The CFSVA was conducted in November, December and January of 2009/2010, which is after the marketing period of the Masika harvest and in the midst of the planting period for the Vuli season. Therefore, the survey was conducted during a relatively lean period in Zanzibar when the food availability situation is more difficult.

CFSVA findings indicate that, at the time of the survey, children (under 15 years old) were eating an average 2.5 meals a day, while adults were eating 2.7 meals. Over three-quarters (84.3%) of households said that the number of meals per day was usual for that time of year.

The CFSVA collected information on the consumption of 21 specific food items in the week preceding the survey. To simplify the analysis, each food item was organised into one of nine food groupings: cereals (maize, rice, other cereals), roots and tubers (cassava, sweet potatoes, banana, other roots and tubers), pulses (groundnuts, beans and peas), vegetables (including green, leafy vegetables, shoots), fruits, animal proteins (fish, meat, eggs), milk, oils and fats (including oil and sunflowers' seeds), and sugar/sugar products. Then we examined the number of days the previous week that each food group was consumed.

Fig 69: Food item consumption

a) % of households consuming item 1 day or more per week; b) Mean number of days item consumed
(Source: 2009/2010 CFSVA)

As Figure 69 illustrates, diets in Zanzibar are heavily cereal- and animal protein-based; only vegetable and pulses are rarely eaten. Sugar consumption is also very high. Overall, cereals, animal protein and sugar are consumed at least one day a week by virtually all households. On average, cereals and sugar were eaten almost daily (6.6 days a week), with rice and bread being the most common cereals consumed (at 5.2 and 3.2 days a week respectively). On average, animal protein was eaten almost six days a week, usually in the form of fish (5.5 days a week).

The next most commonly eaten food groups were fruits, and roots and tubers. Overall average consumption of these groups was fruits 4.5 days a week, and roots and tubers, 4.3 days. Vegetables, pulses and milk were eaten much less frequently (2, 1.5 and 0.8 days a week on average). Oil and fats were consumed 2.3 times per week.

Fig 70: Food item consumption by livelihoods and wealth
a) Mean days food item consumed by livelihood profile; b) Mean days food item consumed by wealth quintile (Source: 2009/2010 CFSVA)

Figures 70 and 71 present the consumption of food items (average number of days per week) by livelihood profiles, wealth quintile and district. Results by livelihood groups show that fishing households and households reliant on aid have the least diversity in their diets, with a notable lack of fruits and oil/fat consumption in both. Households reliant on aid also eat less animal proteins. Agro-pastoralists and salaried workers have the most diverse diets. On average, agro-pastoralists have the highest roots/tubers, pulses, milk and fruit consumption of any livelihood profile. Salaried workers report the highest vegetable and oil/fat consumption.

Results by wealth quintile show a general increase in the number of days food items are consumed as asset wealth increases, with the notable exception of roots/tubers which show a slight decline as wealth increases. Oils/fats and animal proteins appear to be the first food items to increase as wealth increases. As households become even wealthier, however, milk consumption shows the largest increases on a percentage basis, with households in the richest quintile consuming it twice as often as those households in the moderate wealth quintile.

Comparisons by district indicate that North A and Mkoani have amongst the lowest dietary diversity. While all other districts report cereal consumption between six to seven days a week, households in Mkoani report consuming cereals only 5.5 days per week. Households in Mkoani also

report lower than average vegetable consumption. Low dietary diversity in North A is driven by lower than average roots/tubers, pulse, vegetable and milk consumption. On average, these items are only eaten 2.6, 0.8, 1.1, and 0.3 days a week respectively.
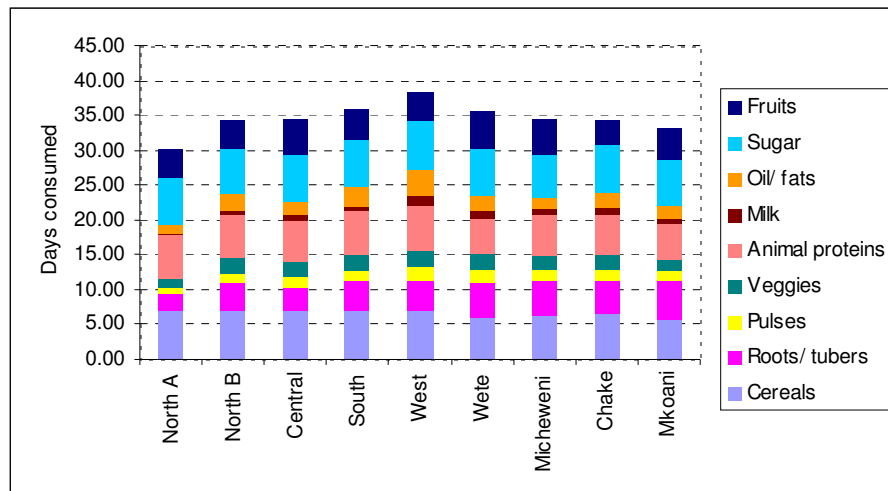
Fig 71: Food item consumption per district
(Source: 2009/2010 CFSVA)

Food sources

Households were asked to list the source of each food item consumend. Examining both the frequency of consumption and the sources relied upon, it is possible to estimate the relative importance of various food sources to the overall diet of the household. Figure 72 shows comparisons of food sources by both livelihood group and district. Food purchase and thus markets appear to be the key source for the majority of food consumed. This is true for all livelihood profiles and districts. Looked at by island and district, own production was a more common food source in Pemba than Unguja. Therefore, unsurprisingly, food purchase was most frequently reported in Unguja's West and South districts and least commonly cited in Pemba´s Mkoani and Wete districts.

While at least 60 percent of food in each livelihood profile was accessed through purchase, there were notable variations. As expected, own production was a more frequent source of food amongst farming households, fisherfolk and agro-pastoralists. Each produced between one-fifth and one-third of their food. Households reliant on aid reported own production as a source for about 20 percent of their food while over 15 percent came from gifts or aid.

Examining sources for individual food items, the main source was still purchase. In fact, purchase was the main source for all cereals, pulses, animal proteins and milk. Only bananas, cassava, vegetables and fruits were accessed more through own production than purchase (70.4, 74.8, 48.4 and 40.3% respectively).
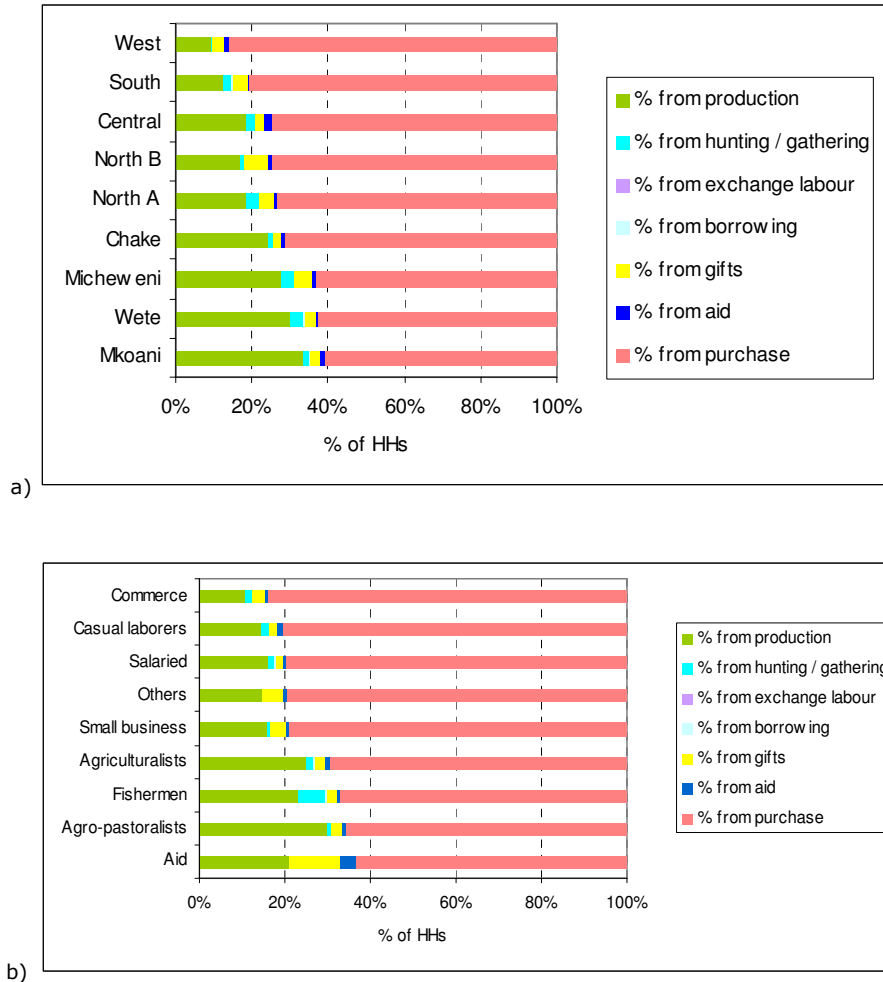
Fig 72: Food sources by livelihood profile and district
a) Source of food by livelihood profile; b) Source of food by district (Source: 2009/2010 CFSVA)

Food Consumption Groups

Household Food Consumption Score

A key indicator in measuring food security in CFSVAs is Food Consumption Score (FCS), which combines: i) dietary diversity (the number of individual foods consumed over the past week); ii) food frequency (the number of days in the past week that a specific food item has been consumed); and the iii) nutritional importance of the food groups (food groups are weighted to reflect their nutritional value). Previous studies have shown FCS to be correlated with nutrient adequacy, kilocalorie intake, children's and women's anthropometry and socio-economic status. As such, the FCS is considered an effective proxy indicator of food access and nutrition intake.

The FCS is computed by grouping together food items for which consumption was assessed over a seven day recall period. For each food group, the frequency represents the number of days an item from the food group was consumed, with a range from 0 (never) to 7 (every day). A weight is assigned to each food group, representing its nutritional value. The food groups and weights are presented in Table 36. The FCS is the sum across food groups of the product of the weighted frequencies.

Table 36: Food consumption score calculation

Food items	Food group	Weight
Cereals/Roots and Tubers: corn, wheat, sorghum, rice, bread, manioc, sweet potatoes, banana	Staples	2
Pulses: peanuts and beans	Pulses	3
Vegetables (including green leafy vegetables and shoots)	Vegetables	1
Fruits	Fruits	1
Animal Proteins: Fish, Meat, Eggs	Meat and Fish	4
Milk/ Milk Products	Milk	4
Oils and Fats	Oil	0.5
Sugars	Sugar	0.5

Source: Comprehensive Food Security and Vulnerability Analysis Guidelines, January 2009

Two thresholds are typically used to distinguish consumption levels: a FCS of 21 and a FCS of 35. These thresholds are used to define three groups: Poor consumption (≤21), Borderline Consumption (>21 and ≤35), and Acceptable Consumption (>35). In the case of Zanzibar, however, very few households (only 0.3%) could be classified as poor food consumption, rendering subsequent analysis difficult to interpret. We therefore decided that poor food consumption households should be combined with borderline food consumption households to form one group; "households with less than acceptable food consumption". Thus, two food consumption groups emerged from this analysis; 1) households with less than acceptable food consumption and 2) households with acceptable food consumption.

According to the 2009/2010 CFSVA, households in Zanzibar have an average food consumption score of 56.2. Categorized by food consumption group, only 3.3 percent of households were classified as having less than acceptable food consumption while 96.7 percent had acceptable food consumption. The main characteristics of each group can be summarized as follows:

- Generally households in the less than acceptable food consumption group eat cereals five days a week, sugars six days a week, tubers almost four days a week and fruits three days a week. Pulses and vegetables are consumed on average 0.5 and 1.3 days a week, while animal protein is consumed almost two days a week. There is no weekly milk consumption.

- Acceptable food consumption household have significantly better diets, eating cereals almost two days a week more, and tubers, pulses and vegetables almost one day a week more. Acceptable food consumption households show a three-fold increase in animal protein consumption and report milk consumption at least one day a week.

Results are shown in Table 37. The table presents the average consumption across the three food consumption groups.

Table 37: Food item consumption by food consumption group

FCS	Pop. (%)	Food groups (weekly consumption)									FCS Average
		Cereals	Tubers	Pulses	Vegs	Fruits	Anim. Prot	Oil	Sugar	Milk	
Less than acceptable	3.3	5.2	3.7	0.5	1.3	3.0	1.9	0.8	6.2	0.0	29.9
Acceptable	96.7	6.6	4.4	1.6	2.0	4.6	6.0	2.4	6.7	0.8	57.1

Source: 2009/2010 CFSVA

Geographic distribution of food consumption groups

Figures 73 and 74 show the percentage of households in both less than acceptable and acceptable food consumption groups by district. As Figure 73 indicates, households with less than acceptable food consumption were concentrated in Pemba, with the highest percentages seen in the central and southern districts of Chake Chake (6.8%) and Mkoani (5.8%). Moving north in Pemba from Chake Chake, the prevalence seemed to decline, with Wete showing a prevalence of 4.0 percent and Micheweni showing a prevalence of 2.9 percent.

In Unguja, the districts most affected by less than acceptable food consumption were in the northern half of the island, with North A and North B reporting the highest prevalence at 3.4 and 5.4 percent respectively. By contrast, the central and southern districts of West, Central and South reported the lowest prevalence with 1.5, 0.5 and 0.5 percent of households reporting this.

Fig 73: Percentage of households with less than acceptable food consumption
(Source: 2009/2010 CFSVA)

As Figure 74 indicates, patterns in the percent of households with acceptable food consumption followed those seen amongst households with less than adequate consumption. Unguja, and particularly West, Central and South districts, reported the highest percentage of households with adequate food consumption while Pemba, and particularly the central and southern districts of Chake Chake and Mkoani, reported the lowest percentages with adequate food consumption.
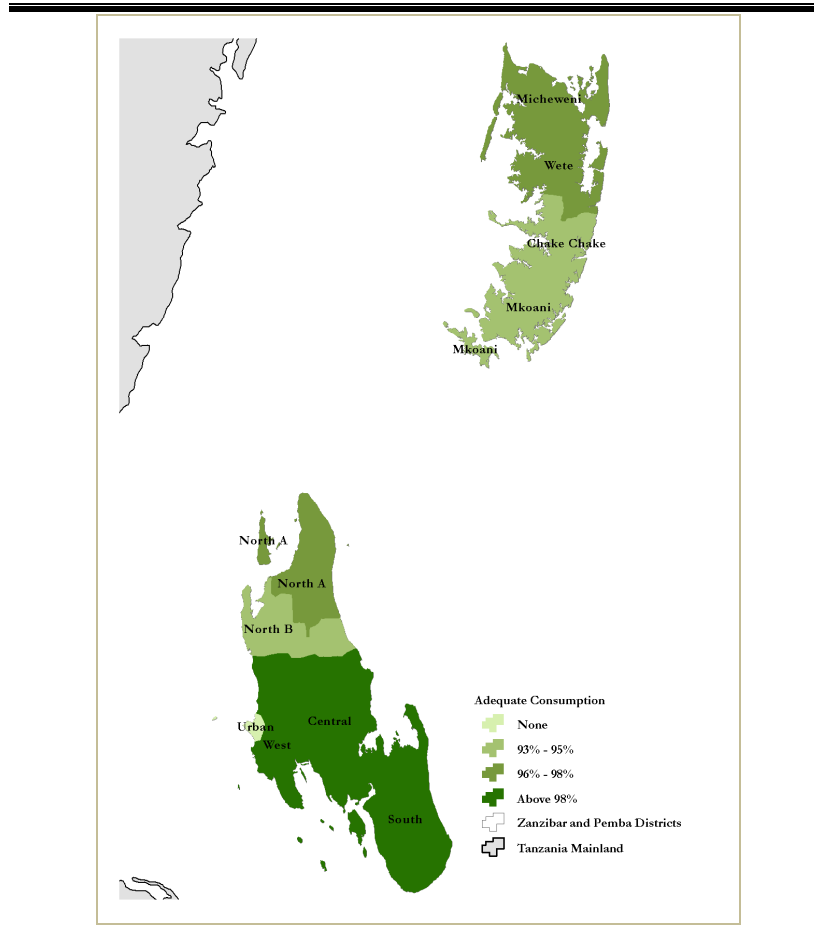
Fig 74: Percentage of households with acceptable food consumption
(Source: 2009/2010 CFSVA)

Changes in food consumption from 2005/2006 to 2009/2010

Comparisons of food consumption data from the 2005/2006[97] and 2009/2010 CFSVAs show a significant fall in the prevalence of households with less than acceptable food consumption. As Figure 75 shows, overall levels declined significantly from 12.8 percent in 2005/2006 to 3.3 percent in 2009/2010. These declines cast doubt on official concerns that increases in food prices over the last few years have led to poorer food access for households. These concerns were voiced in the Zanzibar Programme on Food Security which described the current situation as "grave".[98] While the discrepancy between what has been observed in the country and the findings of the CFSVA need further exploration, a summary assessment of the number of days per week each food item was consumed in 2005/2006 and 2009/2010 revealed generalized increases in almost all food items. There have therefore been improvements in dietary diversity across the board (and especially with regards to fruits, oils/ fats and animal protein). Only milk consumption has shown no improvement.

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[97] It is important to note that the 2005/2006 CFSVA used a different methodology to assess food security status. However, the current methodology for measuring food consumption was applied on the 2005/2006 CFSVA data to ensure comparability.
[98] Zanzibar Programme on Food Security: 2006-2010.
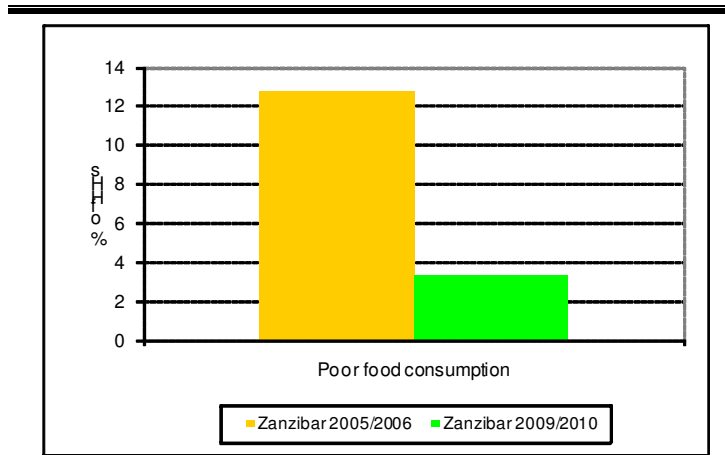
Fig 75: Food consumption comparisons between 2005/2006 and 2009/2010
(Source: 2009/2010 CFSVA)

Food consumption groups and livelihood strategies

Figure 76 examines food consumption groups by livelihood profiles. Overall, less than acceptable food consumption was more prevalent in households reliant on aid (5.7%), agriculture (4.8%), "other" livelihoods (4.2%) and agro pastoralists (4.2%). Assessed as a percentage of all households reporting less than acceptable food consumption, 70.2 percent of households relied on one of these livelihoods, meaning that these four livelihoods account for over two-thirds of all less than acceptable food consumption households.

When examined by wealth quintile, the likelihood of acceptable food consumption generally grew as asset wealth increased. It is notable however, that in the "poorer" wealth quintile there was a higher percentage of acceptable food consumption households than in the "moderate" quintile. This suggests that while the wealth index may be predictive of the food security status of the poorest and richest households, it is not sensitive enough to be an accurate proxy measure for those households in the middle of the wealth spectrum.

In this section, bivariate associations between key household characteristics and food consumption groups were explored. This is intended to provide a preliminary glimpse of what types of households are at greater risk of poor dietary diversity. The results of a multivariate analysis which looked at these issues in greater depth is discussed in a following chapter entitled "Underlying Causes of Food Insecurity and Malnutrition".

As Table 38 indicates, almost all household characteristics examined showed strong associations with acceptable and less than acceptable food consumption. Households headed by women, household heads with no education, crowding index, the percentage of households in lowest wealth quintile and use of chemical and natural fertilizers were all strongly associated with less than acceptable food consumption.

a)

b)
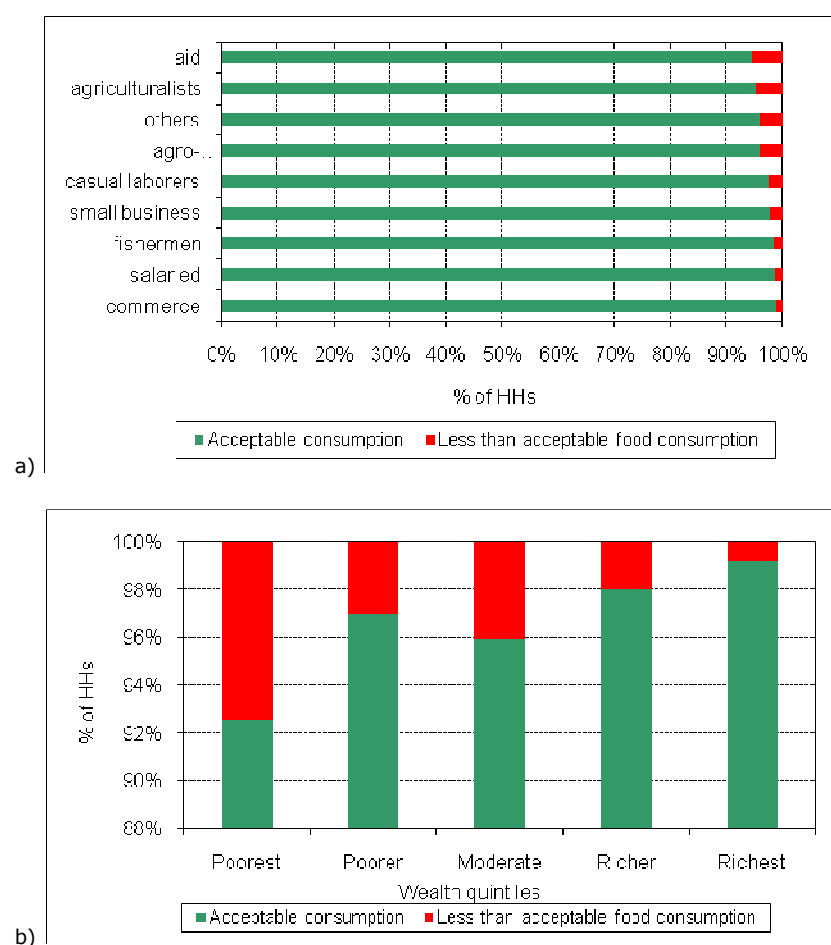
Fig 76: Food consumption by livelihood profiles and wealth quintiles
a) Percentage of less than acceptable and acceptable food consumption groups by livelihoods;
b) Percentage of less than acceptable and acceptable food consumption by wealth quintile
(Source: 2009/2010 CFSVA)

Table 38: Households characteristics associated food consumption

	Less than acceptable FCG	Acceptable FCG
Percent of HHs headed by women	27.6[*]	16.9
HH head has no education	66.1[*]	41.0
Crowding index	2.2[*]	2.0
HH care for at least one orphan	14.4	10.0
HH care for at least one disabled/chronically ill member	9.5	5.1
Percentage of HHs in lowest wealth quintile	41.7[*]	18.1
Cultivated more than 1 ha	12.2	17.0
Percentage of HHs cultivating 4 crops	38.0	49.3
Percentage using natural fertilizer	9.4[*]	23.0
Percentage using chemical fertilizer	0.0[*]	8.4

Source: 2009/2010 CFSVA, Asterisks denote significant difference between less than acceptable and acceptable food consumption categories ($p < 0.05$).

Risk and Vulnerability Context

Risk and Vulnerability Approach

A household's livelihood strategies and outcomes, including food security, are influenced by the environment in which people live. Within this environment, the vulnerability context is framed by critical trends (e.g. population growth, national and international economic trends, governance and technological changes), seasonal cycles (of prices, production, livelihood strategies), and shocks (natural and man-made).[99] Within this context, food insecurity risk is defined as the interaction between the probability of a given hazard of certain intensity, the vulnerability of the population to the hazard and the size of the population.

$$R = H \times VULN \times POP$$

R= Risk to food insecurity: Probability of harmful consequences or expected losses (specifically with regards to food security)

H= Hazard: Probability of occurrence of a potentially damaging phenomenon within a given time period and area

VULN= Vulnerability of a household to the impact of specific hazard

POP= Population living in the area at risk

The following section provides insight into the general vulnerability context, difficulties experienced and households' capacity to withstand them.

Shocks

Reported shocks

The 2009/2010 CFSVA for Zanzibar asked households how often they had been affected by one of 26 shocks in the five years preceding the survey, and whether they had been impacted by this shock in the calendar year preceding the survey. Nationally, 83.1 percent of households reported at least one shock over the past year. Examined by island, more households in Pemba than Unguja reported a shock. Overall, 91 percent of households in Pemba reported experiencing a shock over the past year versus only 77.4 percent in Unguja. This disparity was reflected in the district level comparisons, with four of five districts in Unguja reporting between 70 and 80 percent of households affected by shocks while over 90 percent were affected in three out of four districts in Pemba. As Table 39 shows, the district most affected by shocks was Micheweni (96.7%) and the district least affected was South (72.1%).

Among livelihood groups, between 77 and 89 percent of households in each group reported experiencing a shock in the year preceding the survey. Fisherfolk, households reliant on commerce, casual labourers and agriculturalists were most likely to report a shock with between 84 and 89 percent of households experiencing one. Households reliant on aid were least likely to report a shock, though over three-quarters (77%) of households had experienced one. Looked at by wealth quintiles, there was a discernible association between asset wealth and experiencing a shock, with 90 percent of households in the poorest and poorer wealth quintiles experiencing one versus only 76 percent of households in the richest quintile. The pattern was even stronger amongst food consumption groups. Almost 93 percent of households in the less than acceptable food consumption group had experienced a shock while only 83 percent of households in the adequate food consumption group had.

The most common shocks experienced were high food prices (55.7%) followed by drought/ lack of rainfall (44.8%) and then plant disease/animal pests (38.6%). High fuel costs were reported by 31.0 percent of households while loss of employment and sickness/high health costs were reported by just over one-fifth. Less frequent shocks included high input costs (7.4%) and limited access to credit in the last year (9.9%).

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[99] DFID (1999) Sustainable Livelihoods Guidance Sheet. Department for International Development.

Table 39: Percentage of households exposed to shocks by district

	% with at least one shock in last 12 months	Lack of rainfall in last year	Electricity cuts in last year	High input costs in last year	Sickness/High health costs in last year	High fuel costs in last year	Loss of employment in last year	Limited access to credit in last year	High food prices in last year	Plant disease/ pests in last year
Unguja	**77.4**	**31.6**	**7.6**	**5.7**	**16.7**	**18.3**	**19.7**	**2.7**	**40.8**	**19.3**
North A	78.3	36.2	0.5	8.7	27.1	39.1	22.2	3.4	52.7	33.8
North B	85.9	22.9	20.5	8.8	13.7	7.3	24.4	2.4	35.1	11.7
Central	74.8	35.9	3.9	8.7	31.1	28.2	19.9	1.0	52.4	18.4
South	72.1	36.3	6.9	1.0	2.5	1.0	11.8	1.5	27.9	17.2
West	75.9	27.6	5.5	2.0	11.1	18.1	20.6	5.0	37.7	16.6
Pemba	**91.0**	**63.4**	**24.1**	**9.8**	**31.6**	**49.0**	**28.4**	**20.1**	**76.9**	**66.1**
Wete	94.6	66.3	27.2	14.9	37.1	56.9	33.7	17.3	85.6	73.3
Micheweni	96.7	82.8	35.4	12.4	36.8	54.1	45.9	25.4	93.8	86.1
Chake Chake	82.6	41.1	16.9	2.9	29.0	34.3	19.3	20.8	55.1	46.9
Mkoani	90.1	63.4	16.2	8.9	22.5	50.8	13.1	16.8	72.8	57.1
Zanzibar	**83.1**	**44.8**	**14.4**	**7.4**	**22.8**	**31.0**	**23.3**	**9.9**	**55.7**	**38.6**

Source: 2009/2010 CFSVA

High food prices

High food prices were the most commonly cited shock with 55.7 percent of households reporting having experienced it in the year preceding the survey. High food prices were a problem throughout Zanzibar, though almost twice as many households in Pemba were affected than in Unguja. Looked at by district, high food prices were most common in Micheweni and Wete, with 93.8 and 85.6 percent of households reported this. By contrast, this shock was least often experienced in South (27.9%), West (37.7%) and North B (35.1%) districts. Examined by livelihood profile, high food prices impacted households reliant on aid (65.3%), fisherfolk (61.4%), and agriculturalists (59.3%) disproportionately. Salaried workers were least impacted with only 45.1 percent reporting this shock.

Food prices were probably more of a concern in 2009 than in other years because of the lingering effects of the 2008 food price crisis which was compounded by the 2009 financial crisis. Maize prices released by the Ministry of Industry, Trade and Marketing show generalized increases from January 2006 to January 2008 in multiple markets across Tanzania.

There was very little seasonal fluctuation in households reporting high food prices. Respondents indicated that they were affected throughout the year, ranging from a low of 75.1 percent affected in August to a high of 86.2 percent in December. Interestingly, seasonal fluctuations in the percentage of household impacted were much more apparent in Unguja rather than Pemba. In Unguja, for instance, 64.3 percent of households (who reported high food prices as a shock) were hit in August while three months later (in November) 89.4 percent of households were affected. In Pemba, by contrast, virtually the same percentage of households were impacted by high food prices in August and November (83.3 and 83.5% respectively).

Lack of rainfall/drought

Lack of rainfall or drought was the second most commonly reported shock. Like high food prices, it was most frequent in Pemba (63.4% of households) versus Unguja (31.6% of households). Examined by district, it was most commonly reported in Micheweni (82.8%), Wete (66.3%) and Mkoani (63.4%) and least commonly reported in North B (22.9%) and West (27.6%).

Examined by livelihood group, agriculturalists and fisherfolk were not surprisingly the most impacted. In both groups, over 50 percent of households (53.2 and 52.0% respectively) experienced lack of rainfall/drought in the year preceding the survey. By contrast, households

reliant on aid and casual labour were the least likely to report this shock, with less than one-third of households in either of these two groups impacted.

Examining seasonality, the percentage of households suffering from drought in the year preceding the survey appeared to peak in November at 76.3 percent and bottom out at 38.7 percent in June. While there are certain fluctuations in this trend, it does appear that the months when drought is a major concern range from November through December and March through April. Not surprisingly, these periods correspond to the Vuli and Masika rains.

Plant disease and animal/other pests

Plant disease and animal pests are perennial problems for farmers. Overall, 38.6 percent of households reported this shock, with households in Pemba over 3 times more likely to experience this shock than households in Unguja. The most affected districts included Micheweni (86.1%) and Wete (73.3%). The districts least affected included North B (11.7%) and West (16.6%). Problems with plant disease/animal pests remained constant throughout the year with around half of households impacted in any given month.

Coping Strategies

To examine the coping strategies used by the selected households, the CFSVA asked households how often they had used a list of five coping strategies in the seven days prior to the survey. The information was used to compute a reduced coping strategy index (CSI), which takes into account both the frequency and gravity of the mechanism used.[100]

As Table 40 indicates, coping strategies were much more commonly used in Pemba than in Unguja. The most popular strategies included (i) relying on less preferred or less expensive food and (ii) reducing the number of meals eaten a day. Both strategies were employed an average 2.6 and 2.8 times per household in the seven days preceding the survey. The next most common coping strategies were to borrow food/rely on help from friends (2.0 times per week) and to limit portion size (1.1 times per week). The least common strategy was to restrict adult consumption to preserve children's consumption. Overall, the average CSI is 11.8.

Examined by district, there were significant variations in mean CSI scores. Households in North A reported the highest CSI at 18.9 while Wete, Micheweni and Mkoani all reported CSI scores in excess of 13. The districts with the lowest CSI scores included South and North B districts, at 6.5 and 8.8 respectively.

Among livelihood groups, CSI scores were highest among fisherfolk (13.3), salaried workers and agro-pastoralists (11.7). Small business and casual labourers reported the lowest CSI score at just over 9. Generally, CSI scores decreased with wealth and with improving food consumption, although the association was only strong in the case of food consumption scores. Similar patterns were observed when the uses of individual coping mechanisms were examined by food consumption groups or wealth.

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[100] "Eating less-preferred/expensive foods", "limiting portion size at mealtime" and "reducing the number of meals per day" have a severity score of 1. "Borrowing food or rely on help of friends/relatives" and "limit adult intake in order for small children to eat" have a severity score of 2 and 3 respectively.

Table 40: Number of times per week each coping strategy is used and mean Reduced CSI

	rely less preferred / cheaper food	borrow food / rely on help friends	limit portion size meals	restrict adult consumption to preserve children's consumption	reduce number meals in a day	CSI reduced
Unguja	**1.1**	**1.6**	**1.3**	**1.1**	**1.8**	**10.7**
North A	1.7	2.1	2.6	2.6	2.8	18.9
North B	0.9	1.6	0.9	0.7	1.7	8.8
Central	0.9	1.5	0.9	0.9	1.7	9.2
South	0.8	1.3	0.9	0.5	0.7	6.5
West	1.3	1.3	1.4	1.3	1.5	10.7
Pemba	**4.5**	**1.6**	**0.9**	**0.4**	**3.4**	**13.2**
Wete	4.7	1.7	0.8	0.3	3.8	13.6
Micheweni	4.1	1.3	1.3	0.7	3.7	13.8
Chake Chake	4.2	1.1	0.2	0.5	1.1	9.3
Mkoani	5.0	1.9	0.8	0.2	3.6	13.7
Zanzibar	**2.6**	**2.0**	**1.1**	**0.9**	**2.5**	**11.8**

Source: 2009/2010 CFSVA

Assistance

Food assistance

In Zanzibar, food assistance is uncommon with only 4.1 percent of the sampled households receiving it in the 12 months preceding the survey. Overall 5.5 percent were in Unguja while only 2.2 percent were in Pemba. In Unguja those receiving food assistance were clustered in North B and South districts while in Pemba they most were located in Micheweni and Mkoani. The types of food assistance programmes accessed in Zanzibar included free food distribution, food for school, food for pregnant mothers and food for work. In both Pemba and Unguja, most households seem to access food through free food distribution programmes.

Underlying causes of food insecurity and malnutrition

Food security is a complex construct reflecting multiple dimensions: food availability, food access and food utilization. The food consumption score is commonly used as a proxy-measure of the current food security situation because it is a reliable and easily replicable measure that correlates well with more complex measures (e.g. caloric intake). To understand what factors impact the level of food consumption in Tanzania, key indicators of food security status were examined first on a bivariate and then a multivariate basis. For the multivariate analysis, least squares, linear regression models were developed which regressed a series of independent variables by the continuous dependent variable, food consumption score. Model development was an iterative process with independent variables added and removed as necessary until the best model or series of models was developed. In both rural Mainland Tanzania and rural Zanzibar, decisions on which key food security indicators the model tested were based on the bivariate associations with food consumption scores.

Rural Mainland Tanzania

Underlying causes of food insecurity

All independent variables tested in the Rural Mainland Tanzania model are shown in Table 41.

Table 41: Independent variables included in food security causal analysis models

Human/social capital	Natural capital/Socioeconomic	Exposure to shocks
Region Sex of HH head Age of HH head Crowding (num sleeping/room) Dependency rate Literacy of HH head Presence of orphan in HH Presence of chronically ill adult in HH	Livelihood profiles Tropical livestock unit HH has access to at least one goat HH has access to at least one sheep HH has access to at least one cattle HH has access to at least one poultry HH has access to at least one pig Farming more than one hectare of land Number of seasons farmed HH farms at least 4 crops Number of livelihood activities HH used chemical fertilizer HH used natural fertilizer Wealth index	HH experienced lack of rainfall/late rainfall in past year HH experienced high food prices in past year HH experienced plant disease/animal pests in past year

Table 42 shows the variables that emerged in the regression analysis as highly associated with poor food consumption. Each is addressed separately below:

Livelihood groups: Small subsistence farmers and daily workers were the only livelihoods significantly worse off than salaried workers after controlling for potential confounding variables.

Illiterate household heads: Households with illiterate household heads were significantly more likely to have a lower food consumption score, by an average of 1.4 points, than households with a literate household head.

Wealth Index: Asset ownership was strongly associated with higher food consumption scores. For every one unit increase, food consumption score increased by over 6 points on average.

Tropical Livestock Unit: Access to livestock, as measured by the standardized TLU, was associated with higher food consumption scores, by an average 0.3 points per unit increase.

Cultivation of at least four crops: Diversity in crop production and specifically the cultivation of least four crops was strongly associated with increased food consumption scores. Households who

cultivated at least four crops had a food consumption score on average 2.9 points higher than those who did not.

Use of chemical fertilizers: Households using chemical fertilizers had significantly higher food consumption scores than those who did not. Specifically, households using chemical fertilizers reported food consumption scores almost 4 points higher than those who did not.

Table 42: Final regression model for food security causal analysis, controlling for livelihoods and region

	Regression coefficients	T	Sig.
Constant	61.327	28.990	0.000
Illiterate household head	-1.431	-1.9696	0.045
Wealth Index	6.329	19.049	0.000
TLU (Tropical Livestock Unit)	0.338	5.655	0.000
HH cultivating 4 crops	2.850	4.216	0.000
HH used chemical fertilizers	3.768	4.046	0.000

Source: 2009/2010 CFSVA

Interactions between regions/livelihood groups and the variables that were strongly associated with poor food consumption were examined. This was done in order to determine whether the relationship between these variables had similar effects in all regions or whether they had a particularly strong effect in a particular region. The results of these interactive models show the following:

- Illiteracy of household head: This negatively impacted food consumption in the Mwanza and Mara regions more than anywhere else.
- Access to livestock: This positively impacted food security status in Tanga, Mtwara and Ruvuma more than in other regions and it negatively impacted food consumption in Kagera.
- Cultivating four or more crops: This positively impacted food consumption in Dodoma, Arusha, Kilimanjaro, Singida, Rukwa, Shinyanga, Kagera and Mara regions more than others.
- Using chemical fertilizers: This positively impacted food consumption in Arusha and Shinyanga more than other regions.
- Asset wealth: This positively impacted food consumption in more in Arusha than other regions.

Underlying causes of malnutrition

In Rural Mainland Tanzania, multivariate least squares, linear regressions were also conducted to explore individual level predictors of child malnutrition. As stunting prevalence is the primary nutritional concern in Tanzania, regressions were only conducted on the dependent variable height-for-age z-scores. Independent variables examined in the course of the analysis are shown in Table 43.

Table 44 shows the variables that emerged in the regression analysis as highly associated with poor food consumption. Each is addressed separately below:

Child gender: Male children have significantly lower HAZ scores than female children by -0.161.

Child ill with diarrhoea: Children ill with diarrhoea had a significantly lower HAZ score than those without diarrhoea by -0.313.

Child who received deworming medicines: In a counterintuitive finding, children who received deworming medicines had a significantly lower HAZ score by 0.165. This is likely driven by the fact that deworming programmes largely target children believed to face nutritional challenges.

Wealth Index: Asset ownership was strongly associated with better HAZ scores, by an average of 0.191 per unit increase.

Age of household head: Children with older household heads had significantly higher HAZ scores by 0.008 per year increase in age.

Households who had experienced high food prices in the past year: Children in households who had experienced food price shocks in the past year had a significantly higher HAZ score (by 0.116) than those who had not.

Table 43: Independent variables included in nutrition causal analysis models

Human/social capital	Natural capital/ Socioeconomic/Food consumption	Maternal and child health and nutrition	Exposure to shocks
Sex of HH head Age of HH head Crowding (num sleeping/ room) Dependency ratio Literacy of HH head Presence of orphan in HH Presence of chronically ill adult in HH	Access to adequate drinking water source Access to adequate toilet Farming more than one hectare of land Farming at least 4 crops Tropical Livestock Unit (TLU) Number of livelihood activities Wealth index Percentage of total monthly expenditures on food Access to adequate drinking water source Food consumption score Access to adequate toilet	Child illness (diarrhoea, fever, cough) Maternal BMI Receipt of vitamin A Maternal education Receipt of deworming medicines	HH experienced lack of/late rainfall in past year HH experienced high food prices in past year HH experienced plant disease/animal pests in past year

Table 44: Final regression model for child nutrition causal analysis

	Regression coefficients	T	Sig.
Constant	-0.466	67.4763	0.000
Child gender	-0.161	9.807	0.004
Child ill with diarrhoea	-0.314	-3.444	.001
Child who received deworming medicines	-0.165	-2.620	.009
Wealth Index	0.191	6.802	.000
Age of household head	0.008	3.713	.000
HH experienced high food prices in past year	0.116	2.028	.043

Source: 2009/2010 CFSVA

In summary, disease and particularly diarrhoea was found to be associated with increases in the prevalence of stunting, as was household asset wealth. Receipt of deworming medicines and experience of food price shocks showed counterintuitive findings. Deworming medicines were associated with deterioration (rather than improvement) in nutritional status. This was probably driven by the fact that more malnourished children are targeted for deworming. Likewise, children in households who experienced food price shocks in the past year were slightly better off than those in households who did not experience these shocks. Reasons for this were unclear.

Notably, after accounting for potential confounding variables, food consumption score, water and sanitation, maternal education and maternal BMI did not seem to play a role in stunting prevalence among children.

Rural Zanzibar

Underlying causes of food insecurity

All independent variables tested in the Rural Zanzibar model are shown in Table 45.

Table 45: Independent variables included in food security causal analysis models

Human/social capital	Natural capital/Socioeconomic	Exposure to shocks
District	Livelihood profiles	Reduced coping strategies index
Sex of HH head	HH has access at least one goat	HH experienced lack of/ late
Age of HH head	HH has access to at least one sheep	rainfall in past year
Crowding (num sleeping/room)	HH has access to at least one cattle	HH experienced high food prices
Dependency rate	HH has access to at least one	in past year
Literacy of HH head	poultry	HH experienced plant
Presence of orphan in HH	HH has access to at least one pig	disease/animal pests in past year
Presence of chronically ill adult in	Farming more than one hectare of	HH experienced high
HH	land	fuel/transport costs
	Farming at least 4 crops	
	Number of livelihood activities	
	HH used chemical fertilizer	
	HH used natural fertilizer	
	HH cultivated garden	
	Wealth index	

Table 46 shows the variables that emerged in the regression analysis as highly associated with poor food consumption. Each is addressed separately below:

Livelihood groups: All livelihood groups were significantly worse off, after controlling for wealth, than the agro-pastoral livelihood profile.

Households with vegetable gardens: After controlling for wealth and other potential confounding variables, households who cultivated vegetable gardens were significantly more likely to have high food consumption scores, by an average of 1.8 points, than those who did not cultivate vegetable gardens.

Wealth Index: Asset ownership was strongly associated with higher food consumption scores. For every one unit increase, food consumption score increased by over 2.8 points on average.

Number of livelihood activities: After controlling for potential confounding variables, the number of livelihood activities that a household engaged in was significantly associated with food consumption scores. Specifically, households who engaged in two livelihood activities had a food consumption score 2.2 points higher, on average, than households who engaged in just one activity. Likewise, households who engaged in three livelihood activities had a food consumption score almost 4 points higher. Notably households who engaged in four livelihood activities did not have a significantly higher mean food consumption score than those engaged in only one, though this was likely driven by sample size (as very few households reported four livelihood activities).

Experienced lack of rainfall in past year: Households that reported experiencing a lack of rainfall in the past year were significantly more likely to have lower food consumption by 1.96 points on average.

Use of chemical fertilizers: Households using chemical fertilizers had significantly higher food consumption scores than those who did not. Specifically, households using chemical fertilizers reported food consumption scores 5 points higher than those who did not.

Farmed more than one hectare of land: Households farming more than 1 ha of land had food consumption scores 2.4 points higher on average than those who farmed less than 1 ha.

Access to cattle: Cattle access was associated with higher food consumption score: households who accessed cattle had food consumption scores 5.8 points higher on average than households who did not.

Table 46: Final regression model for food security causal analysis, controlling for livelihoods/district

	Regression coefficients	T	Sig.
Constant	66.471	45.630	0.000
Wealth Index	2.800	8.621	0.000
Vegetable garden	1.815	2.722	0.007
HH has two livelihood activities	2.158	2.960	0.003
HH has three livelihood activities	3.982	4.177	0.000
HH has four livelihood activities	2.133	1.145	0.252
Experience lack of rainfall	-1.961	-2.981	0.003
Used chemical fertilizer[*]	5.009	4.225	0.000
Farmed more than 1 ha of land[*]	2.421	2.798	0.005
Access to cattle[*]	5.769	5.85	0.000

Source: 2009/2010 CFSVA

* denotes the variables (both agriculture and livestock related) that were looked at in separate models because the sample sizes of households engaging in both differed from the sample of all households. Thus, three models were developed in total: 1) overall model (without agriculture or livestock variables); 2) agriculture model (the same overall model but including agricultural variables as well) and 3) livestock access model (again the same overall model but including livestock access).

Conclusions and Recommendations

Rural Mainland Tanzania

Conclusions

Human and social capital

The education of household heads appears to play an important role in food security. It is significant that almost one-quarter of the households (23.6%) are headed by an illiterate head. Notably, illiteracy rates are higher among women household heads as opposed to men heads (45.4% vs 17.5%). Nationwide, approximately 22 percent of households are headed by women.

About 10 percent of households care for at least one chronically ill adult member, while 18 percent care for at least one orphan. These findings are fairly typical in countries with generalized HIV/AIDS epidemics. Interestingly, neither caring for chronically ill adults nor caring for orphans was associated with poor food consumption (on the contrary, caring for orphans showed a slight positive association with good food consumption). This lack of association or even minor protective effect is not surprising as studies on the relationship between HIV and wealth have shown that HIV/AIDS disproportionately impacts wealthier households.[101]

CFSVA findings show net enrolment rates at 70.2 percent. This represents a slight decline since 2005/2006 but straight comparisons between 2005/2006 and 2009/2010 estimates were difficult as the age ranges of children included in the two calculations differed (7-14 years were measured in 2009/2010 vs 7-13 year olds in 2005/2006). Thus, differences in rates were likely the result of the inclusion of 14 years olds in 2009/2010 estimate. Regional comparisons showed that enrolment rates were highest in Kilimanjaro and Tanga (at 79%) and lowest in Rukwa (58.8%) and Mtwara (60%). There was very little difference in school enrolment rates between male and female children (69.0% vs 70.7% respectively).

Natural capital

Households in rural Mainland Tanzania experience either a unimodal or bimodal rainfall regime which influences the timing of lean periods. The unimodal rainfall regime is characterized by a long dry season which extends from May to October and a long rainy season (termed the Musimu rains) stretching from November to April. The bimodal rainfall regime has a short rainy season (the Vuli rains) extending from October to early January and a longer rainy season (the Masika rains) from mid March to the end of June. In bimodal areas, these two seasons are not clearly separated by a well-defined dry period as occurs in regions with proper bimodal rainfall regimes. Instead the period of February to mid March is less rainy and has significant dry spells.

In rural Tanzania almost all households are involved in agriculture. It is rain-fed and largely traditional, with small subsistence farming comprising the largest share of agriculture. Maize production is widespread throughout the country (reported by 90.5% of farmers), with kidney beans (36.5%), cassava (29.3%), rice (23%) and groundnuts (20.6%) the next most common items produced. Overall, 50.2 percent, 53.2 percent and 70.2 percent of the households farming in Masika, Musimu and Vuli seasons respectively cultivated on smallholder plots (less than 1ha). The vast majority of farmers, regardless of cropping season, reported that they owned the land they farmed.

Crop harvests lasted on average 4.7 months for the Masika season and and 3.6 months for the Vuli season. Harvests for the Musimu season, by contrast, lasted almost a full month longer (5.5 months). This is not surprising because these harvests are typically larger. Vuli harvests tend to decline most rapidly with fewer than 30 percent of households maintaining reserves after just four months. Reserves from the Musimu and Masika harvests, however, are still reported by 50 percent or more of households four months after the harvest. The Musimu harvests, however, tend to last longer than the Masika harvests. The percentage of household reporting reserves from the Musimu harvest does not fall below 20 percent until two months before the next Musimu harvest. By

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[101] Mishra V, Bignami S, Greener R, Vaessen M, Hong R, Ghys P, Boema T, Assche A, Khan S, Rutstein S. A study of the association of HIV infection with wealth status in sub-Saharan Africa. DHS Working Paper. No. 31, January 2007.

contrast, the percentage of households with reserves from the Masika season is below 20 percent for a full four months prior to the next Masika harvest. As these households are probably benefiting from the Vuli harvest during this period, this may be less of a problem than it appears. However, the regions of Ruvuma and Rukwa are fully dependent on Masika harvests (and Mbeya to a lesser extent) and therefore they would be subject to shortfalls in harvest produce during this period.

The length of time that crop harvests last is particularly important in Tanzania because no other income-generating activities appear to replace agricultural activities during the months when agriculture is least practised. In practical terms, this means that households are not replacing the income lost during slow agricultural periods, leaving them with less money to purchase food and consequently more reliant on remaining food stocks. This is significant for targeting as it means that households are potentially more vulnerable during the lean periods, which regardless of the cropping season generally fall between November and December and between April and March.

Crop diversity is one strategy for combating food insecurity at household level. Overall, this study found a strong association between households farming four or more crops and improved food consumption. Low crop diversity areas (farming less than four crops) included Manyara, Arusha, Dar es Salaam and Pwani. High crop diversity areas, by contrast included Mwanza, Kigoma, Kilimanjaro and Lindi.

Use of agricultural inputs, such as chemical fertilizers, was also found to be associated with improved food consumption. Overall, about 15 percent of households indicated using chemical fertilizers. Areas with high chemical fertilizer use included Ruvuma, Kilimanjaro, Mbeya and Iringa. Households in Arusha tended to use chemical fertilizers the least. The largest obstacle towards use of agricultural inputs is probably cost, as the price of such items in Tanzania is often prohibitive.

Crop loss is thought to be a major problem in Tanzania but CFSVA findings did not show strong associations between crop loss and poor food consumption. The regions which reported the highest crop loss (as defined by percentage of households who lost more than 20 percent of their harvest) included Iringa and Lindi. The lowest crop loss regions included Kilimanjaro, Dodoma and two of the regions with poorest food consumption (Mtwara and Manyara).

Access to livestock was found to be a highly protective factor against food insecurity in Mainland Tanzania. In total, 70 percent of households reported access to livestock with chicken, goats and cattle amongst the most common animals. Cattle access was most common in the regions of Kilimanjaro, Arusha and Manyara. While access to livestock was generally associated with improved food security status throughout the mainland, it was found to be particularly important in ensuring food security in Tanga, Mtwara and Ruvuma. By contrast, Kagera was the only region where access to livestock was associated with poorer food security status.

Physical capital

Physical capital is important in that it enhances the capability of the household to withstand shocks. Moreover, assessing physical capital helps to understand the wealth of households. In Mainland Tanzania, housing structures were not usually made of permanent materials. Mud floors were common in 78 percent of households while roofs were usually made of galvanized iron (57.6%) or straw (29.3%). Access to safe water and sanitation, an important development goal, was not universal. In fact, only 58 percent of households had access to improved drinking water sources, with rivers and lakes cited as the main source of unimproved water (21.1%). Access to proper sanitation, on the other hand, was much higher at 88 percent.

Using asset ownership and housing infrastructure variables, a wealth index (WI) was computed as a proxy of asset wealth. The WI was found to be strongly associated with poor food consumption. Indeed, 50 percent of households in the poorest food consumption region of Mtwara were in the poorest wealth quintile, and 38 percent of households in Arusha (another poor food consumption region) were in the poorest quintile. Moreover, the results showed that there were virtually no households with poor consumption amongst those households in the rich and richest wealth quintiles. This suggests that the indicators used for the wealth index can be useful in selecting beneficiaries during programme targeting.

Poor-consumption households: How many are they? Where are they?

At the time of the survey, 77 percent of the households in rural Mainland Tanzania had acceptable food consumption, 18.9 percent had borderline food consumption and 4.1 percent had poor food consumption. Poor food consumption households were found to eat mainly cereals (5.3 days a week) and vegetables (3.1 days a week), with very little of any other food, especially animal proteins and milk. Borderline consumption households had only a slightly more diverse diet, eating cereals, tubers, pulses and vegetables one more day a week than poor food consumption households. Borderline food consumption households, however, still ate very little animal proteins and milks (less than one day a week on average).

The prevalence of households with poor food consumption was highest in Mtwara and Manyara, at 20.0 percent and 17.6 percent respectively. Other regions with notable percentages of poor food consumption households included Arusha (6.8%), Singida (5.4%) and Lindi (5.3%).

Manyara and the central regions of Dodoma and Morogoro had the highest prevalence of borderline food consumption households, suggesting that a large percentage (over one-third of households in each region) have tenuous access to food. Combining the poor and borderline food consumption households, a clear band of food insecurity or vulnerability to food insecurity becomes apparent, extending from the south eastern regions of the country, through the central regions and into the north central regions of the country. The prevalence of acceptable consumption is highest in the central and northern coastal regions and in the western part of the country. Overall, adequate food consumption households are most prevalent in Tanga, Kigoma, Rukwa and Mbeya, with over or close to 90 percent of food secure households.

Poor-consumption households: Who are they?

The association between consumption and various household characteristics was also explored. In terms of livelihoods, households relying on daily work, aid and small subsistence farming were the most likely to have poor food consumption, with a prevalence between 5 and 10 percent in each group. These groups also showed high percentages of borderline food consumption households. By contrast, the groups with the highest percentages of acceptable food consumption households included salaried workers. Amongst this group, there were virtually no poor food consumption households and fewer than 10 percent with borderline consumption.

In terms of other household characteristics, food consumption was lowest among the poorest households and improved as wealth increased. Households with poorer consumption also tended to: 1) cultivate less diverse crops; 2) have less access to livestock; 3) use chemical fertilizers less frequently; 4) have only one income activity; 5) have a woman as household head and 4) have an illiterate household head.

Dietary diversity and sources of food

On average, diets in Mainland Tanzania are heavily cereal-based and animal proteins are rarely consumed. Overall, cereals are consumed at least one day a week by 97 percent of households. On average cereals were eaten almost seven days a week (at 6.4), with maize being the most common cereal consumed (5.8 days a week). The next most commonly eaten food group was oils and fats, which were consumed 4.5 days a week on average. Vegetables were consumed more days on average (4.3) than sugars (3.8).

Malnutrition in children

Chronic malnutrition is high in rural Mainland Tanzania; over one-third (36.6%) of all children are stunted. Stunting rates have largely remained unchanged over the last decade. An examination of growth patterns show that stunting starts early in childhood (<1 year) and children decline quite rapidly until about 2 years of age, when children are most stunted. From that point on, there is gradual improvement in nutritional status. This suggests that child care practices, especially complementary feeding patterns are important factors leading to stunting. The highest prevalence of chronic malnutrition (stunting) was found in Iringa, Rukwa and Kigoma where over half of all children were stunted.

Acute malnutrition is not as much of a problem as stunting in Mainland Tanzania, though the CFSVA revealed pockets where acute malnutrition is high. Overall, wasting prevalence was 5.7 percent with most regions showing relatively low prevalence. The only region where prevalence

was particularly concerning was in Arusha. Here, 16.6 percent of children were wasted; however, this prevalence should be interpreted carefully as the sample size was low and therefore the confidence interval quite high (10.9% to 22.4%). Also, this is largely an agro-pastoral area and studies have shown that wasting rates are often higher in agro-pastoral areas than amongst agricultural populations but the health effects associated with these elevated rates of wasting (defined by under 5 mortality) are often similar to those observed among moderately wasted agricultural children.[102]

An examination of growth patterns among children revealed steady deterioration early in childhood, followed by a sustained period of improving nutrition, followed by an unexplained decline in nutritional status as childen approach 5 years of age.

Underweight prevalence was 14.3 percent, with highest rates in Mtwara (21%) and Manyara (19%). Overall, as neither region had the highest stunting or wasting rates, high underweight prevalence probably reflects the combined impact of moderate stunting and wasting that children in these region experience. The lowest prevalence regions include Mbeya and Mwanza.

Women's nutrition status

Malnutrition, as measured by BMI, remains a problem among non pregnant women of reproductive age (15-49 years old) in rural Mainland Tanzania. The study found that 8.9 percent of the women in the country are undernourished which is only a slight decrease from the 10 percent prevalence seen in the 2004/2005 DHS survey. Prevalence was highest (at about 15%) in Mtwara and Arusha and lowest in Tanga, Ruvuma and Mbeya (at below 5%).

Access to health and maternal and child morbidity

Access to antenatal care was almost universally reported with 91 percent of women reporting at least one visit during their last pregnancy. Access was high in most regions with the exception of Kagera and Dar es Salaam where percentages were a little lower at 79 and 82 percent.

The CFSVA showed that 31.5 percent of mothers and 28.9 percent of children had been sick in the two weeks preceding the survey. As Tanzania is a malaria-endemic country, fever was the most common type of childhood illness experienced (23%), followed by coughs (16.7%) infection and then diarrhoea (9.8%). Children in Mwanza, Singida and Tanga were most likely to have fever with prevalence ranging between 30 and 40 percent. Children in Dodoma had the highest prevalence of coughs (at almost 30%) and Mwanza, Singida and Dodoma had the highest prevalence of diarrhoea (slightly over 15% in each region).

Vitamin A and deworming

Vitamin A supplementation and deworming medicine was provided to 87.9 and 67 percent of children respectively in the six months preceding the survey. Children in Kagera, Dar es Salaam and Morogoro reported the highest percentages of both, while Rukwa reported amongst the lowest percentages. Arusha reported the lowest percentage of children receiving deworming medicine, at slightly less than one half.

Shocks and coping mechanisms

On average, 88.4 percent of households reported having experienced a shock during the 12 months preceding the survey. In most cases, there was little variation by region or livelihood group, with between 80 and 100 percent of households in each region and livelihood group reporting a shock. The only exceptions were in Shinyanga and Kagera where only 28 percent and 50 percent of households reported a shock.

The shocks most commonly reported included drought (58.4%), high food prices (53.4%) and plant disease/animal pests at (34.7%). Geographically, drought was most frequently reported in northern (Arusha-90.5%; Tanga-93.9; Manyara-80.0%; Kilimanjaro-87.8%; Mara-85.7%), central (Dodoma-85.2%; Morogoro-80.6%) and south eastern regions (Mtwara-88.0%; Lindi-88.5%).

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[102] Mason J, Chotard S, Dieterich M, Oliphant N, Smith E, Rivers J, Hailey P and Mebrahtu S. Fluctuations in wasting in vulnerable child populations in the Greater Horn of Africa. Working Papers in International Health and Development. No.08-02. New Orleans: Department of International Health and Development, Tulane University, 2008. http://www.sph.tulane.edu/IHD/publications/WP%20Fluctuations%20Mason.pdf

This roughly corresponds to rainfall patterns and reflects the increasing bimodal tendencies in the northern regions. The CFSVA, taking into account household perceptions and rainfall, has characterized the drought risk to regions as follows:

Risk classifications	Type/Timeliness of risk	Regions impacted
Seasonally low	Low hazard all year round as perceived by households in areas with typically good moisture supply	Ruvuma, Rukwa, Kagera and Shinyanga
Seasonally high	High hazard nearly all year round as perceived by households in areas of lower rainfall and moisture availability	Arusha, Tanga and Kilimanjaro
Peak season hazard	Hazard peaks during middle of cropping season, most likely at flowering or grain filling stage; in areas with the highest February rainfall variability	Dodoma, Morogoro and Lindi
Planting season hazard	Hazard peaks during planting and early crop development stages	Mtwara, Dar es Salaam, Mara, Kigoma, Mwanza, Manyara, Tabora, Singida, Mbeya, Iringa, and Pwani

Given the 2008 food price crisis and the 2009 financial crisis, high food prices were a problem in many parts of the country. High percentages of households in northern (Kilimanjaro-77.3%; Mara-80.1%), central (Dodoma-71.3%; Singida-71.4%) and southern regions (Lindi-86.3%; Mtwara-74.8%) reported this shock. Only households in western regions reported this shock less frequently. Examined by livelihood profile, high food prices disproportionately impacted daily workers (62.5%), fishermen/hunters (69.0%), households reliant on aid (60.8%), and "others" (68.4%). Large food/cash crop producers were least affected with only 43.8 percent reporting this shock.

Problems with plant disease and animal pests were reported most frequently in Lindi (83.6%), Kigoma (78.6%), Mtwara (66.9%), Mwanza (63.6%) and Mara (60.9%). The regions least affected included Shinyanga (1.9%), Ruvuma (5.0%) and Arusha (4.5%). Examined by livelihoods, large subsistence famers and "others" were most affected, with 41.9 and 42.9 percent of household affected respectively.

Importantly, shocks, after accounting for wealth (and other potential confounding factors), were not found to be associated with food consumption.

Underlying causes of malnutrition

The examination of growth patterns indicated that high stunting rates could be strongly associated with child card practices that begin shortly after birth, especially related to the timing, quality and diversity of complementary foods. By improving these factors, at least among children in poor food consumption households, findings indicate that it would be possible to see a reduction in stunting rates. Regression analysis seems to support this, as diarrhoea (a key outcome of poor feeding patterns) is strongly associated with increased stunting rates. Notably, water and sanitation, maternal education and maternal BMI did not seem to play a role in stunting prevalence among children.

Recommendations

Given the findings reported above, the CFSVA can make the following recommendations for future programmes and policies in Mainland Tanzania.

Human Capital

The CFSVA findings confirmed the association between illiteracy of household head and food insecurity, even when taking into account wealth and other factors associated with insecurity. Therefore, the CFSVA recommends strengthening policies that promote education. As Mainland Tanzania has already instituted mandatory primary school to address literacy among children, reforms should, in addition, focus on adult literacy programmes, especially targeting adult women.

Natural and Physical Capital

Because use of chemical fertilizers was associated with improved food security status, the CFSVA recommends that the GoT continue expanding the inputs (fertilizer, seeds and pesticides) voucher system established in 2008. The agricultural input voucher programme, which initially targeted only 700,000 poor farmers (farming less than 1 ha of land), expanded in 2009 to cover 1.5 million people. Additional expansions over time to cover more vulnerable farmers, particularly in low food consumption regions such as Mtwara and Manyara, could significantly increase agricultural output and improve food security status.

Agricultural extension services should be provided to promote crop diversification and to help prevent and mitigate crop failures. Crop diversification not only improves food security status but increased diversity in diet will also likely improve nutritional outcomes in mothers and children. This should be particularly targeted toward regions in the north (Arusha and Manyara).

Physical capital

Safe drinking water and good sanitation provide the proper foundation for healthy communities and properly nourished children. As such, a general recommendation is that water and sanitation programmes be promoted in low access areas like Mara, Pwani and Tanga. These programmes would be particularly important in Mara as almost three-quarters of households do not have access to safe drinking water sources.

Food consumption and dietary diversity

As a varied diet provides different nutrients needed by the body for proper growth and maintenance, eating various types of food helps prevent malnutrition and promote health. While households with acceptable food consumption have adequate diversity in their diets, the poor and borderline consumption households, which are clustered in Mtwara, Manyara, Arusha, Lindi and the central regions of the country, do not have the required variation in their diets, largely living off cereal consumption alone. The impact of this is seen in child growth and maternal and child health. In fact, inadequate diversity in the complementary foods provided to children 6-23 months of age may explain the large increases in stunting prevalence during this period. Given this, the CFSVA recommends focusing on dietary diversity, particularly in regards to the importance of providing assorted foods to children 6-23 months of age. This could be in the form of educational campaigns or through agricultural extensions services.

As stunting may also begin in utero, given the intergenerational nature of malnutrition, it is important that pregnant women receive the dietary diversity needed for the development of a healthy baby. Therefore, the CFSVA recommends that nutrition programmes be tailored to pregnant women to ensure that they are receiving adequate diversity in their diets, including consumption of animal proteins and milks.

Maternal and child health and nutrition

Lower rates of post neonatal mortality, indicated by DHS data, indicate that the country's focus on child health issues, particularly in relation to malaria, are having an impact. The CFSVA recommends continued action on these fronts.

A key finding of the CFSVA is that high stunting rates are probably associated with child care practices that begin shortly after birth. This argues for prenatal or early childhood interventions aimed at educating mothers on the importance of proper nutrition for themselves during pregnancy and proper feeding for their children after birth (and particularly the importance of the timely introduction of appropriate/diverse complementary foods and continued breastfeeding until 2 years of age). Increasing access to ante and postnatal care, where such topics are discussed, would be one way of doing this. While the CFSVA found that almost all women (91%) currently seek antenatal care, it may be necessary to strengthen the information provided on the importance of proper maternal nutrition and child care practices.

Rural Zanzibar

Conclusions

Human and social capital

In Zanzibar, 17.3 percent of households are headed by women and close to 38 percent of households are headed by an illiterate person. Almost 3 percent of households reported an adult death in the six months preceding the survey and 5 percent of households were caring for a chronically ill or disabled member. Notably, 10 percent of households reported caring for an orphan, in spite of the relatively low HIV/AIDS prevalence.

Despite Zanzibar's historical focus on education, CFSVA findings show that there is still room for improvement with overall net enrolment rates hovering at 73.3 percent. It is striking that enrolment rates in Pemba are 16 percentage points lower than rates in Unguja, with Mkoani district showing the lowest rates at just above 60 percent. The highest enrolment rates are seen in Unguja's South district, which is consistent with previous assessments.

Natural capital

Households in Zanzibar experience a bimodal rainfall regime. Bimodal rainfall regimes have a short rainy season (the Vuli rains) from October to early January and a longer rainy season (the Masika rains) extending from mid March to the end of June. Throughout Zanzibar, these two seasons are not clearly separated by a well-defined dry periods as inter-monsoonal rains account for one-fifth of all rainfall.[103]

In Zanzibar, agriculture accounts for 50 percent of GDP (and employs nearly 70 percent of the workforce). Agriculture remains rain-fed and largely traditional, with small holder farming the largest share of agriculture. Cassava production is widespread throughout Zanzibar (reported by 93.1% of farmers), with sweet bananas (65.1%), rice (58.3%), sweet potatoes (28.2%), maize (14.5%) and cowpeas (11.5%) the next most common crops produced. Overall, approximately 85 percent of households farming in the Masika and Vuli seasons cultivated smallholder plots (less than 1 ha). Almost two-thirds of households, regardless of cropping season, reported that the land farmed was their own.

Crop harvests lasted on average 3.0 for the Masika season and 2.8 months for the Vuli season. Reserves from the Masika and Vuli harvests tend to decline at a similar rate: both left fewer than 10 percent of households with reserve stock after six months. In practical terms, this means that the cropping seasons preceding the survey provided harvests large enough for households to maintain stock only until the harvest of the next season. Therefore, smaller than normal harvests or failed harvests could result in food shortages months before the next harvest. This concern is valid even though households in Zanzibar rely primarily on purchase rather than own production for food. Food shortages would inevitably lead to large price increases restricting food access for poorer households.

Crop diversity is one strategy for combating food insecurity at household level. The CFSVA found strong bivariate associations between households farming four or more crops and improved food consumption. West district reported the lowest number of households planting four or more crops while North B, Wete and Chake Chake reported the highest.

Use of agricultural inputs, such as chemical fertilizers, was also found to be associated with improved food consumption. Overall, only about 8.1 percent of household indicated using chemical fertilizers, with use more common in Unguja than Pemba. Areas with high chemical fertilizer use included West, South and Central. Households in Wete and Micheweni tended to use chemical fertilizers the least.

Crop loss is thought to be a major problem in Tanzania but CFSVA findings did not show strong associations between crop loss and less than acceptable food consumption. The districts which reported the highest crop loss (as defined by percentage of households who lost more than 20

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[103] Komba YH, Juma S, Fakih S, Abass T and Oliver D [Department of Commercial Crops, Fruits and Forestry: Zanzibar]. (2004). Vegetation Reconnaissance Survey of Kiwengwa Forest Reserve of Zanzibar- Tanzania.

percent of their harvest) included Mkoani, Micheweni and Wete. The districts reporting the lowest crop loss included Chake Chake and Central.

Access to livestock, and particularly to cattle, was found to be a highly protective factor against food insecurity in Zanzibar. In total, 46.1 percent of households reported access to livestock with chicken, cattle and goats being the most common animals. Access to cattle was most common in Pemba rather than Unguja, with access to chickens and cattle particularly common in Micheweni and Mkoani. By contrast, households in North A, South and West districts were least likely to report access to livestock.

Physical capital

Physical capital is important in that it enhances the ability of the household to mitigate shocks. Moreover, assessing physical capital helps to understand the wealth of households. In Zanzibar, housing structures were a mix of permanent and temporary materials. Mud and concrete floors were equally common in households with about 50 percent reporting each. Roofs, by contrast, were usually made of galvinized iron rather than plastic sheeting or straw. Overall, 64.2 percent of roofs were made of galvinized iron. Despite significant improvements, universal access to safe water remains illusive, with 7 percent of households still lacking access to improved drinking water sources. These households were largely reliant on unprotected wells. Access to proper sanitation, on the other hand, was a much bigger problem, with only 65.6 percent of households reporting access and a very alarming 75 percent of households reporting no access in Micheweni district in Pemba.

Using asset ownership and housing infrastructure variables, a wealth index (WI) was computed as a proxy of asset wealth. Looking at the distribution of households in the poorest wealth quintile by island and district revealed some striking differentials. Pemba had almost three times as many households in the poorest wealth quintile as Unguja, with Micheweni and Wete clearly the poorest districts. The wealthiest districts were South and West in Unguja.

Less than acceptable consumption households: How many are they? Where are they?

At the time of the survey, only 3.3 percent of the households in rural Zanzibar reported less than acceptable food consumption. Less than acceptable food consumption households had poor diets, relying cereal consumption five days a week, roots and tubers consumption four days a week and vegetable as well as animal protein consumption approximately one to two days a week. Acceptable consumption households had much better diets with cereal, pulses and milk consumed about one day more a week and a three-fold increase in animal protein consumption.

There are clear differences between districts in the distribution of less than acceptable food consumption household. As the maps below indicate, households with less than acceptable food consumption were concentrated in Pemba, with the highest percentages seen in the central and southern districts of Chake Chake (6.8%) and Mkoani (5.8%). Moving north in Pemba from Chake Chake, the prevalence seemed to decline, with Wete showing a prevalence of 4.0 percent and Micheweni showing a prevalence of 2.9 percent.

In Unguja, the districts most affected by poor food consumption were in the northern half of the island, with North A and North B reporting the highest prevalence at 3.4 and 5.4 percent respectively. By contrast, the central and southern districts of West, Central and South reported the lowest prevalence with 1.5, 0.5 and 0.5 percent of households reporting this.

Patterns in the percentage of households with acceptable food consumption followed those seen amongst households with less than adequate consumption. Unguja, and particularly West, Central and South districts, reported the highest percentage of households with adequate food consumption while Pemba, and particularly the central and southern districts of Chake Chake and Mkoani, reported the lowest percentages with adequate food consumption.

Less than acceptable consumption households: Who are they?

To determine who the food insecure were, various household characteristics were explored in relation to food consumption at the bivariate level, including:

Livelihoods: Less than acceptable food consumption was more prevalent in households reliant on aid (5.7%), agriculture (4.8%), "other" livelihoods (4.2%) and agro-pastoralists (4.2%). Assessed as a percentage of all households reporting less than acceptable consumption, 70.2 percent of households relied on one of these livelihoods, meaning that these four livelihoods account for over two-thirds of all less than acceptable food consumption households.

Demographics: Households headed by illiterate household heads, households headed by women and households with high crowding index appeared more likely to have poorer food consumption than other households.

Wealth and Production: Food consumption was lowest among the poorest households and improved as wealth increased. Households with less than acceptable consumption tended to:
(i) have access to less livestock (cattle);
(ii) cultivate less than one hectare of land;
(ii) not cultivate a household garden;
(iv) be less likely to use chemical fertilizers; and
(v) engage in fewer livelihood activities.

Shocks and coping mechanisms

The CFSVA explored in detail the types of shocks that households in Zanzibar experienced. The top three shocks reported by households included high food prices (55.7%), plant disease/animal pests (49.4%) and drought (44.8%).

Geographically, high food prices were most frequent in Pemba with 93.8, 85.6 and 72.8 percent of households reporting this in Micheweni, Wete and Mkoani respectively. High food prices were less of a problem in Unguja. Here, only 27.9, 35.1 and 37.7 percent of households reported this in the South, North B and West districts respectively. Looked at by livelihoods, there was little variation in the percentage of households affected, ranging from 45 percent amongst salaried workers to 65.3 percent amongst households reliant on aid.

Patterns in plant disease/animal pests were similar to those observed with high food prices, with households in Pemba again disproportionately impacted. Overall, 86.1, 73.3 and 57.1 percent of households in Micheweni, Wete and Mkoani reported this shock. In Unguja, by contrast, only 11.7, 17.2 and 18.4 percent of households in North B, South and Central districts were affected by this. Examined by livelihood profile, agriculturalists (47.7%), fishermen (47.9%) and agro-pastoralists (45.0%) were most affected, while small business (25.7%) and casual labourers (25.9%) were the least impacted.

Problems with drought also followed the same patterns seen above, with households in Pemba rather than Unguja more affected. Overall, drought was commonly reported by households in Micheweni (82.8%), Wete (66.3%) and Mkoani (63.4%). It was least reported in Unguja's North B district, where only about one-fifth of households mentioned this shock. Examined by livelihood, no difference was found: between one-third and one-half of all households in each livelihood group reported this shock. Households relying on agriculture (53.2%), agro-pastoralism (52.0%) and fishing (44.3%) were most likely to report this shock, while the livelihood profiles least impacted included households reliant on aid (30.1%), casual labour (33.1%) and commerce (39.5%).

Recommendations

Given the findings reported above, the CFSVA can make the following recommendations for future programmes and policies.

Human Capital

The CFSVA findings confirm the association between the illiteracy of the household head and food insecurity, even when taking into account wealth and other factors associated with insecurity. Therefore, the CFSVA recommends strengthening policies that promote education. As Zanzibar has already instituted mandatory primary and secondary school to address literacy among children, reforms should, in addition, focus on adult literacy programmes, especially targeting adult women.

Natural Capital

As the use of chemical fertilizers was associated with improved food security status, the CFSVA recommends that the GoZ facilitate access to inputs such as fertilizer, seeds and pesticides. By giving farmers access to this technology, it will be possible to increase yields, bolstering both food supply and household livelihoods.

Agricultural extension services should be provided to promote crop diversification and to help prevent and mitigate crop failures. Crop diversification not only improves food security status but increased diet diversity will probably also improve nutrition in mothers and children.

Finally, the CFSVA confirms that household gardens have a beneficial impact on household food security. Therefore, it is recommended that household and community gardens be encouraged as a way of bolstering household coping capacity during periods of food stress.

Physical capital

Safe drinking water and good sanitation provide the proper foundation for healthy communities and properly nourished children. As such, a general recommendation is that water and sanitation programmes, being conducted as part of the Zanzibar Food Security and Nutrition Policies and Programmes, be targeted to low access areas like the Pemba districts of Micheweni, Wete and Mkoani. These programmes appear particularly necessary in Micheweni where over three-fourths (77%) of household do not have access to improved sanitation.

Food consumption and dietary diversity

Since assorted foods provide different nutrients needed by the body for proper growth and maintenance, eating various types of food helps prevent malnutrition and promote health. While households with acceptable food consumption have adequate diversity in their diets, the less than acceptable food consumption households, which are clustered in Pemba and in the North B district of Unguja, do not. These households rely on an inadequate mix of cereal, root and tuber and animal protein consumption per week. This probably affects overall health and child nutrition so improving dietary diversity could significantly improve health and nutrition outcomes.

Annexes

The electronic copy of the report includes the full version of the Annexes. The hard copy includes a short version of the Annexes.

Annex 1: In-depth regional profiles of poorest food consumption regions

Mtwara

Food consumption

Food consumption groups (% HHs)			Mean FCS	Food groups (average weekly consumption)								
Poor	Borderline	Acceptable		Cereals	Tubers	Pulses	Vegs	Fruits	Anim. Prot	Oil	Sugar	Milk
20.0	28.5	51.4	37.8	4.3	3.8	1.3	3.2	3.3	3.0	1.1	2.3	0.1

Livelihood Groups

	Livelihood group prevalence (% HHs)	Food consumption groups (% HHs)		
		Poor	Borderline	Acceptable
Small food/ cash crop farmers	5.1	0.0	27.1	72.9
Small subsistence farmers	54.1	29.2	30.9	39.9
Big food/ crop farmers	2.4	20.5	19.8	59.7
Big subsistence farmers	7.1	0.0	33.2	66.8
Small business	4.8	9.8	39.9	50.3
Commerce	3.8	12.1	0.0	87.9
Daily workers	8.5	11.1	38.7	50.2
Agro-pastoralists	2.4	0.0	19.4	80.6
Fisherfolk/hunters	3.7	12.8	0.0	87.2
Aid	2.8	49.3	16.8	33.8
Others	1.9	0.0	49.6	50.4
Salaried	3.4	0.0	14.7	85.3

Crop production
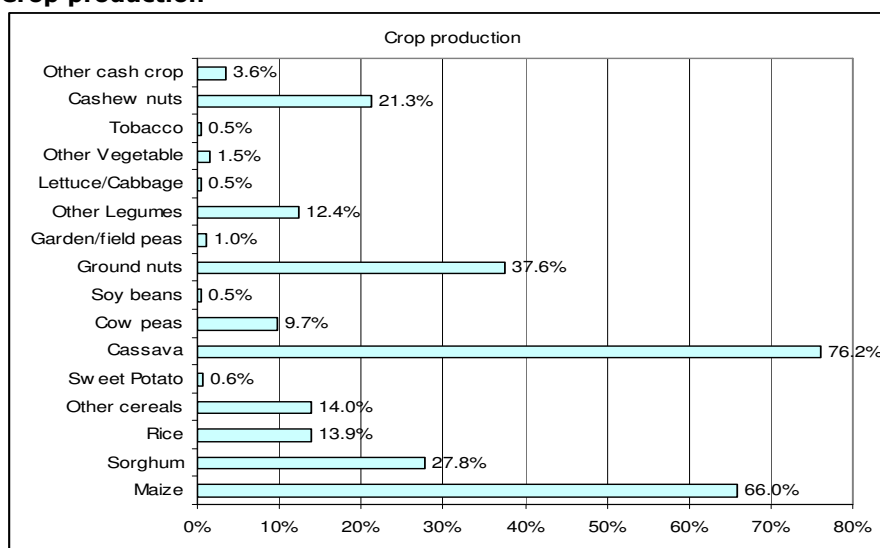
Socioeconomic status

Shocks *(% of households)*

	with at least one shock in last 12 months	Lack of rainfall in last year	flooding in last year	high input costs in last year	malaria in last year	high fuel costs in last year	lack of water/quality water in last year	sickness in last year	high food prices in last year	lack of irrigation in last year	plant disease/ pests in last year
Mtwara	100	**88.0**	4.6	**27.2**	4.3	15.7	**25.8**	8.5	**74.8**	9.9	**66.9**

Red=80+% of HHs experienced shock; orange= 50-75% of HHs experienced shock; green= 25-50% HHs experienced shock

Manyara

Food consumption

Food consumption groups (% HHs)			Mean FCS	Food groups (average weekly consumption)								
Poor	Borderline	Acceptable		Cereals	Tubers	Pulses	Vegs	Fruits	Anim. Prot	Oil	Sugar	Milk
17.6	42.9	39.6	40.2	6.6	1.0	2.2	4.5	0.8	1.5	3.3	2.7	1.4

Livelihood Groups

	Livelihood group prevalence (% HHs)	Food consumption groups (% HHs)		
		Poor	Borderline	Acceptable
Small food/ cash crop farmers	3.7	12.2	37.6	50.3
Small subsistence farmers	29.1	19.7	58.9	21.4
Big food/ crop farmers	5.2	18.3	18.1	63.6
Big subsistence farmers	17.4	11.3	36.1	52.6
Small business	4.4	11.2	44.7	44.1
Commerce	3.9	12.2	37.7	50.1
Daily workers	6.3	38.6	53.7	7.7
Agro-pastoralists	23.6	20.1	28.9	51
Fisherfolk/hunters	--	--	--	--
Aid	0.9	0	100	0
Others	1.9	0	50.5	49.5
Salaried	3.5	0	42.5	57.5

Crop production

Socioeconomic status

wealth quintiles

	Poorest
	Poorer
	Moderate
	Richer
	Richest

Shocks *(% of households)*

	with at least one shock in last 12 months	Lack of rainfall in last year	flooding in last year	high input costs in last year	malaria in last year	high fuel costs in last year	lack of water/quality water in last year	sickness in last year	high food prices in last year	lack of irrigation in last year	plant disease/ pests in last year
Manyara	96.7	**80.0**	1.9	10.5	11.0	4.3	**31.6**	11.9	15.8	10.5	**29.8**

Red=80+% of HHs experienced shock; orange= 50-75% of HHs experienced shock; green= 25-50% HHs experienced shock

Arusha

Food consumption

Food consumption groups (% HHs)			Mean FCS	Food groups (average weekly consumption)								
Poor	Borderline	Acceptable		Cereals	Tubers	Pulses	Vegs	Fruits	Anim. Prot	Oil	Sugar	Milk
6.8	25.0	68.2	51.2	6.8	1.0	2.0	4.0	0.7	1.6	5.1	5.6	3.8

Livelihood Groups

	Livelihood group prevalence (% HHs)	Food consumption groups (%HHs)		
		Poor	Borderline	Acceptable
Small food/ cash crop farmers	3.5	0.0%	26.9	73.1
Small subsistence farmers	10.2	9.3%	33.3	57.4
Big food/ crop farmers	3.7	0.0%	0.0	100.0
Big subsistence farmers	16.2	6.0%	23.5	70.5
Small business	7.7	13.1%	26.0	60.9
Commerce	1.4	0.0%	0.0	100.0
Daily workers	11.2	0.0%	52.0	48.0
Agro-pastoralists	39.4	10.1%	19.7	70.2
Fisherfolk/hunters	1.0	0.0%	53.5	46.5
Aid	0.5	0.0%	0.0	100.0
Others	3.3	0.0%	29.6	70.4
Salaried	1.9	0.0%	0.0	100.0

Crop production

Economic status

w ealth quintiles

- Poorest
- Poorer
- Moderate
- Richer
- Richest

36.0
13.0
17.1
17.2
16.7

Shocks *(% of households)*

	with at least one shock in last 12 months	Lack of rainfall in last year	flooding in last year	high input costs in last year	malaria in last year	high fuel costs in last year	lack of water/quality water in last year	sickness in last year	high food prices in last year	lack of irrigation in last year	plant disease/ pests in last year
Arusha	95.5	**90.5**	1.4	9.2	0.0	15.0	6.7	3.7	**54.2**	1.0	4.5

Red=80+% of HHs experienced shock; orange= 50-75% of HHs experienced shock; green= 25-50% HHs experienced shock

Singida

Food consumption

Food consumption groups (% HHs)			Mean FCS	Food groups (average weekly consumption)								
Poor	Borderline	Acceptable		Cereals	Tubers	Pulses	Vegs	Fruits	Anim. Prot	Oil	Sugar	Milk
5.4	25.5	69.1	48.2	6.9	0.9	3.6	5.6	1.0	2.1	5.2	3.5	1.0

Livelihood Groups

	Livelihood group prevalence (% HHs)	Food consumption groups (%HHs)		
		Poor	Borderline	Acceptable
Small food/ cash crop farmers	1.9	25.9	0.0	74.1
Small subsistence farmers	31.2	9.7	37.8	52.5
Big food/ crop farmers	0.5	0.0	0.0	100.0
Big subsistence farmers	13.0	3.7	18.9	77.4
Small business	19.0	2.5	15.6	81.9
Commerce	11.6	0.0	21.0	79.0
Daily workers	6.4	15.2	46.8	37.9
Agro-pastoralists	13.5	0.0	21.6	78.4
Fisherfolk/hunters	0.5	0.0	0.0	100.0
Aid	--	0.0	0.0	0.0
Others	2.0	0.0	0.0	100.0
Salaried	0.5	0.0	0.0	100.0

Crop production

Crop production

Crop	%
Other cash crop	39%
Cashew nuts	1%
Tobacco	0%
Cotton	2%
Mangoes	0%
Oranges	0%
Dark Green Vegetables	1%
Lettuce/Cabbage	0%
Ground nuts	26%
Soy beans	0%
Cow peas	7%
Kidney beans	17%
Cassava	3%
Sweet Potato	11%
Other cereals	28%
Rice	3%
Sorghum	60%
Maize	80%

Socioeconomic status

wealth quintiles

- Poorest
- Poorer
- Moderate
- Richer
- Richest

Shocks *(% of households)*

	with at least one shock in last 12 months	Lack of rainfall in last year	flooding in last year	high input costs in last year	malaria in last year	high fuel costs in last year	lack of water/quality water in last year	sickness in last year	high food prices in last year	lack of irrigation in last year	plant disease/ pests in last year
Singida	100.0	**63.0**	3.3	19.1	**67.0**	18.9	**53.2**	**30.9**	**71.4**	9.1	**47.8**

Red=80+% of HHs experienced shock; orange= 50-75% of HHs experienced shock; green= 25-50% HHs experienced shock

Lindi

Food consumption

Food consumption groups (% HHs)			Mean FCS	Food groups (average weekly consumption)								
Poor	Borderline	Acceptable		Cereals	Tubers	Pulses	Vegs	Fruits	Anim. Prot	Oil	Sugar	Milk
5.3	25.7	69.0	45.7	6.3	2.5	2.3	4.1	4.9	2.9	3.7	3.2	0.2

Livelihood Groups

	Livelihood group prevalence (% HHs)	Food consumption groups (% HHs)		
		Poor	Borderline	Acceptable
Small food/ cash crop farmers	2.6	0	58.8	41.2
Small subsistence farmers	9.9	5	42.9	52
Big food/ crop farmers	3.2	0	34.9	65.1
Big subsistence farmers	7.2	6.8	36.1	57.1
Small business	27.6	6	9.8	84.3
Commerce	6.1	0	7.8	92.2
Daily workers	8.8	5.9	34.9	59.2
Agro-pastoralists	2.1	0	75.2	24.8
Fisherfolk/hunters	9.1	0	28.9	71.1
Aid	1.6	0	0	100
Others	20.6	10.4	30.5	59.1
Salaried	1.0	0	0	100

Crop production

Socioeconomic status

wealth quintiles

- Poorest
- Poorer
- Moderate
- Richer
- Richest

Shocks *(% of households)*

	with at least one shock in last 12 months	Lack of rainfall in last year	flooding in last year	high input costs in last year	malaria in last year	high fuel costs in last year	lack of water/quality water in last year	sickness in last year	high food prices in last year	lack of irrigation in last year	plant disease/ pests in last year
Lindi	99.5	**88.5**	1.0	11.4	**40.9**	**34.2**	**37.0**	**35.6**	**86.3**	9.3	**83.6**

Red=80+% of HHs experienced shock; orange= 50-75% of HHs experienced shock; green= 25-50% HHs experienced shock

Annex 2: Intraregional estimations of food insecurity

Geographic Distribution of Food Security and Poverty Indicators

An analysis of the spatial distribution at subregional level of food security and household wealth indicators was carried out for this report; the indicators were:

1. prevalence of households with poor and borderline food consumption
2. prevalence of households within the two lowest wealth quintiles)

The motivation was to map these indicators in a smooth and continuous way such that the shape and magnitude of variations within administrative boundaries could be identified — it was evident from a plain geographical plotting of the values of the indicators at each sampled village/cluster that:

considerable spatial variation existed within certain regions;

changes from high to low indicator levels could occur over short distances; and

patterns of the indicators exhibited well defined spatial structure within Tanzania

The method used was a spatial regression approach (geographical weighted regression) where the variable of interest (in this case, the indicators mentioned above) is related to explanatory variables that are available as a continuous grid (such as a map or satellite image). The section "Methodology Details" offers a more detailed presentation of the methodology.

This may also help provide some insight into which variables (e.g. population density, distance to roads, vegetation, elevation) exercise more influence on the spatial variation of the indicators. At this stage this methodology is used so that some insight on the patterns of the parameters at sub region level can be gained. This followed encouraging results from similar experiments for Haiti and Yemen.

Food Consumption

The results for prevalence of poor/borderline food consumption are shown in the figure below for both the method's output and the standard region-level mapping, with the two results using the same colour scale and classes. See also the figures in the section "Methodology Details" where the results of the analysis are overlaid with the cluster level values, allowing a more detailed idea of the quality of the fit across the country and also compared with an interpolation method.

The spatial pattern indicated by the spatial regression agrees with the broad patterns displayed by the standard method, in that the areas with worst scores are organized along a south to north belt from Lindi to Arusha regions and lower values in the southwest and western areas. Worst affected areas are both identified as the southeasternmost areas of Tanzania (Mtwara) and areas in the central north (Dodoma, Manyara, Arusha).

There are however interesting differences in the detail – the method indicates that Lindi. Ruvuma and Iringa regions have a pronounced internal (sub-regional) variation – in Lindi the estimated prevalence varies from over 50% to under 20% and in Iringa and Ruvuma from 5% to more than 30%; areas of lower prevalence (lower than 10%) are in the western regions of the country (Rukwa, Tabora, Kigoma) as well as in Tanga region; the spatial model also indicates lower prevalences for Mwanza and Kigoma. Although broad patterns are correct, some underestimation of the highest values in Manyara is noticeable. Morogoro also has a tendency for underestimation.

As with any regression / interpolation methods, under or over estimation of some values is inevitable. The key is whether the indications it provides on the patterns of sub-regional variations are relevant and/or useful enough to warrant application e.g. in geographical targeting (such as is currently being experimented in Yemen).

(a)

(b)
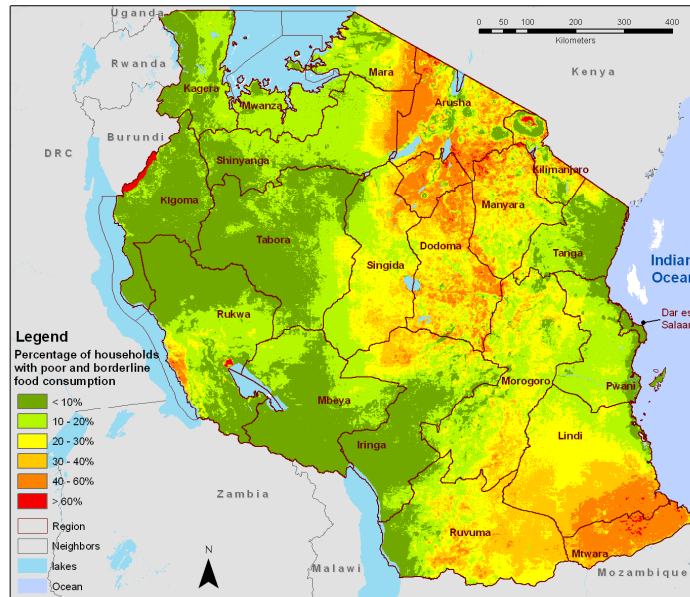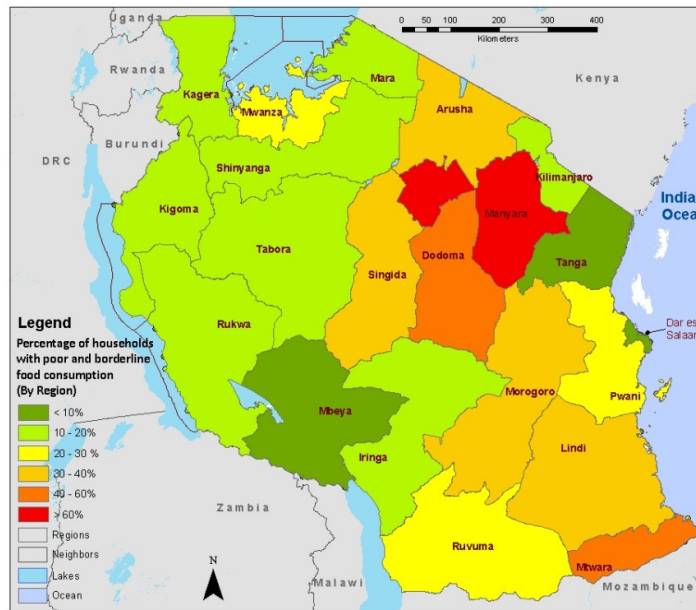
Figure: Percentage of HHs with poor and borderline Food Consumption Score – (a) from spatial regression model and (b) per region

Poverty (Wealth Index)

The result of the mapping is shown below with the two results using the same colour scale and classes.

As expected, the spatial pattern indicated by the spatial regression agrees with the broad patterns displayed by the standard method, in that the areas with higher prevalence of poor households are in the southeast of the country and also in central and northern areas.

(a)

(b)
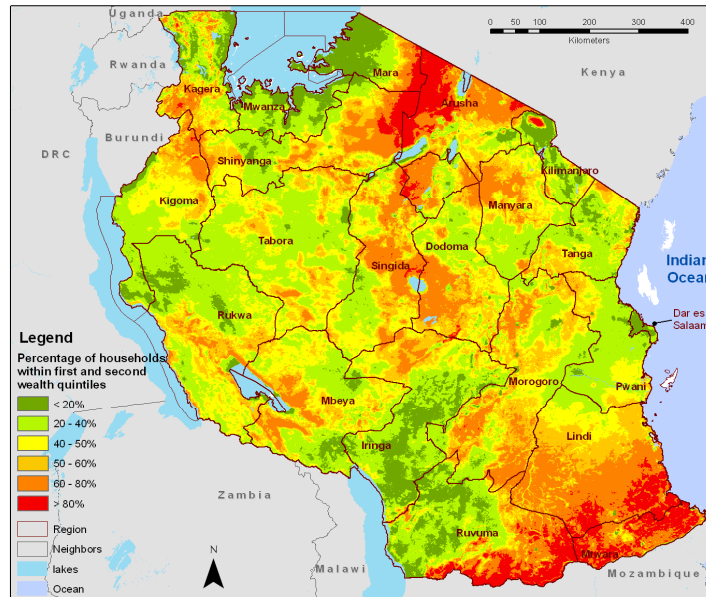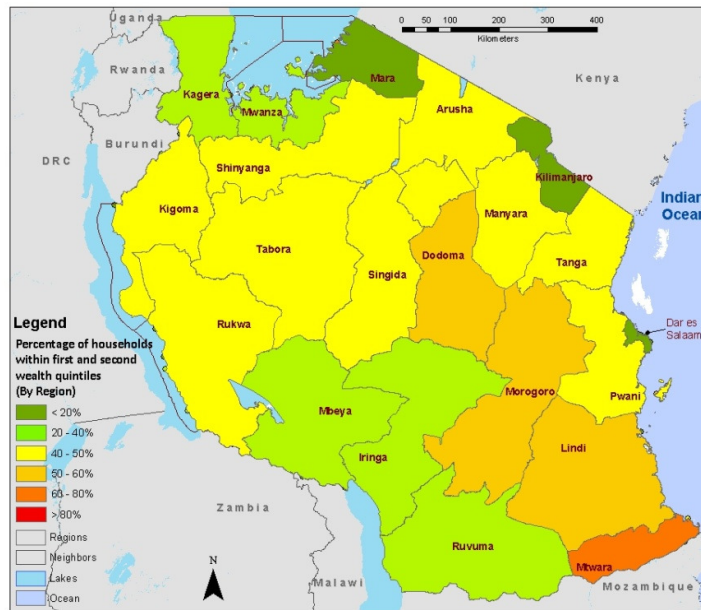
Figure: Percentage of HHs within the lowest two wealth quintiles – (a) from spatial regression model and (b) per region

The spatial regression however reveals considerable variation within regions particularly for Ruvuma and Iringa as well as pockets of poverty in northern Kigoma and southern Kagera regions and higher prevalence in Arusha and eastern Shinyanga regions.

Methodology Details

The report includes maps of food insecurity and poverty levels that were prepared using a method of spatial regression known as geographical weighted regression (GWR, Fotheringham et al, 2002). It is an extension of ordinary multivariate regression to the spatial case, i.e. when the variables to be analysed are collected at geographical locations and the spatial dimension has an influence on the analysis.

It accounts for the possibility that the relationship between an independent variable and explanatory variables may change across the region of interest. For example, if you want to model

174

poverty levels over fairly large and diverse regions, you might expect the degree of influence exerted by some factors or their significance to be more important in some areas than others.

In ordinary regression, a variable of interest is modelled as a function of a set of explanatory variables:

$$\hat{Y} = b_o + \sum_N b_i \cdot X_i + e$$

In GWR, the above scheme is extended in such a way that the regression coefficients (and other standard regression elements such as standard errors and significance levels) are allowed to vary in space.

$$\hat{Y} = b_o(u,v) + \sum_N b_i(u,v) \cdot X_i + e$$

This means that you can obtain regression coefficients bi at any arbitrary location within your region of interest. This is done by carrying out regressions which include all points in the dataset but weighted by their distance to the estimation point (hence the name geographically weighted regression): for any arbitrary location, data points close to it have more influence on the regression coefficients than data points further away.

The distance weighting uses a smoothly (gaussian) decaying function of distance, e.g.:

$$w_{ij} = exp(-1/2*(d_{ij} / h)^2)$$

where wi is the weight of location i for estimation location j, dij is the distance between location i and estimation location j.

The variable h in the equation controls how fast this decay takes place. If h is large decay is slow; at the limit, if h is close to the maximum distance between data points GWR reverts to OLS (ordinary least squares, i.e. regression without a spatial dimension). The smaller h is the more spatially variable will the relationship. The method determines an optimum value of h such that estimation error is minimised.

For datasets with irregular distribution of data points it is possible to use a spatial varying inclusion window, whereby for any arbitrary location the local regression uses the nearest N data points, with N being determined optimally also by minimising estimation error. So, where many data points are found together the inclusion window is small, in areas of sparse sampling the inclusion window automatically adjusts to a wider size. The N points included are also weighted according to distance to the estimation point.

Given that regression coefficients can be obtained at any location, provided the explanatory variables are continuous spatial data, estimates of the independent variable can also be obtained at any location required – hence a map of the estimated variable can be derived.

This methodology is in the first stages of applicability to food security indicators. It has been applied to the study of the spatial variation in price data, crime rates, educational achievement, etc, and their explanatory factors.

Analysis for Tanzania: In the context of this report the methodology has been applied primarily in order to define and make clear the patterns of spatial variation in key food security indicators, by estimating their value at unsampled locations. Essentially the method has been applied as an interpolation mechanism. A detailed analysis of the spatial variations in the regression coefficients (e.g. in order to identify where some determinants are more important than others) will be left for more advanced stages of the work.

In the analysis carried out for Tanzania a set of potential explanatory variables were selected. These had to be available as maps/images and were assumed to have a bearing on food insecurity or poverty levels. The variables chosen were as follows:

Population and infrastructure — urban areas, population density, distance to all-weather roads;

Land cover-related — predominance of pasture, crop, forest;

Biophysical — rainfall (seasonal amount and variability), vegetation (amount, inter-annual variability), topography (altitude, slope), distance to rivers.

The first set accounts for human settlement characteristics and ease of access to markets and other amenities (through distance to nearest all-weather road). The second and third set account for environmental factors — the type of landscape, variability of productivity, ease of access to water, etc…

In the analysis (which by and large follows the same approach as classic regression) only significant variables are retained in the final model. There is some additional complexity in that some variables may not be globally significant but may be locally significant in part of the area of interest.

For food insecurity prevalence (percentage of households with poor and borderline food consumption score), the variables retained were:

Distance to roads

Urban areas

Elevation

Rainfall amount

Vegetation amount

Inter-annual rainfall and vegetation variability

For poverty levels (percentage of households in lowest 40 percent wealth index distribution), the variables retained were:

- Distance to roads
- Population density
- Urban areas
- Land Cover (pasture and forest)
- Elevation
- Vegetation amount and vegetation variability

A visual idea of the quality of the models can be gained from figures below, where the cluster level values are overlaid on the maps. Additional evaluation of the spatial regression behaviour can be gained by comparison with additional maps prepared by a spatial interpolation method (Kriging), where estimates at an arbitrary location are made based on neighbouring data points, i.e. the information comes only from the dataset not from other variables.

(a)

(b)
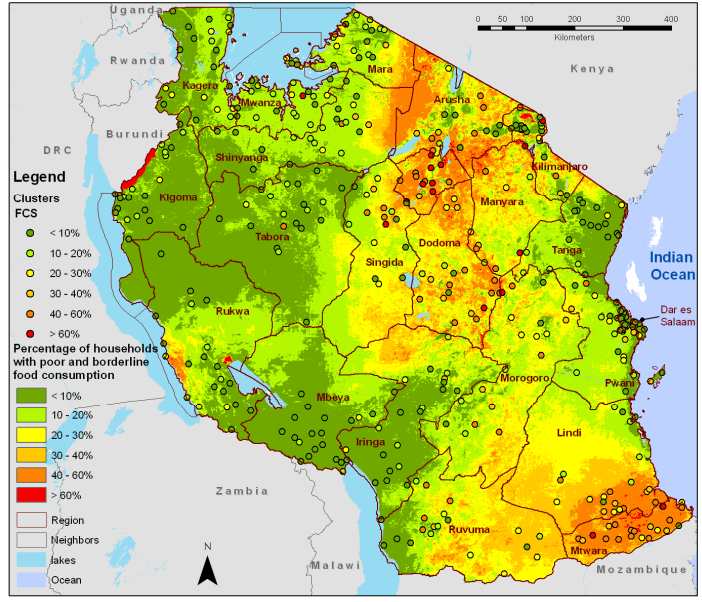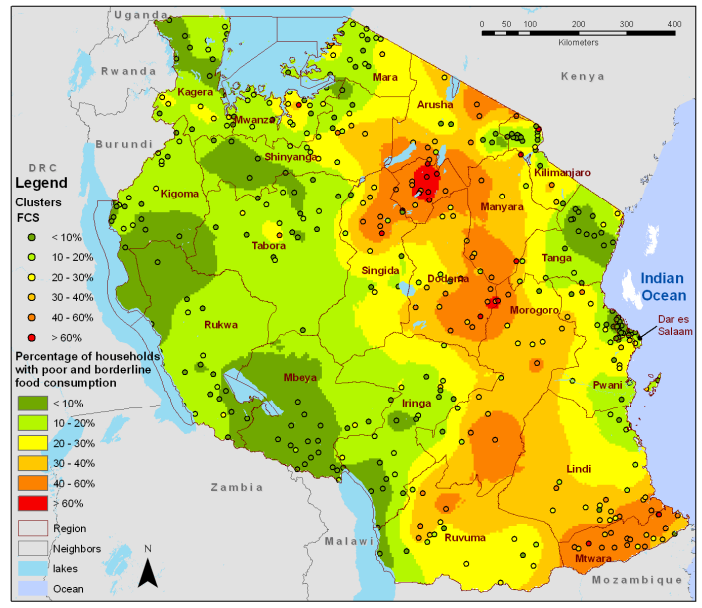
Figure: Percentage of HHs with poor and borderline Food Consumption Score, (a) spatial regression output with cluster level values overlaid, (b) Kriging output with cluster level values overlaid

(a)

(b)
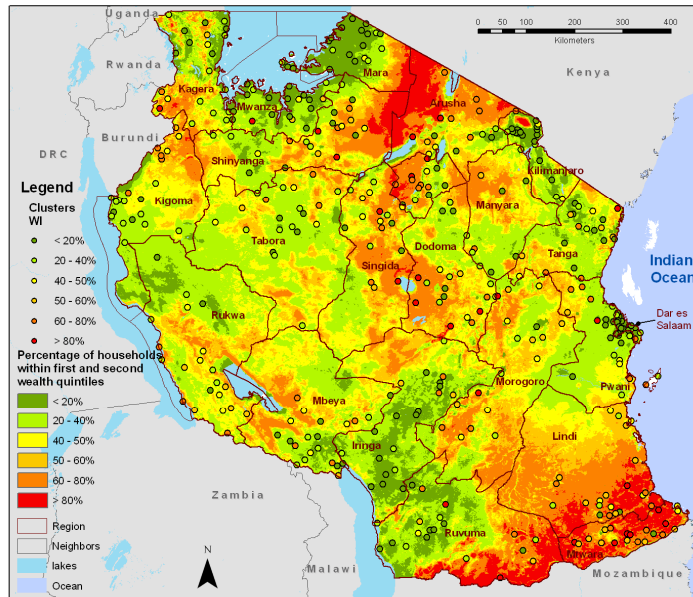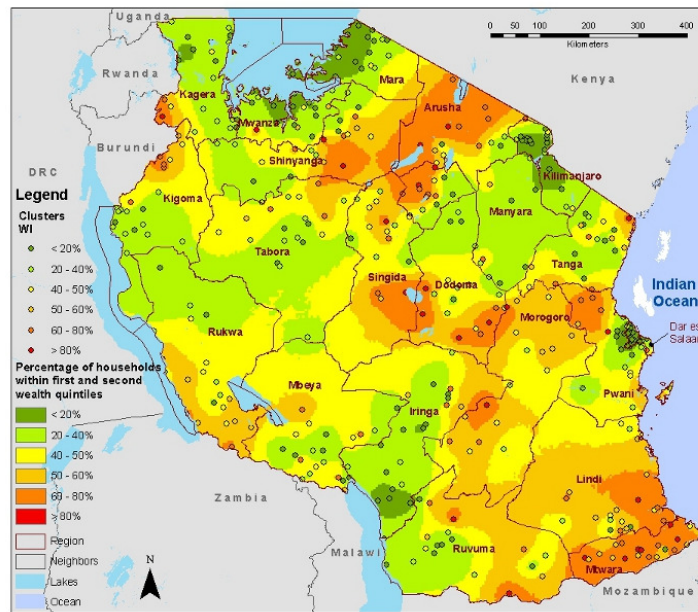
Figure: Percentage of HHs in the two lowest wealth quintiles (Wealth Index), (a) spatial regression output with cluster level values overlaid, (b) Kriging output with cluster level values overlaid

The patterns from the two methods are consistent (as they are based on the same dataset) with the spatial regression providing finer spatial detail due to the external variables used.

General results for the modelling for each indicator are as follows:

FCS:

Global regression r2 : 0.16

GWR regression adjusted r2 : 0.44

WI:

Global regression r2 : 0.23

GWR regression adjusted r2 : 0.40

Annex 3: Rural Mainland Tanzania Tables

Human and Social Capital

Age and marital status of household head

	Age of HH head	Married	Partner	Divorced	Living apart not divorced	Widow /Widower	Never married
Dodoma	47	57.7	17.6	7.6	5.2	9.5	2.4
Arusha	47	76.3	1.4	1.5	4.4	14.9	1.5
Kilimanjaro	53	69.4	1.8	2.9	5.7	17.7	2.4
Tanga	46	67.8	5.3	9.1	3.3	11.0	3.5
Morogoro	47	59.3	8.3	9.2	3.4	15.4	4.4
Pwani	42	66.5	9.1	5.7	2.5	9.2	6.9
Dar es Salaam	43	66.4	10.4	6.0	4.7	9.1	3.5
Lindi	46	69.0	13.2	1.4	5.7	7.3	3.4
Mtwara	46	68.1	7.1	9.1	4.7	7.6	3.4
Ruvuma	44	75.2	3.4	5.3	4.2	8.5	3.3
Iringa	44	67.1	8.3	2.3	2.4	18.0	1.9
Mbeya	42	79.3	0.9	1.0	8.6	9.3	1.0
Singida	45	84.5	0.5	1.4	4.3	8.7	0.5
Tabora	50	69.1	9.0	6.6	2.4	11.9	1.0
Rukwa	40	82.4	4.3	1.0	2.7	9.0	0.5
Kigoma	45	76.2	10.2	1.5	1.0	9.2	1.9
Shinyanga	45	69.0	8.8	8.0	3.4	8.5	2.4
Kagera	48	73.4	9.9	1.5	3.8	10.3	0.9
Mwanza	49	83.5	1.6	0.5	4.9	9.6	0.0
Mara	46	80.0	0.5	3.0	2.4	14.2	0.0
Manyara	45	79.7	3.3	2.0	6.4	8.1	0.5
Rural Mainland Tz	**46**	**72.3**	**6.5**	**4.1**	**4.1**	**11.0**	**2.0**

Net enrolment rate by gender

	% male children 7-14 years of age enrolled in school	% female children 7-14 years of age enrolled in school	% all children 7-14 years of age enrolled in school
Dodoma	65.0	77.9	73.0
Arusha	66.0	59.0	64.0
Kilimanjaro	81.9	76.2	79.0
Tanga	79.7	75.2	79.3
Morogoro	67.2	73.1	69.2
Pwani	56.9	66.7	63.5
Dar es Salaam	69.4	73.0	73.2
Lindi	72.4	84.2	78.4
Mtwara	55.8	60.6	60.0
Ruvuma	71.1	79.2	77.8
Iringa	67.6	66.0	69.2
Mbeya	70.4	79.2	77.9
Singida	60.7	64.4	62.6
Tabora	67.7	73.4	71.2
Rukwa	61.2	59.4	58.8
Kigoma	64.1	64.4	62.3
Shinyanga	73.3	71.6	72.3
Kagera	64.6	69.7	68.3
Mwanza	72.3	66.4	68.5
Mara	71.7	75.6	73.2
Manyara	72.2	68.2	70.6
Rural Mainland Tz	**69.0**	**70.7**	**70.5**

Reason for absenteeism among male children enrolled in school

	Sickness	Work for money	Domestic work	Taking care of siblings	Long distance to school	School expenses	Refusal to go	Other reasons
Dodoma	38.5	15.4	7.6	0.0	0.0	0.0	23.8	14.8
Arusha	17.4	0.0	0.0	0.0	0.0	0.0	49.6	0.0
Kilimanjaro	40.1	0.0	0.0	0.0	0.0	33.7	6.2	0.0
Tanga	61.3	0.0	0.0	0.0	0.0	0.0	18.5	0.0
Morogoro	44.4	0.0	0.0	0.0	0.0	12.7	14.6	28.3
Pwani	0.0	0.0	0.0	0.0	23.5	0.0	0.0	26.5
Dar es Salaam	29.0	0.0	7.3	0.0	0.0	0.0	13.2	0.0
Lindi	46.5	0.0	0.0	5.1	0.0	0.0	14.4	14.2
Mtwara	0.0	0.0	0.0	0.0	20.0	0.0	20.0	0.0
Ruvuma	66.2	0.0	0.0	0.0	0.0	0.0	33.8	0.0
Iringa	49.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mbeya	31.1	0.0	0.0	0.0	0.0	12.8	6.3	6.3
Singida	22.1	0.0	14.7	7.7	0.0	0.0	36.3	20.6
Tabora	39.2	0.0	7.7	0.0	0.0	0.0	38.6	7.5
Rukwa	17.1	0.0	0.0	0.0	0.0	19.4	0.0	9.9
Kigoma	30.4	0.0	0.0	0.0	0.0	10.0	49.8	9.8
Shinyanga	63.7	4.5	4.5	0.0	4.9	4.4	0.0	9.2
Kagera	63.3	0.0	6.4	0.0	5.8	6.1	0.0	0.0
Mwanza	54.0	0.0	5.9	5.9	0.0	11.9	11.3	5.3
Mara	36.0	0.0	0.0	0.0	0.0	8.4	0.0	18.7
Manyara	55.3	0.0	17.7	0.0	0.0	0.0	8.6	9.2
Rural Mainland Tz	**44.4**	**1.7**	**4.4**	**1.2**	**1.7**	**7.1**	**13.6**	**8.4**

Reason for absenteeism among female children enrolled in school

	Sickness	Work for money	Domestic work	Taking care of siblings	Long distance to school	School expenses	Refusal to go	Other reasons
Dodoma	8.8	0.0	0.0	0.0	0.0	0.0	0.0	7.1
Arusha	33.0	0.0	0.0	0.0	0.0	0.0	0.0	17.0
Kilimanjaro	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tanga	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.2
Morogoro	0.0	0.0	0.0	0.0	0.0	12.7	0.0	0.0
Pwani	26.7	0.0	0.0	0.0	0.0	0.0	23.3	0.0
Dar es Salaam	50.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lindi	9.4	0.0	0.0	0.0	0.0	0.0	15.3	4.8
Mtwara	19.5	0.0	0.0	0.0	0.0	0.0	40.4	0.0
Ruvuma	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iringa	50.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mbeya	31.5	0.0	5.8	0.0	0.0	6.4	6.2	0.0
Singida	7.3	0.0	15.0	7.7	0.0	6.7	0.0	7.0
Tabora	7.0	0.0	7.7	0.0	0.0	0.0	0.0	0.0
Rukwa	53.6	0.0	8.8	0.0	0.0	0.0	0.0	9.9
Kigoma	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0
Shinyanga	23.2	4.5	0.0	0.0	0.0	0.0	0.0	0.0
Kagera	26.1	0.0	0.0	0.0	0.0	18.6	0.0	0.0
Mwanza	5.6	0.0	5.9	0.0	0.0	0.0	0.0	0.0
Mara	18.5	0.0	0.0	0.0	0.0	9.2	0.0	27.9
Manyara	0.0	0.0	9.0	0.0	0.0	0.0	0.0	0.0
Rural Mainland Tz	**17.3**	**0.6**	**2.8**	**0.3**	**0.0**	**3.6**	**2.1**	**3.4**

Communities distance to primary and secondary schools

	Primary school			Secondary school		
	Less than one hour	One to two hours	Three or more hours	Less than one hour	One to two hours	Three or more hours
Dodoma	90.5	9.5	0.0	42.9	42.9	14.3
Arusha	68.4	21.1	10.5	42.1	15.8	42.1
Kilimanjaro	85.0	15.0	0.0	70.0	20.0	10.0
Tanga	100.0	0.0	0.0	45.0	30.0	25.0
Morogoro	100.0	0.0	0.0	55.6	33.3	11.1
Pwani	100.0	0.0	0.0	42.1	42.1	15.8
Dar es Salaam	70.0	30.0	0.0	50.0	45.0	5.0
Lindi	85.7	14.3	0.0	52.4	19.0	28.6
Mtwara	71.4	28.6	0.0	42.9	38.1	19.0
Ruvuma	95.2	4.8	0.0	57.1	19.0	23.8
Iringa	95.0	5.0	0.0	40.0	40.0	20.0
Mbeya	52.4	42.9	4.8	33.3	42.9	23.8
Singida	81.0	19.0	0.0	33.3	38.1	28.6
Tabora	100.0	0.0	0.0	60.0	30.0	10.0
Rukwa	95.2	4.8	0.0	33.3	38.1	28.6
Kigoma	90.5	9.5	0.0	47.6	38.1	14.3
Shinyanga	100.0	0.0	0.0	81.0	4.8	14.3
Kagera	95.2	0.0	4.8	38.1	28.6	33.3
Mwanza	71.4	23.8	4.8	33.3	52.4	14.3
Mara	66.7	33.3	0.0	33.3	52.4	14.3
Manyara	90.5	9.5	0.0	19.0	52.4	28.6
Rural Mainland Tz	**85.8**	**13.1**	**1.2**	**45.2**	**34.5**	**20.3**

Community health facility/health worker access

	% with health facilities	% with health workers	% without health facilities/ workers
Dodoma	95.2	95.2	0.0
Arusha	78.9	100.0	0.0
Kilimanjaro	80.0	80.0	15.0
Tanga	65.0	100.0	0.0
Morogoro	100.0	100.0	0.0
Pwani	89.5	100.0	0.0
Dar es Salaam	95.0	100.0	0.0
Lindi	76.2	90.5	4.8
Mtwara	81.0	95.2	4.8
Ruvuma	95.2	90.5	0.0
Iringa	45.0	35.0	55.0
Mbeya	100.0	100.0	0.0
Singida	71.4	81.0	9.5
Tabora	90.0	90.0	0.0
Rukwa	85.7	100.0	0.0
Kigoma	95.0	100.0	0.0
Shinyanga	95.2	100.0	0.0
Kagera	90.5	95.2	4.8
Mwanza	100.0	100.0	0.0
Mara	85.7	100.0	0.0
Manyara	95.2	90.5	4.8
Rural Mainland Tz	**86.2**	**92.5**	**4.7**

Percent of households with at least one member displaced and reason for displacement

	HH experienced migration in the past 6 months	Insecurity	Work/other Economic Opportunities	Medical Treatment	Education	Land Wrangles	Other
Dodoma	14.8	3.2	32.3	6.2	25.9	3.1	29.2
Arusha	6.6	0.0	14.4	7.9	54.8	0.0	22.9
Kilimanjaro	16.7	0.0	36.6	5.9	40.6	0.0	16.9
Tanga	14.7	0.0	48.3	18.6	29.7	0.0	3.3
Morogoro	7.3	7.0	20.9	0.0	18.7	0.0	53.4
Pwani	14.6	3.2	28.6	9.6	12.7	0.0	45.8
Dar es Salaam	10.0	10.4	35.2	4.7	20.0	0.0	29.7
Lindi	15.2	0.0	38.0	12.6	8.8	3.2	37.4
Mtwara	8.9	5.5	31.9	10.3	5.1	0.0	47.2
Ruvuma	10.3	13.8	27.8	4.3	24.4	0.0	29.6
Iringa	16.8	0.0	37.2	5.4	51.5	0.0	5.8
Mbeya	13.8	10.5	30.7	6.9	24.7	6.6	20.5
Singida	8.6	0.0	50.6	0.0	16.0	0.0	33.4
Tabora	15.6	9.3	40.3	12.8	21.5	0.0	16.1
Rukwa	4.2	0.0	27.0	0.0	12.0	0.0	61.0
Kigoma	5.3	0.0	36.3	0.0	9.2	0.0	54.5
Shinyanga	15.3	3.0	37.8	22.3	15.3	0.0	21.7
Kagera	18.0	2.8	36.3	7.8	26.4	0.0	26.7
Mwanza	17.8	0.0	26.4	10.6	10.9	0.0	52.1
Mara	13.2	13.7	21.0	21.3	14.5	0.0	29.5
Manyara	13.3	0.0	25.7	3.5	37.3	0.0	33.4
Rural Mainland Tz	**13.1**	**3.6**	**33.3**	**10.0**	**24.0**	**0.8**	**28.3**

Place of migration

	Travelled outside the district (not sure of destination)	Travelled outside the district to a rural area	Travelled outside the district to an urban area	Travelled outside the country	Travelled to another place in the same district
Dodoma	45.3	6.5	22.4	0.0	25.8
Arusha	46.6	38.5	7.3	7.6	0.0
Kilimanjaro	11.7	8.5	76.9	3.0	0.0
Tanga	26.4	23.7	46.6	3.2	0.0
Morogoro	27.3	21.5	22.2	0.0	29.1
Pwani	13.8	17.5	54.5	3.6	10.5
Dar es Salaam	19.0	28.1	28.6	4.7	19.5
Lindi	16.8	13.5	39.7	3.3	26.7
Mtwara	36.9	16.1	25.9	0.0	21.2
Ruvuma	19.7	19.5	33.1	0.0	27.7
Iringa	16.7	23.1	31.2	2.8	26.2
Mbeya	22.1	10.4	18.5	7.2	41.8
Singida	22.2	33.0	44.9	0.0	0.0
Tabora	65.5	10.4	13.5	0.0	10.5
Rukwa	74.6	0.0	0.0	0.0	25.4
Kigoma	36.6	18.0	27.3	0.0	18.1
Shinyanga	38.7	23.1	32.0	6.2	0.0
Kagera	40.0	8.1	16.4	2.6	32.9
Mwanza	10.8	26.9	21.2	0.0	41.0
Mara	40.6	4.4	33.9	12.7	8.4
Manyara	39.0	24.8	25.7	0.0	10.6
Rural Mainland Tz	**31.0**	**17.3**	**29.9**	**2.8**	**19.1**

Physical Capital

Crowding index

	Crowding Index (no. HH member / sleeping room)
Dodoma	2.31
Arusha	2.35
Kilimanjaro	2.21
Tanga	2.21
Morogoro	1.99
Pwani	2.25
Dar es Salaam	2.52
Lindi	2.01
Mtwara	1.86
Ruvuma	1.80
Iringa	2.13
Mbeya	2.38
Singida	2.30
Tabora	2.31
Rukwa	2.80
Kigoma	2.32
Shinyanga	2.73
Kagera	2.31
Mwanza	2.66
Mara	2.57
Manyara	2.80
Rural Mainland Tz	**2.35**

Type of floor

	type floor						
	Concrete	Mud	Straw	Wood	Plastic	Galvanized iron	Tiles
Dodoma	15.4	83.6	0	0	.5	.5	0
Arusha	21.0	77.0	2.0	0	0	0	0
Kilimanjaro	51.2	48.4	0	.4	0	0	0
Tanga	16.9	81.7	.9	0	.5	0	0
Morogoro	14.8	83.8	.5	.9	0	0	0
Pwani	29.1	69.9	.5	.5	0	0	0
Dar es Salaam	62.0	35.1	0	0	.5	.9	1.4
Lindi	10.2	89.4	.5	0	0	0	0
Mtwara	13.8	85.3	0	.5	.5	0	0
Ruvuma	22.8	76.8	0	0	.5	0	0
Iringa	37.4	62.6	0	0	0	0	0
Mbeya	30.0	69.5	.4	0	0	0	0
Singida	13.3	86.3	0	0	0	.5	0
Tabora	12.0	87.0	1.0	0	0	0	0
Rukwa	20.7	79.3	0	0	0	0	0
Kigoma	8.0	91.5	0	0	.5	0	0
Shinyanga	9.5	89.6	.5	0	.5	0	0
Kagera	22.8	75.8	.9	0	0	.5	0
Mwanza	26.2	73.3	.5	0	0	0	0
Mara	21.8	75.8	.5	1.4	0	.5	0
Manyara	12.4	86.6	0	0	0	1.0	0
Rural Mainland Tz	**21.1**	**78.0**	**.5**	**.2**	**.2**	**.2**	**0**

Type of Roof

	type roof						
	Concrete	Mud	Straw	Wood	Plastic	Galvanized iron	Tiles
Dodoma	0	30.6	13.3	0	0	56.1	0
Arusha	0	2.0	40.5	.5	0	57.0	0
Kilimanjaro	0	0	4.9	0	1.0	94.1	0
Tanga	5	.5	5.3	0	36.4	57.4	0
Morogoro	0	2.3	38.0	2.5	.5	56.8	0
Pwani	0	1.4	40.3	2.9	2.2	48.7	4.4
Dar es Salaam	1.3	.5	0	0	12.5	85.2	.5
Lindi	0	0	15.3	0	45.8	38.9	0
Mtwara	0	0	55.1	0	16.5	28.4	0
Ruvuma	0	0	41.4	.5	0	58.1	0
Iringa	0	0	28.5	.5	0	71.0	0
Mbeya	0	0	27.4	0	2.9	69.7	0
Singida	0	58.3	6.8	0	0	34.9	0
Tabora	0	4.8	50.9	2.0	7.0	35.4	0
Rukwa	0	0	59.9	.9	0	38.8	.4
Kigoma	0	1.0	38.4	1.9	0	58.7	0
Shinyanga	0	20.0	26.3	0	0	53.7	0
Kagera	0	0	22.2	0	2.3	75.5	0
Mwanza	0	0	33.7	0	0	66.3	0
Mara	0	1.0	39.0	11.1	.5	48.4	0
Manyara	1.1	15.2	26.9	.5	0	56.3	0
Rural Mainland Tz	**.1**	**6.8**	**29.3**	**1.0**	**5.0**	**57.6**	**.2**

Percent of households with an unimproved drinking water source and toilet type

	unimproved toilet	unimproved water
Dodoma	10.2	30.8
Arusha	34.2	47.7
Kilimanjaro	3.4	6.3
Tanga	8.3	61.6
Morogoro	7.2	30.5
Pwani	5.4	63.2
Dar es Salaam	0.5	32.8
Lindi	4.4	34.5
Mtwara	10.0	47.2
Ruvuma	3.5	6.8
Iringa	0.9	31.9
Mbeya	2.4	47.0
Singida	12.1	55.4
Tabora	10.5	46.7
Rukwa	2.0	24.6
Kigoma	1.0	45.1
Shinyanga	30.0	37.0
Kagera	24.8	57.0
Mwanza	3.9	40.1
Mara	27.8	73.2
Manyara	17.1	45.4
Rural Mainland Tz	**12.0**	**41.8**

Household relied on alternate drinking water source

	alternative source drinking water						
	Public tap/ piped water	Pond, lake, river or stream	Borehole with pump	Rain water	Protected dug well or spring	Unprotected well or spring	Vendor
Dodoma	23.8	19.3	7.1	0	19.3	14.4	16.2
Arusha	28.9	33.3	1.8	10.0	17.1	3.5	5.4
Kilimanjaro	18.5	52.7	2.2	6.8	11.3	8.4	0
Tanga	12.1	27.5	18.3	9.3	15.1	14.1	3.6
Morogoro	4.8	23.3	13.8	21.0	8.2	29.0	0
Pwani	5.3	9.7	0	19.9	10.4	49.6	5.1
Dar es Salaam	2.6	0	14.1	7.9	35.0	18.9	21.4
Lindi	4.9	11.6	6.9	36.7	12.9	26.9	0
Mtwara	7.1	15.4	2.0	62.9	3.4	7.3	2.0
Ruvuma	8.8	20.7	2.8	5.9	58.7	3.1	0
Iringa	0	41.1	11.7	0	31.4	15.8	0
Mbeya	12.0	34.5	5.2	20.4	19.0	8.8	0
Singida	18.5	22.2	0	14.8	18.6	25.8	0
Tabora	1.6	16.5	3.3	11.9	30.0	36.6	0
Rukwa	22.3	32.7	0	18.0	12.4	14.7	0
Kigoma	14.0	45.7	12.0	0	18.3	7.9	2.1
Shinyanga	4.3	24.8	2.8	41.4	9.8	14.9	1.9
Kagera	6.4	33.1	10.3	22.6	8.8	13.9	4.9
Mwanza	5.3	19.9	10.6	23.8	12.2	27.3	.9
Mara	16.9	23.3	10.4	20.6	2.6	24.9	1.3
Manyara	8.3	39.1	3.4	6.7	3.3	27.8	11.6
Rural Mainland Tz	**10.3**	**27.2**	**6.5**	**22.0**	**13.6**	**17.7**	**2.7**

Distance to driveable road

	Less than one hour	One to two hours	Three or more hours
Dodoma	85.7	9.5	4.8
Arusha	47.4	21.1	31.6
Kilimanjaro	65.0	25.0	10.0
Tanga	75.0	15.0	10.0
Morogoro	88.9	5.6	5.6
Pwani	78.9	15.8	5.3
Dar es Salaam	95.0	5.0	0.0
Lindi	66.7	19.0	14.3
Mtwara	76.2	19.0	4.8
Ruvuma	100.0	0.0	0.0
Iringa	65.0	30.0	5.0
Mbeya	57.1	38.1	4.8
Singida	52.4	23.8	23.8
Tabora	95.0	5.0	0.0
Rukwa	61.9	14.3	23.8
Kigoma	61.9	9.5	28.6
Shinyanga	85.7	9.5	4.8
Kagera	76.2	9.5	14.3
Mwanza	76.2	19.0	4.8
Mara	76.2	14.3	9.5
Manyara	52.4	38.1	9.5
Rural Mainland Tz	**73.2**	**16.6**	**10.3**

Economic Capital and Livelihood Strategies

Percent of HHs with work migrants/Characteristics of migrations

	at least one member work away from the HH?	Town	within region	To another region	Dar es Salam	Greater Horn Region	Abroad
Dodoma	18.1	10.4	24.4	24.3	62.5	0.0	0.0
Arusha	8.5	36.0	21.8	42.3	7.4	0.0	0.0
Kilimanjaro	42.0	22.4	19.5	47.2	39.7	3.4	4.7
Tanga	28.8	16.8	31.1	24.5	56.9	0.0	0.0
Morogoro	22.1	10.2	45.3	14.1	57.1	0.0	0.0
Pwani	21.0	14.8	14.6	20.5	66.5	0.0	0.0
Dar es Salaam	19.5	2.4	12.1	51.8	83.0	2.8	0.0
Lindi	20.5	11.3	23.4	23.6	67.4	3.1	0.0
Mtwara	13.2	20.8	17.1	29.4	61.9	4.5	12.0
Ruvuma	7.6	25.5	25.3	13.2	61.3	5.9	0.0
Iringa	22.0	12.7	18.2	41.0	43.6	2.5	0.0
Mbeya	10.1	51.9	21.0	32.3	10.6	0.0	0.0
Singida	8.0	0.0	23.3	59.2	17.5	0.0	0.0
Tabora	12.9	32.1	40.9	22.6	22.8	0.0	0.0
Rukwa	4.4	30.0	25.7	44.3	0.0	0.0	0.0
Kigoma	15.8	6.7	16.6	40.1	43.3	6.6	0.0
Shinyanga	6.2	17.1	34.2	48.7	16.3	0.0	7.9
Kagera	10.2	30.0	29.3	40.6	17.4	5.5	0.0
Mwanza	13.7	19.6	9.4	46.3	29.7	9.5	4.8
Mara	15.5	15.3	3.1	66.1	25.0	3.1	0.0
Manyara	5.6	49.9	9.7	40.4	0.0	0.0	0.0
Rural Mainland Tz	**15.2**	**19.0**	**23.2**	**35.4**	**42.3**	**2.2**	**1.5**

Characteristics of temporary migrants

	% HHs with seasonal migrants	# months migrants away	seasonal migrants send money	how often to the seasonal send money			% of HHs with the amount of remittances from seasonal migrants (tshs)			
				Once a year	2-4 times in a year	4 times or more in a year	0 - 50,000	50,000 - 100,000	100,000 – 200,0000	>200,0000
Dodoma	6.1	1.7	90.0	33.7	66.3	0	67.2	32.8	0	0
Arusha	1.9	0.7	73.9	37.5	62.5	0	0	0	68.7	31.3
Kilimanjaro	2.8	4.3	80.1	23.1	53.7	23.1	23.1	0	0	76.9
Tanga	12.5	1.1	75.9	58.7	36.2	5.1	55.1	28.3	16.6	0
Morogoro	2.8	2.5	80.4	25.9	24.7	49.3	0	75.7	0	24.3
Pwani	4.7	1.6	60.7	36.2	0	63.8	67.6	0	0	32.4
Dar es Salaam	10.9	1.5	40.9	53.3	37.1	9.6	53.3	37.1	0	9.6
Lindi	6.2	1.7	54.4	63.1	0	36.9	68.3	15.8	15.8	0
Mtwara	0	1.4	0	0	0	0	0	0	0	0
Ruvuma	2.4	0.7	100.0	49.0	51.0	0	49.0	24.8	0	26.1
Iringa	2.4	2.1	52.4	52.4	0	47.6	100.0	0	0	0
Mbeya	4.3	0.7	100.0	17.6	50.8	31.6	14.7	15.7	26.9	42.8
Singida	4.7	0.7	20.9	31.1	68.9	0	73.9	26.1	0	0
Tabora	7.2	0.9	71.2	30.3	41.1	28.6	32.1	46.0	0	21.9
Rukwa	0.5	0.4	0	0	0	0	0	0	0	0
Kigoma	4.8	1.5	33.2	75.8	0	24.2	75.1	24.9	0	0
Shinyanga	1.4	0.5	100.0	47.8	0	52.2	0	0	0	100
Kagera	4.7	0.6	50.8	56.6	43.4	0	56.4	14.6	29.0	0
Mwanza	5.7	1.1	74.9	10.8	45.6	43.6	43.4	22.0	23.5	11.1
Mara	2.8	1.4	80.1	51.3	23.9	24.8	66.3	33.6	0	0
Manyara	2.4	0.5	100.0	0	19.8	80.2	40.7	0	39.7	19.6
Rural Mainland Tz	**4.3**	**1.3**	**70.5**	**39.1**	**38.4**	**22.4**	**46.2**	**24.6**	**14.1**	**15.1**

Seasonality of temporary migrations

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Dodoma	55.4	69.9	69.9	69.9	69.6	62.2	62.5	70.0	69.3	69.3	69.5	30.1
Arusha	53.8	53.8	53.8	53.8	53.8	76.9	53.8	53.8	53.8	26.1	53.8	76.9
Kilimanjaro	52.1	52.1	52.1	67.7	52.1	34.4	49.1	67.7	67.7	67.7	100.0	48.2
Tanga	15.9	3.7	12.1	3.7	16.4	11.2	7.5	30.6	49.5	41.8	38.1	19.8
Morogoro	67.3	67.3	67.3	51.1	66.8	66.8	66.8	67.1	67.1	67.1	67.1	34.4
Pwani	60.3	60.3	60.3	60.3	60.3	69.8	68.7	68.7	78.8	89.4	69.3	59.2
Dar es Salaam	30.5	56.8	79.0	74.1	70.3	56.6	34.3	51.5	43.1	38.1	26.0	21.4
Lindi	31.3	31.3	39.4	39.4	31.3	39.4	54.9	54.9	63.0	46.6	38.6	31.3
Mtwara	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruvuma	100.0	100.0	100.0	61.8	80.1	100.0	80.0	100.0	100.0	100.0	100.0	61.7
Iringa	40.3	40.3	40.3	40.3	21.3	21.3	21.3	61.3	80.9	80.9	80.9	80.9
Mbeya	32.4	44.4	44.4	44.4	57.2	56.3	56.3	66.5	66.7	66.7	56.3	32.4
Singida	49.4	49.4	49.4	49.4	49.4	49.0	50.1	69.9	69.7	59.4	59.4	49.9
Tabora	59.5	53.0	45.8	52.4	52.6	65.6	59.2	39.5	40.3	33.5	53.9	21.0
Rukwa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	100.0	100.0	0.0
Kigoma	29.5	29.5	29.5	29.5	29.5	29.5	39.4	49.6	79.7	79.7	90.2	59.2
Shinyanga	0.0	0.0	0.0	32.5	35.5	32.0	100.0	32.0	67.5	0.0	68.0	0.0
Kagera	50.1	29.2	39.4	29.6	40.0	70.5	49.6	70.5	70.0	29.6	39.4	29.7
Mwanza	34.4	34.4	42.4	50.6	41.5	33.4	41.5	50.1	66.7	75.1	74.7	34.1
Mara	66.8	83.3	100.0	100.0	67.4	83.3	84.1	83.5	84.1	66.8	66.8	50.3
Manyara	40.2	59.8	59.8	39.7	39.7	39.7	59.3	59.3	59.3	39.7	39.7	80.4
Rural Mainland Tz	**41.6**	**41.6**	**45.4**	**44.3**	**45.3**	**47.5**	**47.7**	**55.3**	**63.1**	**54.7**	**58.7**	**35.8**

Characteristics of prolonged migrants

	prolonged migrant (yes/no)	prolonged migrants send money	how often do prolonged migrants send money per year			amount of remittances from prolonged migrants (in Tshs)			
			Once	2-4 times	4 times or more	0 - 50,000	50,000 - 100,000	100,000 – 200,0000	>200,0000
Dodoma	14.9	86.6	32.3	46.2	21.6	35.7	46.7	14.0	3.6
Arusha	6.2	58.0	42.3	20.5	37.2	28.1	30.4	0.0	41.5
Kilimanjaro	38.3	81.0	32.7	46.7	20.6	40.1	15.7	16.8	27.3
Tanga	16.3	93.8	27.2	34.9	37.8	9.1	31.3	31.7	27.9
Morogoro	19.8	73.3	48.1	29.3	22.6	36.5	46.2	10.6	6.8
Pwani	17.2	78.3	40.1	34.7	25.2	60.7	9.1	17.4	12.8
Dar es Salaam	11.1	39.4	58.5	33.2	8.3	75.5	8.5	8.2	7.7
Lindi	15.4	62.5	65.9	29.1	5.0	52.8	41.1	6.0	0.0
Mtwara	13.2	50.3	30.2	54.4	15.4	56.2	36.1	7.7	0.0
Ruvuma	5.7	73.6	72.1	13.2	14.7	49.8	24.7	25.5	0.0
Iringa	18.3	71.2	47.5	36.9	15.6	51.0	24.3	6.7	18.0
Mbeya	7.3	93.2	0.0	70.3	29.7	15.0	31.8	38.3	15.0
Singida	3.8	43.9	73.6	26.4	0.0	76.6	0.0	0.0	23.4
Tabora	7.1	100.0	27.4	36.9	35.7	24.8	41.8	17.2	16.1
Rukwa	3.9	42.0	64.2	0.0	35.8	64.2	0.0	35.8	0.0
Kigoma	12.4	73.3	47.2	17.4	35.4	42.8	14.4	9.5	33.2
Shinyanga	4.8	29.8	66.5	16.7	16.8	67.3	0.0	0.0	32.7
Kagera	7.0	49.6	19.9	40.1	40.0	19.9	20.0	20.0	40.1
Mwanza	8.0	49.5	51.3	48.7	0.0	34.7	49.0	16.3	0.0
Mara	13.6	51.2	50.2	28.2	21.6	29.3	49.6	13.9	7.1
Manyara	3.3	85.0	51.4	32.5	16.1	34.2	0.0	49.7	16.1
Rural Mainland Tz	**11.5**	**71.8**	**39.3**	**37.8**	**23.0**	**37.7**	**28.8**	**16.3**	**17.2**

	small cash crop farmers	small subsistence farmers	big cash/crop farmers	big subsistence farmers	small business	Commerce	daily workers	Agropastorals	fishermen/hunters	Aid	Others	Salaried
						LIVELIHOOD PROFILES						
Dodoma	0.9	11.4	2.4	12.6	10.4	19.4	14.2	14.4	6.2	2.9	2.4	2.8
Arusha	3.5	10.2	3.7	16.2	7.7	1.4	11.2	39.4	1.0	0.5	3.3	1.9
Kilimanjaro	13.3	21.3	4.4	8.8	6.9	3.6	10.8	19.8	1.4	2.8	2.0	4.8
Tanga	5.4	28.2	3.5	18.0	8.1	10.9	7.5	2.8	2.9	2.7	4.8	5.3
Morogoro	6.9	21.6	3.7	11.1	11.1	3.7	19.0	5.9	2.0	7.5	6.0	1.4
Pwani	1.9	28.7	5.0	7.7	23.8	7.0	10.2	2.8	4.4	1.9	2.8	3.9
Dar es Salaam	4.5	7.9	0.4	1.9	23.8	21.1	12.7	1.9	3.4	0.5	2.5	19.4
Lindi	2.6	9.9	3.2	7.2	27.6	6.1	8.8	2.1	9.1	1.6	20.6	1.0
Mtwara	5.1	54.1	2.4	7.1	4.8	3.8	8.5	2.4	3.7	2.8	1.9	3.4
Ruvuma	8.8	31.0	5.7	30.7	7.2	5.3	5.8	1.4	0.9	0.0	0.5	2.7
Iringa	6.1	21.5	3.7	5.3	1.0	29.4	10.5	10.9	1.0	2.0	3.9	4.8
Mbeya	12.7	13.1	3.2	3.9	24.4	3.6	5.8	23.7	1.5	0.5	2.4	5.3
Singida	1.9	31.2	0.5	13.0	19.0	11.6	6.4	13.5	0.5	0.0	2.0	0.5
Tabora	11.7	34.5	0.5	5.4	10.2	12.7	6.7	9.8	2.9	2.4	0.9	2.3
Rukwa	15.5	20.9	16.3	16.4	6.7	3.9	1.0	1.9	8.7	0.0	5.8	3.0
Kigoma	1.5	12.6	10.2	37.0	4.0	9.9	10.9	4.0	1.9	2.0	2.5	3.5
Shinyanga	3.5	46.5	1.5	0.5	15.0	1.9	12.4	12.5	1.0	0.0	3.0	2.4
Kagera	9.7	30.4	4.3	11.7	9.4	12.4	3.4	13.8	1.9	0.0	1.0	1.9
Mwanza	4.7	27.9	2.4	14.5	9.1	7.7	9.3	6.9	4.2	0.5	9.9	2.9
Mara	7.8	38.2	3.2	7.1	6.8	6.2	5.2	12.4	8.4	0.0	1.4	3.3
Manyara	3.7	29.1	5.2	17.4	4.4	3.9	6.3	23.6	0.0	0.9	1.9	3.5
Rural Mainland Tz	**6.3**	**25.9**	**3.8**	**11.7**	**10.9**	**8.6**	**9.1**	**12.1**	**3.0**	**1.5**	**3.7**	**3.3**

Natural Capital

Number of hectares farmed in Masika season

	land farmed during Masika season						
	Less than 0.1	0.1- 0.19	0.2 – 0.49	0.5– 0.99	1– 1.99	2 – 5	more than 5
Dodoma	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arusha	3.6	6.7	6.2	24.9	26.8	21.1	10.7
Kilimanjaro	1.6	4.6	8.9	32.2	34.3	18.4	0.0
Tanga	5.5	3.9	13.5	34.1	26.7	10.7	5.5
Morogoro	0.0	2.3	25.0	28.1	30.1	14.5	0.0
Pwani	3.6	10.0	18.2	26.6	19.7	20.7	1.3
Dar es Salaam	28.3	26.2	9.1	15.7	16.8	3.9	0.0
Lindi	0.0	8.7	20.0	22.3	28.9	17.1	3.0
Mtwara	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruvuma	2.9	1.0	7.0	19.9	25.4	39.8	4.0
Iringa	0.0	17.7	0.0	16.6	32.9	32.9	0.0
Mbeya	1.5	7.8	17.8	30.3	21.0	15.0	6.6
Singida	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Tabora	100.0	0.0	0.0	0.0	0.0	0.0	0.0
Rukwa	9.2	8.8	4.5	6.1	30.3	28.6	12.5
Kigoma	28.7	10.1	0.0	0.0	12.1	31.1	17.9
Shinyanga	0.0	0.0	52.0	48.0	0.0	0.0	0.0
Kagera	8.8	14.2	10.6	19.8	32.6	12.3	1.6
Mwanza	2.0	4.0	20.1	14.9	38.8	18.3	1.9
Mara	12.6	12.8	24.7	23.3	14.5	10.3	1.9
Manyara	4.6	4.5	18.4	18.0	40.7	13.9	0.0
Rural Mainland Tz	**6.0**	**7.7**	**13.6**	**22.9**	**26.4**	**18.5**	**4.9**

Number of hectares farmed in Musimu season

	land farmed during Musimu season						
	Less than 0.1	0.1 - 0.19	0.2 – 0.49	0.5 – 0.99	1– 1.99	2 – 5	more than 5
Dodoma	2.3	3.4	5.8	10.9	25.6	37.9	14.2
Arusha	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kilimanjaro	0.0	6.5	13.8	26.9	39.9	12.9	0.0
Tanga	0.0	0.0	0.0	67.5	0.0	0.0	32.5
Morogoro	1.8	1.9	7.5	17.8	36.0	26.0	9.0
Pwani	0.0	0.0	0.0	0.0	100.0	0.0	0.0
Dar es Salaam	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lindi	1.8	3.4	8.4	25.1	39.2	18.9	3.3
Mtwara	28.5	13.3	9.3	13.4	21.6	11.8	2.1
Ruvuma	0.0	0.0	0.0	34.0	66.0	0.0	0.0
Iringa	4.9	9.8	8.8	25.3	26.1	20.0	5.0
Mbeya	0.0	0.0	37.5	25.0	25.0	0.0	12.5
Singida	5.9	8.9	19.4	15.1	17.9	16.0	16.8
Tabora	32.0	24.2	24.2	5.5	2.6	6.1	5.5
Rukwa	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kigoma	3.2	0.0	0.0	0.0	6.3	58.3	32.3
Shinyanga	23.4	44.4	21.5	5.6	2.6	2.0	0.5
Kagera	15.7	3.5	4.8	31.5	32.6	10.7	1.1
Mwanza	3.4	10.0	12.4	25.2	29.2	17.7	2.1
Mara	100.0	0.0	0.0	0.0	0.0	0.0	0.0
Manyara	1.7	5.2	10.2	16.6	21.4	29.6	15.3
Rural Mainland Tz	**11.3**	**13.8**	**12.8**	**15.3**	**20.3**	**18.9**	**7.6**

Number of hectares farmed in Vuli season

	land farmed in season Vuli season						
	Less than 0.1	0.1- 0.19	0.2– 0.49	0.5– 0.99	1 – 1.99	2 – 5	more than 5
Dodoma	0.0	0.0	0.0	0.0	100.0	0.0	0.0
Arusha	7.4	6.2	13.4	33.4	18.0	11.8	9.7
Kilimanjaro	0.0	0.0	23.9	26.5	49.6	0.0	0.0
Tanga	4.9	3.7	15.6	36.4	25.0	8.7	5.7
Morogoro	0.0	6.1	61.7	22.2	4.1	5.9	0.0
Pwani	7.9	18.5	15.6	28.5	12.2	16.2	1.1
Dar es Salaam	35.0	24.8	6.3	15.2	12.3	6.3	0.0
Lindi	100.0	0.0	0.0	0.0	0.0	0.0	0.0
Mtwara	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruvuma	0.0	0.0	32.1	34.4	0.0	33.5	0.0
Iringa	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mbeya	1.8	34.5	39.8	12.8	11.1	0.0	0.0
Singida	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tabora	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rukwa	100.0	0.0	0.0	0.0	0.0	0.0	0.0
Kigoma	36.6	11.6	1.0	7.6	15.2	19.2	8.8
Shinyanga	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kagera	7.5	14.9	12.6	32.9	27.9	4.1	0.0
Mwanza	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mara	10.2	22.6	34.0	17.3	8.4	6.3	1.2
Manyara	18.8	12.5	24.9	31.2	12.6	0.0	0.0
Rural Mainland Tz	**10.3**	**13.8**	**20.1**	**25.9**	**18.2**	**8.4**	**3.4**

How long does harvest last

	Duration of masika harvest (mos)	Duration of musimu harvest (mos)	Duration of vuli harvest (mos)
Dodoma	--	3.7	--
Arusha	3.3	--	1.8
Kilimanjaro	3.7	3.2	6.9
Tanga	3.8	2.7	3.6
Morogoro	4.4	5.0	2.4
Pwani	2.8	1.0	2.0
Dar es Salaam	2.5	--	0.9
Lindi	3.2	3.6	0.0
Mtwara	--	4.3	--
Ruvuma	6.2	9.0	5.0
Iringa	7.9	8.4	--
Mbeya	7.7	11.6	4.7
Singida	8.0	6.4	--
Tabora	10.1	5.8	--
Rukwa	6.3	--	--
Kigoma	4.0	7.2	4.9
Shinyanga	8.9	6.2	--
Kagera	3.5	4.7	4.0
Mwanza	5.2	5.3	--
Mara	4.3	1.0	3.4
Manyara	4.4	4.6	3.5
Rural Mainland Tz	**4.7**	**5.5**	**3.6**

Fertilizer use (either chemical or natural) and crop loss

	Used chemical fertilizer	Used natural fertilizer	Percent of the time crops were planted and over 20% were lost
Dodoma	0.5	31.9	0
Arusha	16.2	47.0	3.6
Kilimanjaro	49.9	71.5	2.5
Tanga	5.2	8.7	22.7
Morogoro	6.9	2.6	3.9
Pwani	3.2	9.2	23.7
Dar es Salaam	19.3	35.6	19.8
Lindi	1.0	2.4	56.8
Mtwara	2.6	8.9	5.4
Ruvuma	59.7	17.0	29.6
Iringa	47.6	36.4	62.5
Mbeya	45.1	29.0	5.3
Singida	1.8	42.2	22.7
Tabora	24.8	16.9	25.0
Rukwa	10.3	15.0	15.2
Kigoma	5.8	17.2	21.6
Shinyanga	4.4	22.7	21.5
Kagera	4.3	74.4	30.4
Mwanza	3.3	48.5	17.4
Mara	4.5	25.8	15.4
Manyara	4.0	55.9	3.0
Rural Mainland Tz	**14.5**	**31.6**	

Food consumption

Food item consumption (average number of days per week)

	Cereals	Tubers	Pulses	Vegetables	Oils	Fruit	Animal prot.	Sugar	Milk
Dodoma	6.9	0.9	3.4	5.7	4.0	0.7	1.7	3.1	1.0
Arusha	6.8	1.0	2.0	4.0	5.1	0.7	1.6	5.6	3.8
Kilimanjaro	6.5	2.3	2.9	4.1	6.5	1.8	3.6	5.6	3.6
Tanga	7.0	3.6	3.5	5.4	5.7	2.7	4.3	5.9	1.7
Morogoro	6.8	1.9	2.4	4.6	3.6	2.7	2.0	4.1	0.4
Pwani	6.9	2.1	3.3	3.1	4.5	3.3	2.7	5.5	0.6
Dar es Salaam	7.0	2.5	4.2	4.8	5.1	4.9	3.8	5.9	1.3
Lindi	6.3	2.5	2.3	4.1	3.7	4.9	2.9	3.2	0.2
Mtwara	4.3	3.8	1.3	3.2	1.1	3.3	3.0	2.3	0.1
Ruvuma	6.8	2.8	2.6	4.8	4.2	1.2	3.2	3.7	1.1
Iringa	6.9	2.8	4.0	5.2	6.1	1.8	2.9	4.7	1.0
Mbeya	6.8	3.2	5.1	4.2	5.5	2.9	3.9	4.4	2.1
Singida	6.9	0.9	3.6	5.6	5.2	1.0	2.1	3.5	1.0
Tabora	6.9	2.5	5.3	5.2	3.3	3.3	2.6	3.6	1.1
Rukwa	6.2	2.7	4.9	2.7	4.9	2.5	3.7	3.8	1.1
Kigoma	5.8	4.5	5.3	3.7	5.5	4.2	3.0	1.8	0.5
Shinyanga	6.9	3.1	4.7	4.8	4.3	1.9	2.6	2.9	1.1
Kagera	4.6	5.3	5.0	3.0	4.2	1.7	3.5	3.2	1.4
Mwanza	5.9	5.2	2.7	3.0	4.9	3.8	3.6	3.1	1.4
Mara	5.9	5.7	1.4	3.8	3.7	1.6	4.1	3.4	2.4
Manyara	6.6	1.0	2.2	4.5	3.3	0.8	1.5	2.7	1.4

Health and Nutrition

Maternal and child illness and care seeking behaviour (part 1)

	Mother ill in last two weeks	Child ill in the last 2 weeks	Child ill with fever	Cild ill with cough	Child ill with diarrhea	Child ill with "other" illness	Child seen at a health facility
Region							
Dodoma	34.2	37.8	29.6	29.6	16.2	2.3	77.4
Arusha	22.4	19.4	13.9	9.2	2.0	3.7	63.1
Kilimanjaro	30.3	29.3	18.7	14.7	3.1	1.9	92.7
Tanga	47.5	40.1	32.0	20.1	9.3	3.7	87.2
Morogoro	25.7	24.8	19.5	10.8	7.1	1.7	82.6
Pwani	32.4	31.2	25.5	18.8	9.3	3.2	93.5
Dar es Salaam	31.1	34.4	29.1	18.0	9.8	1.5	86.8
Lindi	37.4	33.0	23.6	19.6	13.5	3.0	77.6
Mtwara	26.1	27.0	23.9	9.3	7.2	.0	61.6
Ruvuma	27.6	15.7	14.4	6.6	2.2	1.3	95.4
Iringa	21.1	23.9	13.6	13.1	8.5	1.6	74.4
Mbeya	17.2	22.5	16.5	13.2	5.0	2.1	68.5
Singida	27.7	35.3	32.1	22.3	15.9	.9	86.5
Tabora	21.2	14.4	10.6	8.0	4.8	1.5	51.6
Rukwa	38.5	27.4	22.8	15.5	12.0	.5	57.8
Kigoma	24.5	17.6	14.9	10.3	11.0	.5	48.6
Shinyanga	36.5	34.3	29.7	21.4	12.4	1.1	67.8
Kagera	37.9	25.7	19.3	18.8	9.9	.5	62.3
Mwanza	43.1	41.8	37.2	21.4	15.9	1.3	67.3
Mara	38.8	25.0	17.4	8.9	6.1	6.6	66.0
Manyara	30.7	25.1	18.8	17.3	9.3	.9	72.6
Livelihoods							
small cash crop farmers	26.2	28.0	20.6	18.9	14.5	0.5	77.6
small subsistence farmers	31.9	28.1	21.8	16.5	10.1	1.6	70.3
big cash/crop farmers	33.9	25.5	23.8	14.6	9.4	1.5	73.7
big subsistence farmers	32.1	27.9	21.7	15.8	8.3	2.6	65.3
small business	34.4	29.4	23.0	17.2	7.1	2.3	74.5
commerce	34.0	32.4	27.0	18.8	10.3	2.1	77.5
daily workers	27.9	33.8	27.2	18.7	8.3	1.9	73.5
agropastorals	29.3	25.9	20.8	16.0	10.5	2.0	74.9
fishermen/hunters	34.0	31.0	26.4	18.2	16.0	1.7	79.0
aid	36.1	19.8	19.8	12.4	12.4	.0	62.7
others	36.8	34.0	27.5	13.9	12.3	1.9	76.7
salaried	25.0	26.8	22.1	13.7	6.0	1.6	67.5
Wealth Quintiles							
Poorest	29.5	31.7	25.2	18.8	10.1	1.6	65.8
Poorer	32.3	30.2	24.0	18.5	11.4	1.8	74.6
Moderate	30.9	25.5	20.1	14.6	8.9	1.7	80.9
Richer	32.9	28.5	23.0	15.8	9.7	2.1	75.8
Richest	31.6	28.2	22.8	15.6	8.9	2.3	69.2

Maternal and child illness and care seeking behaviour (part 2)

	Mother ill in last two weeks	Child ill in the last 2 weeks	Child ill with fever	Cild ill with cough	Child ill with diarrhea	Child ill with "other" illness	Child seen at a health facility
Food consumption group							
Poor	31.8	23.6	15.0	12.6	5.3	1.6	65.8
borderline	28.0	27.5	20.5	15.5	9.0	1.9	67.2
Acceptable	32.3	29.5	24.0	17.1	10.1	1.9	74.4
Rural Mainland Tz	**31.5**	**28.9**	**23.0**	**16.7**	**9.8**	**1.9**	**72.8**

Maternal hygiene practices

	Wash hands before preparing meals	Before eating	After going to the toilet	After cleaning a child that has gone to the bathroom	When they are dirty	Never wash hands	used soap to wash hands after going to the toilet
Region							
Dodoma	36.3	84.9	62.8	20.8	19.1	3.0	76.7
Arusha	28.2	86.6	72.1	13.2	55.5	0.5	73.1
Kilimanjaro	18.0	88.8	87.1	10.2	47.0	1.9	98.3
Tanga	28.0	94.1	66.7	27.0	4.4	0.0	65.
Morogoro	60.1	81.3	79.7	35.8	62.7	0.5	56.9
Pwani	44.2	89.6	79.6	30.9	23.3	1.3	83.3
Dar es Salaam	35.7	95.4	93.8	34.2	51.7	3.0	88.3
Lindi	30.1	96.9	98.2	30.4	13.4	0.0	80.5
Mtwara	56.9	97.9	96.2	34.2	50.5	2.8	62.3
Ruvuma	48.0	98.3	95.3	20.6	45.0	0.4	46.8
Iringa	32.6	98.4	90.2	29.4	35.0	1.2	60.7
Mbeya	9.8	74.9	34.9	12.2	26.9	0.5	46.3
Singida	31.6	95.2	91.2	26.3	38.7	1.3	78.9
Tabora	15.3	70.0	53.7	9.8	42.6	5.5	56.5
Rukwa	57.5	91.9	74.2	59.6	54.9	1.2	80.0
Kigoma	6.0	86.1	78.4	2.2	74.2	0.8	73.8
Shinyanga	22.0	94.4	76.9	20.6	63.7	2.2	73.4
Kagera	56.5	90.4	83.4	28.2	89.7	4.8	81.4
Mwanza	24.1	82.3	67.1	9.2	38.6	2.3	84.3
Mara	29.8	93.6	85.8	19.5	60.6	1.0	88.5
Manyara	11.3	88.8	72.0	18.9	48.7	2.2	35.2
Livelihood profiles							
small cash crop farmers	33.9	88.8	72.7	23.5	43.9	1.9	70.9
small subsistence farmers	29.0	89.3	76.2	19.8	47.7	2.0	69.1
big cash/crop farmers	34.0	88.1	84.0	26.8	43.8	1.5	78.6
big subsistence farmers	31.3	90.1	78.5	20.2	45.3	1.2	69.7
small business	35.2	91.6	77.3	25.7	36.9	1.0	76.7
Commerce	37.1	91.5	85.1	28.3	43.5	2.5	77.8
daily workers	31.9	89.8	79.9	22.9	44.2	1.4	61.4
Agropastorals	27.5	86.6	70.8	21.4	54.1	2.2	67.7
fishermen/hunters	35.6	92.1	85.4	30.8	44.1	1.1	78.1
Aid	40.6	92.6	90.0	18.9	41.2	0.0	54.9
Others	30.9	88.3	86.0	29.9	28.2	3.3	76.0
Salaried	34.6	92.9	86.7	25.9	49.9	2.3	85.3
Wealth quintiles							
Poorest	30.3	88.3	68.6	23.2	42.6	1.2	52.8
Poorer	32.3	89.2	75.4	23.3	39.8	1.7	65.8
Moderate	31.3	89.8	80.0	23.0	46.5	1.6	71.9
Richer	33.9	88.6	81.7	23.8	47.1	2.3	78.5
Richest	32.7	92.1	84.7	24.5	46.4	1.9	84.5
Food consumption groups							
Poor	35.8	87.6	75.8	22.6	49.7	1.9	59.3
Borderline	30.4	90.8	78.7	18.7	41.6	1.5	61.3
Acceptable	32.4	89.8	78.9	24.6	45.3	1.8	74.9
Rural Mainland Tz	**32.2**	**89.9**	**78.8**	**23.5**	**44.9**	**1.8**	**72.0**

Breastfeeding practices and childcare

	Early initiation of breastfeeding	breastfeeding with one day	exclusive breastfeeding under 6 months of age	received solid foods between 6-8 months of age	Continued breastfeeding
Regions					
Dodoma	90.6	100	66.6	83.2	90.4
Arusha	93.2	100	35.5	83.3	100
Kilimanjaro	77.4	100	54.6	100	100
Tanga	54.7	89	61.7	82.4	87.9
Morogoro	80	82.9	52.7	100	100
Pwani	81.9	93.1	55.3	80.8	100
Dar es Salaam	74.6	87.5	61.1	77.6	88.7
Lindi	39.8	68.8	49.6	100	91.7
Mtwara	61.5	98	53.9	100	100
Ruvuma	53.7	85	44.8	100	92.9
Iringa	94.4	100	65.4	100	100
Mbeya	69.5	84.3	56.5	67.7	92.9
Singida	84.9	93.1	49.9	74.8	85.6
Tabora	78.1	95.4	47.4	100	72.3
Rukwa	69	99.1	73.1	78.9	85.4
Kigoma	96.5	98.9	81.7	62.5	84.1
Shinyanga	55.9	94.1	73.6	100	93.3
Kagera	51.2	98.7	76.2	84.6	49.4
Mwanza	35.5	91.5	78.1	82.5	72.2
Mara	47.1	98.3	44.1	100	86.9
Manyara	88.3	98.8	58.9	71.6	75.0
Livelihood Profiles					
Small cash crop farmers	72.5	89.7	72.2	81.1	82.9
Small subsistence farmers	65.1	95.4	58	90.2	85.4
big cash/crop farmers	70.4	97.6	77.4	89.4	76.8
big subsistence farmers	68.2	93.3	69.9	78.6	86.0
Small business	66.8	91.4	55.7	63.5	84.2
commerce	73	94.1	63.5	90	89.9
daily workers	70.8	93.4	35.7	86.1	84.9
agropastorals	77.9	96.5	70.9	78.6	81.6
fishermen/hunters	63.5	91.9	59.3	88.7	100
Aid	91.4	93.7	--	100	--
others	61.5	95.2	57.8	100	85.0
salaried	76	97.7	52.2	94.9	100
Wealth Quintiles					
Poorest	72.3	95.8	57.4	79	87.9
Poorer	70.1	93.4	67	92.9	85.7
Moderate	69.1	93.7	62.8	74.1	83.9
Richer	68.3	93.1	60.2	83.4	86.0
Richest	63.7	93.4	57.1	92.6	85.9
Food consumption groups					
poor	63.5	95.5	64.8	67.1	62.3
borderline	69.4	95	55	82	85.2
acceptable	69.1	93.7	62.8	84.4	86.7
Rural Mainland Tz	69	94	61.3	83.4	85.9

Child Malnutrition (0-59 months)

	wasting	stunting	underweight
Dodoma	5.2	45.2	18.3
Arusha	16.6	34.1	16.8
Kilimanjaro	6.1	21.0	11.5
Tanga	7.9	34.4	12.7
Morogoro	2.2	37.3	11.9
Pwani	5.2	31.8	13.0
Dar es Salaam	6.0	20.9	11.9
Lindi	5.1	42.3	14.1
Mtwara	7.1	32.6	20.7
Ruvuma	3.4	35.7	11.2
Iringa	0.7	54.6	15.8
Mbeya	4.1	31.0	10.4
Singida	5.3	28.7	18.3
Tabora	7.0	30.8	13.8
Rukwa	7.8	50.7	18.0
Kigoma	8.1	53.1	18.4
Shinyanga	5.3	36.6	13.5
Kagera	6.2	39.2	13.7
Mwanza	1.5	31.9	10.1
Mara	4.6	26.4	11.8
Manyara	8.0	38.8	19.3
Rural Mainland Tz	**5.7**	**36.6**	**14.3**

	at least one shock in last 5 years	at least one shock in last 12 months	Lack of rainfall in last year	flooding in last year	high input costs in last year	malaria in last year	high fuel costs in last year	lack of water/quality water in last year	sickness in last year	high food prices in last year	lack of irrigation in last year	plant disease/ pests in last year
Region												
Dodoma	93.8	91.9	85.2	4.8	10.0	9.0	16.6	15.9	28.8	71.0	2.7	27.4
Arusha	96.4	95.5	90.5	1.4	9.2	0.0	15.0	6.7	3.7	54.2	1.0	4.5
Kilimanjaro	98.5	98.5	87.8	4.4	45.0	4.7	32.0	8.7	26.3	77.3	27.1	20.6
Tanga	100.0	99.0	93.9	1.9	22.7	2.8	20.8	37.8	6.0	59.1	30.1	35.2
Morogoro	100.0	99.4	80.6	0.9	15.4	3.7	5.5	13.4	41.6	55.1	4.2	54.9
Pwani	92.0	90.5	74.8	1.8	5.1	4.5	18.7	16.9	15.1	55.9	6.2	22.9
Dar es Salaam	99.0	98.1	73.8	0.9	11.8	13.2	33.3	32.6	25.5	74.1	21.7	16.8
Lindi	99.5	99.5	88.5	1.0	11.4	40.9	34.2	37.0	35.6	86.3	9.3	83.6
Mtwara	100.0	100.0	88.0	4.6	27.2	4.3	15.7	25.8	8.5	74.8	9.9	66.9
Ruvuma	84.9	84.5	5.7	1.4	46.2	2.9	28.2	2.4	18.2	25.5	0.9	5.0
Iringa	99.1	97.7	31.8	3.4	57.2	4.8	48.3	6.2	28.2	56.9	1.4	19.9
Mbeya	99.6	99.6	39.5	9.0	38.7	4.6	16.8	50.1	29.0	44.8	0.0	10.7
Singida	100.0	100.0	63.0	3.3	19.1	67.0	18.9	53.2	30.9	71.4	9.1	47.8
Tabora	97.0	97.0	42.9	6.3	26.7	14.3	9.5	40.8	26.8	56.6	7.1	52.8
Rukwa	95.6	95.6	0.9	3.1	27.1	25.4	32.1	26.1	29.7	49.8	5.7	27.5
Kigoma	99.0	98.1	32.4	8.2	25.6	36.3	32.8	9.3	29.2	71.7	3.3	78.6
Shinyanga	29.1	28.2	12.4	0.9	0.0	0.0	0.0	1.5	11.1	1.0	0.0	1.9
Kagera	71.1	49.5	25.6	5.6	8.5	3.4	6.1	8.0	18.9	23.6	4.8	24.6
Mwanza	100.0	100.0	72.2	2.4	46.5	26.4	40.9	21.4	40.1	78.1	17.6	63.6
Mara	100.0	100.0	85.7	1.9	9.6	24.7	47.6	35.7	35.0	80.1	0.9	60.9
Manyara	97.6	96.7	80.0	1.9	10.5	11.0	4.3	31.6	11.9	15.8	10.5	29.8
Livelihoods												
Small cash crop farmers	94.0	89.5	55.6	7.1	25.0	9.2	19.7	21.8	27.6	50.6	11.2	30.9
Small subsistence farmers	83.9	81.1	53.1	2.3	21.3	12.1	19.4	19.2	19.2	48.2	8.2	36.1
big cash/crop farmers	93.1	90.8	53.5	2.2	28.6	12.6	26.9	22.9	21.8	43.8	6.5	37.7
big subsistence farmers	93.8	92.2	58.0	2.1	24.3	14.9	24.3	18.5	18.8	49.7	8.9	41.9
Small business	91.1	87.9	60.4	3.6	17.0	14.6	19.6	23.7	25.1	55.1	5.2	32.1
Commerce	93.6	92.0	54.4	6.0	26.7	16.4	26.5	26.9	26.6	56.1	9.3	36.3
daily workers	94.6	93.9	66.5	3.5	23.2	13.5	17.9	20.4	31.9	62.5	10.0	36.7
Agropastorals	89.3	88.6	66.1	5.1	20.3	9.4	16.0	21.3	22.7	50.7	5.4	25.7
fishermen/hunters	95.8	94.8	67.8	2.7	18.1	16.2	25.4	26.2	28.0	69.0	3.6	32.5
Aid	95.6	94.2	50.8	0.9	9.4	3.7	18.1	21.0	34.0	60.8	2.4	26.1
Others	94.4	93.5	67.9	2.7	28.8	8.2	23.9	25.0	31.7	68.4	8.1	42.9
Salaried	89.4	89.4	51.5	1.7	27.7	11.3	29.5	23.5	22.2	58.3	8.4	23.2
Wealth Quintile												
Poorest	90.0	88.3	61.5	2.7	14.5	10.8	13.4	23.0	19.1	53.1	5.6	30.9
Poorer	90.6	89.3	58.8	3.5	21.0	14.0	17.1	23.9	26.7	52.4	6.5	34.9
Moderate	91.6	88.6	58.9	3.0	23.0	14.6	22.0	20.2	23.0	53.2	7.9	40.1
Richer	89.4	87.1	55.1	4.6	23.8	11.5	22.3	19.1	23.8	51.6	7.9	37.6
Richest	90.3	88.7	57.5	3.2	29.7	12.9	30.2	20.7	26.1	57.1	10.6	30.7
Food consumption group												
poor	95.2	93.9	76.0	5.6	14.1	9.8	11.8	23.1	22.7	44.4	7.8	36.3

Households receiving food assistance and type of food assistance

	% receiving food assistance	Receipt of school feeding	Receipt of food for pregnancy	Receipt of food for training	Receipt of food for work	Receipt of food distribution	Receipt of other food assistance
Region							
Dodoma	66.6	1.5	2.2	4.4	1.5	93.4	0.0
Arusha	79.4	2.4	1.3	4.4	1.3	66.7	24.0
Kilimanjaro	72.2	2.4	1.3	2.5	2.7	74.2	20.0
Tanga	17.3	2.6	5.3	13.2	0.0	59.8	5.8
Morogoro	18.3	0.0	0.0	5.1	5.0	71.5	23.6
Pwani	13.9	3.4	3.8	11.1	3.8	70.6	3.8
Dar es Salaam	5.9	0.0	42.9	0.0	7.4	15.5	10.2
Lindi	55.9	0.9	1.7	8.1	1.7	86.4	2.4
Mtwara	8.5	0.0	0.0	0.0	0.0	44.7	55.3
Ruvuma	1.4	31.1	0.0	0.0	35.1	33.8	0.0
Iringa	5.3	0.0	0.0	0.0	0.0	91.4	18.3
Mbeya	2.4	19.0	0.0	20.1	0.0	41.3	40.3
Singida	2.8	32.8	0.0	0.0	0.0	0.0	33.0
Tabora	2.9	0.0	0.0	17.6	0.0	50.0	16.5
Rukwa	4.2	0.0	0.0	0.0	22.5	0.0	88.7
Kigoma	9.5	0.0	0.0	26.0	0.0	74.0	0.0
Shinyanga	10.0	15.0	0.0	14.4	4.5	37.8	4.8
Kagera	3.8	12.8	13.0	0.0	25.1	24.3	24.8
Mwanza	12.6	3.8	0.0	23.2	0.0	53.7	19.2
Mara	19.6	2.5	2.6	4.9	0.0	87.7	4.8
Manyara	49.7	9.0	1.9	2.9	0.9	65.8	27.8
Livelihoods							
small cash crop farmers	19.6	0.0	0.0	6.8	3.0	64.4	25.1
small subsistence farmers	17.1	6.0	3.4	5.8	3.0	66.3	15.7
big cash/crop farmers	21.3	5.8	5.9	5.7	0.0	77.3	6.4
big subsistence farmers	24.2	2.1	0.6	6.0	0.5	79.4	11.7
small business	23.8	3.4	2.0	9.0	3.6	66.4	15.8
Commerce	14.8	2.9	0.0	7.0	2.5	83.4	6.6
daily workers	30.2	2.9	0.0	4.9	0.9	79.4	15.8
agropastorals	30.8	3.5	0.6	3.7	0.9	66.9	23.5
fishermen/hunters	26.1	8.0	11.1	12.9	4.2	65.8	7.7
Aid	57.6	2.4	0.0	12.4	5.5	72.3	10.5
Others	29.0	0.0	2.2	5.8	1.4	87.4	2.5
Salaried	16.9	4.7	6.0	6.4	4.2	50.2	22.3
Wealth Quintiles							
Poorest	29.0	2.4	3.0	8.9	2.6	72.2	11.6
Poorer	23.5	5.8	0.9	5.7	1.0	76.4	11.7
Moderate	22.8	1.9	2.2	5.1	1.5	70.1	18.2
Richer	20.1	2.2	2.2	4.9	2.1	71.4	17.3
Richest	18.5	2.9	1.0	6.0	3.6	69.8	17.4
Food consumption group							
Poor	33.8	10.7	2.0	7.3	2.0	60.9	23.0
Borderline	34.4	3.1	1.1	5.9	2.3	73.7	14.3
acceptable	19.6	3.0	2.2	6.4	2.0	72.2	14.8
Rural Mainland Tz	23.0	3.5	1.9	6.3	2.1	71.9	15.2

HHs receiving non food assistance

	receiving non food assistance	Receipt of money allowance assist.	Receipt of education assist.	Receipt of medical services assist.	Receipt of construction assist.	Receipt of water and sanitation assist.	Receipt of agriculture assist.	Receipt of Veterinary assist.	Receipt of other assist.
Region									
Dodoma	6.5	43.3	21.2	6.8	0.0	0.0	14.3	0.0	29.0
Arusha	3.9	0.0	0.0	0.0	12.4	24.8	12.1	0.0	50.6
Kilimanjaro	7.2	60.0	32.0	12.9	0.0	0.0	0.0	0.0	21.1
Tanga	43.0	5.5	13.4	33.1	0.0	0.0	4.6	2.2	47.8
Morogoro	10.9	39.2	12.6	18.6	4.3	0.0	20.6	0.0	13.2
Pwani	3.4	41.6	42.8	0.0	0.0	0.0	0.0	0.0	44.4
Dar es Salaam	7.7	25.0	37.4	25.9	0.0	0.0	5.7	6.1	0.0
Lindi	10.0	5.0	33.7	8.9	0.0	0.0	5.0	18.4	28.5
Mtwara	0.0	.	.		.	.	.	.	.
Ruvuma	38.5	2.5	3.7	88.7	0.0	0.0	2.9	0.0	6.3
Iringa	32.9	6.0	8.5	2.7	2.8	1.4	7.3	1.5	82.7
Mbeya	4.4	22.9	11.0	32.5	0.0	0.0	11.0	10.1	11.8
Singida	0.4	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
Tabora	21.0	9.0	13.7	30.2	0.0	0.0	9.0	15.7	31.2
Rukwa	62.7	3.0	1.6	1.6	0.8	1.6	0.8	6.8	90.6
Kigoma	9.0	26.8	21.6	15.3	0.0	0.0	0.0	0.0	41.2
Shinyanga	33.1	10.1	0.0	10.1	1.5	0.0	4.1	3.1	74.0
Kagera	23.5	2.1	16.4	40.9	2.1	0.0	0.0	8.3	30.3
Mwanza	7.3	6.5	26.5	33.3	13.5	0.0	14.1	0.0	40.1
Mara	54.0	8.8	0.9	3.4	0.9	0.9	2.7	3.7	83.4
Manyara	2.4	0.0	19.7	0.0	19.7	0.0	0.0	19.7	18.9
Livelihoods									
Small cash crop farmers	21.9	7.0	3.3	13.7	0.0	0.0	2.5	16.1	60.8
Small subsistence farmers	19.6	10.0	7.7	18.9	2.2	0.3	7.1	2.8	57.8
big cash/crop farmers	25.7	5.6	8.6	15.3	0.0	0.0	2.4	4.3	63.9
big subsistence farmers	19.4	5.7	9.3	27.6	3.9	1.2	4.0	1.1	54.1
Small business	15.1	10.4	9.5	24.1	1.3	0.0	4.9	1.1	53.2
commerce	21.2	10.2	13.0	20.9	0.0	0.0	4.4	3.0	53.9
daily workers	15.1	18.3	10.9	11.4	2.6	1.5	2.1	4.6	57.0
agropastorals	11.2	7.8	8.6	28.6	0.0	2.0	0.0	10.0	48.0
fishermen/hunters	19.9	4.0	4.8	13.2	0.0	2.9	0.0	5.0	61.8
Aid	40.6	31.3	23.0	41.4	7.4	3.5	17.6	10.8	22.5
Others	19.1	3.3	12.5	21.6	0.0	0.0	8.6	2.6	53.6
salaried	17.8	13.3	7.2	23.0	0.0	0.0	4.6	2.5	54.0
Wealth Quintile									
Poorest	15.7	13.1	9.9	20.5	0.8	0.6	3.3	5.3	51.9
Poorer	16.8	5.8	7.8	22.3	4.6	1.1	5.1	8.0	56.9
Moderate	20.7	9.3	6.4	18.7	0.6	0.0	3.7	5.8	57.4
Richer	20.9	10.1	11.3	24.2	1.4	0.7	4.6	3.1	53.1
Richest	18.1	11.5	10.7	19.2	0.6	0.8	7.8	0.8	56.6
Food consumption group									
Poor	9.5	4.3	18.2	4.1	0.0	0.0	0.0	8.2	49.1
Borderline	12.2	14.3	10.7	17.0	4.9	1.4	6.8	3.9	50.3
Acceptable	20.3	9.5	9.0	21.9	1.2	0.6	4.7	4.5	55.7
Rural Mainland Tz	18.3	10.0	9.4	20.9	1.6	0.7	4.8	4.5	54.9

Annex 4: Rural Zanzibar Tables

Human and Social Capital

Age and marital status of household head

	Age of HH head	Married	Partner	Divorced	Living apart not divorced	Widow /Widower	Never married
Unguja	**46.9**	**80.9**	**0.5**	**9.4**	**0.7**	**8.1**	**0.5**
North A	48.1	85.5	0.0	6.3	1.0	7.2	0.0
North B	48.6	77.6	0.0	9.3	1.5	10.2	1.5
Central	48.0	74.3	1.0	13.1	0.5	10.2	1.0
South	46.8	80.9	0.0	11.3	0.0	7.8	0.0
West	43.3	85.9	1.5	7.0	0.5	5.0	0.0
Pemba	**48.2**	**85.0**	**0.0**	**4.8**	**0.5**	**9.3**	**0.4**
Wete	47.3	85.1	0.0	5.0	0.5	8.9	0.5
Micheweni	48.6	88.5	0.0	2.9	0.5	7.7	0.5
Chake Chake	47.3	83.6	0.0	3.9	0.5	11.6	0.5
Mkoani	50.0	82.7	0.0	7.9	0.5	8.9	0.0
Rural Zanzibar	**47.5**	**82.6**	**0.3**	**7.5**	**0.6**	**8.6**	**0.4**

Net enrolment rate by gender

	Enrolment rate for boys	Enrolment rate for girls	Enrolment rate for all children
Unguja	**77.5**	**79.4**	**80.4**
North A	81.7	80.3	80.7
North B	75.0	75.4	77.2
Central	76.8	76.2	79.1
South	79.7	89.1	86.3
West	73.9	76.2	78.2
Pemba	**65.1**	**64.4**	**64.0**
Wete	61.1	66.5	66.5
Micheweni	67.8	65.5	64.7
Chake Chake	65.0	64.6	62.3
Mkoani	66.4	60.7	61.7
Rural Zanzibar	**72.3**	**72.7**	**73.3**

Reason for absenteeism among male children enrolled in school

	Sickness	Work for money	Domestic work	Taking care of siblings	Long distance to school	School expenses	Refusal to go	Other reasons
Unguja	**25.9**	**0.0**	**4.5**	**2.2**	**2.2**	**7.0**	**48.4**	**4.5**
North A	0.0	0.0	0.0	0.0	0.0	16.7	66.7	16.7
North B	36.4	0.0	9.1	0.0	0.0	0.0	54.5	0.0
Central	25.0	0.0	25.0	25.0	25.0	0.0	50.0	0.0
South	27.3	0.0	0.0	0.0	0.0	0.0	45.5	9.1
West	27.3	0.0	0.0	0.0	0.0	18.2	36.4	0.0
Pemba	**23.6**	**0.0**	**0.0**	**0.0**	**0.0**	**13.0**	**33.8**	**34.5**
Wete	8.3	0.0	0.0	0.0	0.0	0.0	16.7	58.3
Micheweni	50.0	0.0	0.0	0.0	0.0	33.3	50.0	33.3
Chake Chake	50.0	0.0	0.0	0.0	0.0	30.0	20.0	0.0
Mkoani	0.0	0.0	0.0	0.0	0.0	0.0	60.0	40.0
Rural Zanzibar	**24.9**	**0.0**	**2.5**	**1.2**	**1.2**	**9.7**	**42.0**	**17.6**

Reason for absenteeism among female children enrolled in school

	Sickness	Work for money	Domestic work	Taking care of siblings	Long distance to school	School expenses	Refusal to go	Other reasons
Unguja	**18.6**	**0.0**	**4.7**	**0.0**	**4.9**	**4.5**	**13.8**	**4.8**
North A	16.7	0.0	0.0	0.0	0.0	0.0	16.7	0.0
North B	27.3	0.0	18.2	0.0	0.0	0.0	18.2	0.0
Central	25.0	0.0	0.0	0.0	0.0	25.0	25.0	0.0
South	9.1	0.0	0.0	0.0	0.0	9.1	9.1	9.1
West	18.2	0.0	0.0	0.0	18.2	0.0	9.1	9.1
Pemba	**5.3**	**0.0**	**0.0**	**0.0**	**0.0**	**7.8**	**10.6**	**24.2**
Wete	8.3	0.0	0.0	0.0	0.0	0.0	16.7	58.3
Micheweni	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0
Chake Chake	10.0	0.0	0.0	0.0	0.0	20.0	10.0	0.0
Mkoani	0.0	0.0	0.0	0.0	0.0	0.0	10.0	20.0
Rural Zanzibar	**12.8**	**0.0**	**2.6**	**0.0**	**2.8**	**6.0**	**12.4**	**13.3**

Percent of households with at least one member displaced and reason for displacement

	HH experienced migration in the past 6 months	Insecurity	Work/other Economic Opportunities	Medical Treatment	Education	Land Wrangles	Other
Unguja	**3.9**	**0.0**	**54.7**	**7.7**	**29.6**	**0.0**	**8.0**
North A	3.4	0.0	28.6	0.0	71.4	0.0	0.0
North B	4.4	0.0	66.7	0.0	33.3	0.0	0.0
Central	1.9	0.0	50.0	25.0	25.0	0.0	0.0
South	2.9	0.0	16.7	16.7	50.0	0.0	16.7
West	6.5	0.0	76.9	7.7	0.0	0.0	15.4
Pemba	**9.0**	**2.7**	**42.8**	**2.7**	**17.6**	**0.0**	**34.1**
Wete	8.4	0.0	70.6	0.0	5.9	0.0	23.5
Micheweni	12.4	0.0	38.5	0.0	11.5	0.0	50.0
Chake Chake	6.3	7.7	23.1	15.4	23.1	0.0	30.8
Mkoani	8.9	5.9	35.3	0.0	35.3	0.0	23.5
Rural Zanzibar	**6.0**	**1.7**	**47.3**	**4.6**	**22.2**	**0.0**	**24.2**

Place of migration

	Travelled outside the district (not sure of destination)	Travelled outside the district to a rural area	Travelled outside the district to an urban area	Travelled outside the country
Unguja	**28.6**	**13.1**	**49.5**	**8.8**
North A	28.6	0.0	71.4	0.0
North B	14.3	14.3	71.4	0.0
Central	0.0	0.0	25.0	75.0
South	50.0	0.0	50.0	0.0
West	40.0	30.0	30.0	0.0
Pemba	**25.7**	**10.0**	**58.6**	**5.7**
Wete	17.6	11.8	64.7	5.9
Micheweni	38.5	11.5	42.3	7.7
Chake Chake	30.0	0.0	70.0	0.0
Mkoani	11.8	11.8	70.6	5.9
Rural Zanzibar	**26.7**	**11.1**	**55.5**	**6.8**

Natural Capital

Number of hectares farmed in Masika season

	Total land farmed in Masika season						
	< 0.1Ha	0.1Ha - 0.19 Ha	0.2 Ha – 0.49 Ha	0.5 Ha – 0.99 Ha	1 Ha – 1.99 Ha	2 Ha – 5 Ha	more than 5 Ha
Unguja	**4.3**	**32.4**	**22.4**	**21.8**	**15.2**	**3.9**	**0.0**
North A	3.5	38.9	24.3	16.0	13.9	3.5	0.0
North B	10.7	29.5	14.8	18.8	22.1	4.0	0.0
Central	1.9	43.4	19.5	17.0	15.1	3.1	0.0
South	0.0	22.3	24.1	35.7	16.1	1.8	0.0
West	4.4	23.1	34.1	25.3	5.5	7.7	0.0
Pemba	**3.0**	**19.3**	**42.2**	**24.6**	**9.1**	**1.7**	**0.1**
Wete	2.1	21.4	45.5	21.9	8.0	1.1	0.0
Micheweni	2.5	17.3	47.2	26.4	5.6	1.0	0.0
Chake Chake	3.6	23.4	33.9	22.4	12.5	3.6	0.5
Mkoani	3.8	14.7	42.4	27.7	10.3	1.1	0.0
Rural Zanzibar	**3.7**	**25.7**	**32.5**	**23.2**	**12.1**	**2.8**	**0.1**

Number of hectares farmed in Musimu season

	Total land farmed in Vuli season						
	< 0.1Ha	0.1Ha - 0.19 Ha	0.2 Ha – 0.49 Ha	0.5 Ha – 0.99 Ha	1 Ha – 1.99 Ha	2 Ha – 5 Ha	more than 5 Ha
Unguja	**4.3**	**35.5**	**27.0**	**16.8**	**12.6**	**3.7**	**0.0**
North A	6.7	43.3	17.2	17.2	15.7	0.0	0.0
North B	10.1	30.4	20.3	14.5	16.7	8.0	0.0
Central	1.8	39.2	26.3	19.3	11.7	1.8	0.0
South	0.7	29.0	42.8	15.2	9.0	3.4	0.0
West	2.5	37.0	25.9	18.5	9.9	6.2	0.0
Pemba	**5.4**	**27.8**	**45.7**	**16.0**	**4.7**	**0.4**	**0.0**
Wete	2.0	29.8	45.7	19.2	3.3	0.0	0.0
Micheweni	2.2	19.7	59.9	16.1	2.2	0.0	0.0
Chake Chake	14.7	31.6	27.9	16.9	7.4	1.5	0.0
Mkoani	3.4	29.5	49.3	11.6	6.2	0.0	0.0
Rural Zanzibar	**4.8**	**32.2**	**35.1**	**16.5**	**9.2**	**2.3**	**0.0**

How long does harvest last

	Duration of masika harvest (mos)	Duration of vuli harvest (mos)
Unguja	**3.5**	**3.3**
North A	3.4	3.2
North B	3.4	3.3
Central	3.3	3.2
South	3.7	3.6
West	3.8	2.8
Pemba	**2.4**	**2.2**
Wete	2.3	2.1
Micheweni	2.1	1.9
Chake Chake	3.0	2.5
Mkoani	2.3	2.4
Rural Zanzibar	**2.9**	**2.8**

Did the household use fertilizer (either chemical or natural) for last harvest

	Used chemical fertilizer	Used natural fertilizer	Percent of times that crops were planted and over 20% were lost
Unguja	**11.1**	**31.5**	**10.4**
North A	7.6	15.9	8.9
North B	5.7	29.7	12.0
Central	9.5	39.7	4.5
South	10.5	35.5	12.5
West	26.2	36.4	15.9
Pemba	**4.7**	**12.6**	**21.4**
Wete	4.8	10.7	23.0
Micheweni	3.0	12.7	26.9
Chake Chake	5.2	15.6	8.9
Mkoani	5.9	11.4	27.0
Rural Zanzibar	**8.1**	**22.5**	**15.6**

Physical Capital

Crowding index

	Crowding (# sleeping/ room)
Unguja	**2.0**
North A	2.1
North B	2.1
Central	2.1
South	1.9
West	2.1
Pemba	**1.9**
Wete	2.0
Micheweni	2.0
Chake Chake	1.8
Mkoani	1.9
Rural Zanzibar	**2.0**

Type of Roof

	Concrete	Mud	Straw	Wood	Plastic	Galvanized iron	Asbestos	Tiled
Unguja	**1.6**	**1.9**	**0.9**	**1.4**	**30.9**	**69.1**	**0.3**	**2.4**
North A	2.0	2.0	1.0	1.5	30.5	71.0	0.0	1.9
North B	2.1	3.6	1.5	3.6	46.4	52.1	0.0	3.4
Central	1.0	0.5	0.5	0.5	30.0	69.0	1.5	1.0
South	1.6	1.0	0.5	0.5	26.0	74.0	0.0	3.9
West	1.6	2.1	1.0	1.0	21.9	79.2	0.0	1.5
Pemba	**1.4**	**3.5**	**0.4**	**0.2**	**44.0**	**57.6**	**0.0**	**0.9**
Wete	1.5	3.5	0.5	0.0	48.7	53.3	0.0	1.5
Micheweni	1.0	1.9	0.0	1.0	66.8	33.7	0.0	0.0
Chake Chake	2.4	5.3	0.5	0.0	28.2	74.8	0.0	1.4
Mkoani	0.5	3.2	0.5	0.0	31.1	70.0	0.0	0.5
Rural Zanzibar	**1.5**	**2.6**	**0.7**	**0.9**	**36.4**	**64.2**	**0.2**	**1.8**

Type of Floor

	Concrete floor	Mud floor	Straw floor	Wooden floor	Tiled floor
Unguja	**60.7**	**38.8**	**1.0**	**1.1**	**0.8**
North A	44.4	53.6	1.9	0.5	0.5
North B	53.7	46.3	2.0	1.0	0.0
Central	60.2	39.3	0.0	0.5	0.0
South	72.1	26.5	0.5	1.0	2.0
West	71.4	29.6	0.5	2.5	1.5
Pemba	**36.2**	**66.9**	**0.5**	**0.7**	**0.9**
Wete	39.6	64.4	0.5	0.5	1.5
Micheweni	20.6	82.3	0.5	1.9	0.5
Chake Chake	49.3	53.6	1.0	0.0	1.4
Mkoani	35.1	67.5	0.0	0.5	0.0
Rural Zanzibar	**50.5**	**50.4**	**0.8**	**1.0**	**0.8**

Percent of households with an unimproved drinking water source and toilet type

	Unimproved toilet	Unimproved water source
Unguja	**19.9**	**5.3**
North A	33.8	8.7
North B	33.7	4.9
Central	20.0	3.9
South	6.0	2.0
West	7.2	7.0
Pemba	**54.9**	**9.6**
Wete	55.7	2.0
Micheweni	76.8	11.5
Chake Chake	37.7	13.5
Mkoani	48.4	11.5
Rural Zanzibar	**34.4**	**7.0**

Household relied on alternate drinking water source

	Public tap/ piped water	Pond, lake, river or stream	Borehole with pump	Rain water	Protected dug well or spring	Unprotected well or spring	Vendor
Unguja	**7.9**	**4.8**	**6.5**	**1.3**	**48.1**	**29.4**	**2.0**
North A	18.4	6.1	28.6	6.1	32.7	4.1	4.1
North B	5.7	13.2	0.0	0.0	22.6	58.5	0.0
Central	10.0	0.0	0.0	0.0	66.0	24.0	0.0
South	2.4	0.0	0.0	1.2	70.6	24.7	1.2
West	8.3	6.7	10.0	0.0	36.7	33.3	5.0
Pemba	**12.0**	**0.0**	**1.6**	**2.0**	**37.8**	**46.6**	**0.0**
Wete	8.4	0.0	3.6	0.6	42.2	45.2	0.0
Micheweni	20.8	0.0	0.0	0.0	44.8	34.4	0.0
Chake Chake	14.0	0.0	1.6	0.8	31.0	52.7	0.0
Mkoani	4.5	0.0	0.7	7.5	30.6	56.7	0.0
Rural Zanzibar	**10.5**	**1.7**	**3.4**	**1.7**	**41.5**	**40.4**	**0.7**

Economic Capital and Livelihood Strategies

Characteristics of migrations

	at least one member work away from the HH	Town	within region	To another region	Dar es Salam	Greater Horn Region	Abroad
Unguja	**7.7**	**68.9**	**22.7**	**21.6**	**15.7**	**1.4**	**5.4**
North A	4.3	77.8	11.1	22.2	11.1	0.0	0.0
North B	10.2	71.4	19.0	23.8	28.6	0.0	4.8
Central	5.3	72.7	54.5	27.3	0.0	0.0	0.0
South	10.3	81.0	28.6	23.8	0.0	0.0	0.0
West	8.0	43.8	6.3	12.5	31.3	6.3	18.8
Pemba	**9.3**	**10.6**	**4.1**	**49.4**	**49.4**	**2.6**	**1.3**
Wete	12.9	7.7	7.7	53.8	50.0	0.0	0.0
Micheweni	5.7	8.3	0.0	41.7	41.7	16.7	8.3
Chake Chake	9.2	10.5	5.3	42.1	52.6	0.0	0.0
Mkoani	9.4	16.7	0.0	55.6	50.0	0.0	0.0
Rural Zanzibar	**8.4**	**42.1**	**14.2**	**34.4**	**31.2**	**1.9**	**3.5**

Unguja	2.4	6.9	72.7	18.8	32.4	48.7	18.8	40.8	18.2	22.2
North A	1.9	4.1	85.7	0.0	33.3	66.7	16.7	16.7	33.3	33.3
North B	1.0	6.0	60.0	33.3	33.3	33.3	33.3	33.3	33.3	0.0
Central	3.4	8.2	77.8	28.6	57.1	14.3	14.3	57.1	14.3	14.3
South	2.0	9.9	57.1	0.0	50.0	50.0	0.0	75.0	0.0	25.0
West	3.5	5.8	77.8	28.6	0.0	71.4	28.6	28.6	14.3	28.6
Pemba	4.1	5.7	73.7	20.5	70.8	8.8	5.9	40.7	24.0	29.4
Wete	4.5	7.0	66.7	20.0	80.0	0.0	10.0	20.0	50.0	20.0
Micheweni	3.3	4.7	71.4	0.0	100.0	0.0	0.0	40.0	20.0	40.0
Chake Chake	1.4	4.4	55.6	0.0	60.0	40.0	0.0	20.0	20.0	60.0
Mkoani	7.3	5.4	93.3	35.7	57.1	7.1	7.1	64.3	7.1	21.4
Rural Zanzibar	3.1	6.2	73.2	19.7	52.7	27.6	12.0	40.7	21.3	26.0

Unguja	**5.2**	**82.5**	**20.6**	**55.6**	**23.8**	**18.6**	**24.2**	**38.9**	**18.3**
North A	1.9	14.3	0.0	0.0	100.0	0.0	0.0	0.0	100.0
North B	7.8	94.7	22.2	50.0	27.8	16.7	11.1	44.4	27.8
Central	3.4	77.8	14.3	57.1	28.6	14.3	28.6	42.9	14.3
South	7.4	100.0	15.8	63.2	21.1	21.1	31.6	36.8	10.5
West	5.0	75.0	33.3	55.6	11.1	22.2	33.3	33.3	11.1
Pemba	**6.1**	**90.0**	**12.7**	**80.1**	**7.3**	**1.9**	**23.7**	**39.9**	**34.6**
Wete	7.4	85.0	11.8	88.2	0.0	5.9	29.4	35.3	29.4
Micheweni	3.3	85.7	16.7	83.3	0.0	0.0	16.7	33.3	50.0
Chake Chake	5.8	88.9	6.3	68.8	25.0	0.0	12.5	37.5	50.0
Mkoani	7.9	100.0	18.8	81.3	0.0	0.0	31.3	50.0	18.8
Rural Zanzibar	**5.5**	**85.9**	**16.8**	**67.2**	**16.0**	**10.7**	**23.9**	**39.3**	**26.0**

Percent of HHs in each livelihood group by region

	agriculturalists	fishermen	small business	salaried	casual laborers	commerce	aid	others	agro-pastoralists
Unguja	**28.8**	**15.6**	**17.1**	**10.6**	**10.4**	**4.4**	**2.4**	**4.8**	**5.9**
North A	40.0	30.2	12.7	5.9	3.4	2.0	1.0	3.4	1.5
North B	24.3	15.8	21.3	10.4	7.9	4.0	3.5	2.0	10.9
Central	49.3	6.3	13.2	3.9	11.7	3.4	2.4	2.0	7.8
South	16.7	17.2	18.2	15.3	10.3	3.9	3.0	10.8	4.4
West	16.2	9.1	19.3	16.8	17.8	8.6	2.0	5.6	4.6
Pemba	**36.5**	**15.9**	**6.5**	**11.0**	**5.5**	**3.2**	**7.5**	**2.5**	**11.5**
Wete	36.3	18.9	7.0	11.9	4.0	2.0	7.0	2.0	10.9
Micheweni	27.1	26.6	8.2	5.8	6.3	4.3	6.3	2.9	12.6
Chake Chake	42.9	2.9	6.8	17.1	7.8	2.9	6.8	1.0	11.7
Mkoani	39.9	14.9	3.7	9.0	3.7	3.7	10.1	4.3	10.6
Rural Zanzibar	**32.0**	**15.7**	**12.7**	**10.8**	**8.3**	**3.9**	**4.5**	**3.9**	**8.2**

Food consumption chapter

Food item consumption by region

	Cereals	Roots tubers	Pulses	Veggies	Animal Proteins	Oil/Fats	Milk	Sugar	Fruits
Unguja	**6.9**	**3.7**	**1.5**	**2.1**	**6.2**	**2.6**	**0.7**	**6.7**	**4.4**
North A	6.9	2.6	0.8	1.1	6.3	1.4	0.3	6.7	4.0
North B	6.9	4.3	1.3	2.2	6.1	2.3	0.7	6.5	4.2
Central	7.0	3.2	1.8	2.1	6.0	1.9	0.7	6.7	5.2
South	7.0	4.3	1.5	2.3	6.3	3.0	0.3	6.7	4.4
West	7.0	4.3	1.9	2.5	6.3	4.0	1.3	6.9	4.0
Pemba	**6.1**	**5.2**	**1.7**	**1.9**	**5.4**	**2.0**	**0.9**	**6.6**	**4.7**
Wete	6.0	5.0	1.9	2.1	5.0	2.2	1.1	6.7	5.6
Micheweni	6.3	5.0	1.8	1.8	5.8	1.7	0.8	6.4	5.1
Chake Chake	6.4	5.0	1.6	2.2	5.5	2.3	1.0	6.7	3.6
Mkoani	5.6	5.8	1.3	1.5	5.3	1.9	0.7	6.6	4.6
Rural Zanzibar	**6.6**	**4.3**	**1.6**	**2.0**	**5.9**	**2.3**	**0.8**	**6.6**	**4.5**

Risk and Vulnerability Context

Percent of households experiencing shocks

	HH experienced shock in last year	High food prices	Lack of rainfall in last year	High fuel prices	Sickness	Plant disease/ animal pests
Unguja	**77.4**	**40.8**	**31.6**	**18.3**	**16.7**	**19.3**
North A	78.3	52.7	36.2	39.1	27.1	33.8
North B	85.9	35.1	22.9	7.3	13.7	11.7
Central	74.8	52.4	35.9	28.2	31.1	18.4
South	72.1	27.9	36.3	1.0	2.5	17.2
West	75.9	37.7	27.6	18.1	11.1	16.6
Pemba	**91.0**	**76.9**	**63.4**	**49.0**	**31.6**	**66.1**
Wete	94.6	85.6	66.3	56.9	37.1	73.3
Micheweni	96.7	93.8	82.8	54.1	36.8	86.1
Cake	82.6	55.1	41.1	34.3	29.0	46.9
Mkoani	90.1	72.8	63.4	50.8	22.5	57.1
Livelihood groups						
Agriculturalists	84.0	59.3	53.2	39.2	26.8	47.7
Fisherfolk	86.7	61.4	52.0	28.4	20.8	47.9
Small business	82.3	50.0	37.3	27.9	25.0	25.7
Salaried	81.0	45.1	40.8	27.4	20.4	35.1
Casual laborers	84.1	56.7	33.1	19.0	18.5	25.9
Commerce	89.4	52.5	39.5	22.0	19.2	29.8
Aid	77.4	65.3	30.1	24.2	29.7	30.3
Others	72.7	51.7	38.3	18.1	8.3	19.4
Agro-pastoralists	80.9	53.6	44.3	38.4	18.4	45.0
Wealth quintiles						
Poorest	89.8	68.4	55.0	35.5	30.6	51.5
Poorer	90.0	61.9	52.8	41.0	27.9	48.6
Moderate	82.9	62.3	49.5	35.9	24.2	41.9
Richer	78.7	51.0	39.3	24.2	21.1	34.4
Richest	75.8	41.5	32.9	19.5	15.5	22.3
Food consumption groups						
Less than acceptable consumption	93.0	66.2	55.7	36.3	26.8	48.3
Acceptable consumption	82.7	55.4	44.4	30.8	22.7	38.3
Rural Zanzibar	**84.2**	**55.7**	**44.8**	**31.0**	**22.8**	**38.6**

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food security analysis