

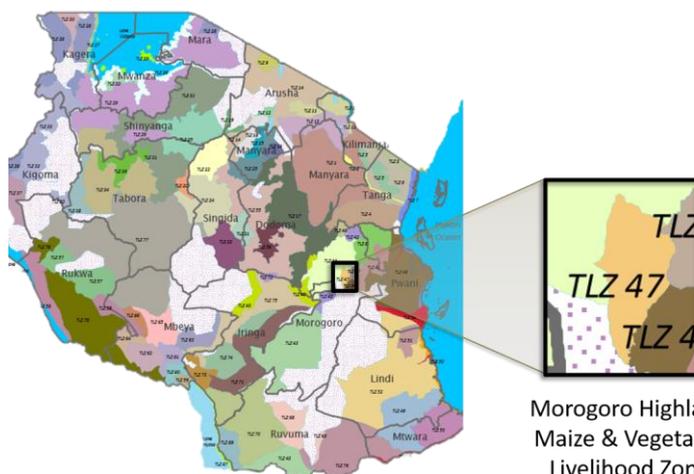
Tanzania Livelihood Baseline Profile

Morogoro Highland Maize & Vegetable Livelihood Zone (TLZ 47)

April, 2016¹

Zone Description

The *Morogoro Highland Maize and Vegetable Livelihood Zone* is a small zone found in Mvomero District in Morogoro Region, including seven wards: Mlali, Bunduki, Mgeta, Langali, Nyandira, Tchenzema and Kikeo. At 2,000 to 2,300 metres above sea level, this is a highland area overlooking the town of Morogoro. The topography is made up of mountainous terrain, with hills and valleys following the contours of two main rivers: the Mgeta and Mbakana. The rivers are part of the Ruvu sub-basin, which is found at the base of the Uluguru mountains. They provide a year-round source of water for irrigation. This was originally a heavily forested area, much of which has been cleared for agriculture. Only a third of the forest cover that existed here in 1900 remained by the mid-1990s². Rainforests in on the high mountain slopes have been declared forest reserves, but enforcement of the protections associated with this status are not easily imposed. Agricultural lands, surrounded by forests, are the main ground cover. The population density is around 42 people per square kilometre³.



The rains here fall in two periods, from October to January, and then March through May. Annual precipitation ranges from 700-2,300 mm, with higher amounts found at higher elevations. Temperatures average around 18^o C in the cool season and 30^o C in the warmer months. The soils are well-drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays. Soil fertility is low, and land is hard to come by.

The local economy rests on the cultivation and sale of vegetable crops. Households here generally do not produce enough food crops to cover their annual consumption needs. Thus, the strategy is to grow higher value vegetable crops throughout the year using both rain-fed and irrigated plots, and to use the cash from the sales of these crops to fund essential food and non-food purchases. This strategy depends on households' access to markets, which is not always assured during the rainy season. Livestock are not a central part of the household economy, but provide small amounts of supplemental income.

Households cultivate on small plots of land, constrained by the mountainous terrain and a growing population density. They use these small plots to maximum effect, however, growing a large array of crops,

¹ Fieldwork for the current profile was undertaken in February of 2016. The information presented in this profile refers to the reference year, which was the consumption year that started in February 2014 and ended in January 2015. Provided there are no fundamental and rapid shifts in the economy, the information in this profile is expected to remain valid for approximately five to ten years (i.e. until 2020-2025). All prices referred to in the document are for the reference year.

² Nobert, Joel, et al, *Investigating the effects of landuse change on the streamflows of upper Ruvu River Subbasin, Tanzania*, www.waternetonline.ihe.nl/symposium/10/.../Nobert-%20J.doc

³ Based on the 2012 national census.

including maize, beans, pigeon peas, green peas, tomatoes, cabbages, sweet peppers, cow peas, carrots, eggplants and bananas. Maize and beans, as well as small amounts of Irish potatoes, green peas and bananas, are grown for household consumption; a portion of these crops is also sold. All the vegetable crops are grown almost exclusively for sale. Tomatoes and cabbages are especially important cash crops, and these tend to be grown mainly by middle and better off households, who can afford the expensive inputs associated with these crops. The vegetable crops are irrigated during the dry season, or when rainfall distribution is poor; maize, beans and bananas are entirely rain-fed. All cultivation is done by hand, using hand hoes and machetes. It is not possible to use oxen because of the mountainous terrain. All households use improved seeds, as well as fertilisers and pesticides, although the quantities vary by wealth group. The agricultural season extends throughout the year, and people are busy almost every month with one task or another. Land preparation, planting and transplanting tomatoes, and weeding are especially arduous, and for these tasks middle and better off households hire members from poor and very poor households to work for them. This provides important cash for poorer households, who could not survive without this seasonal work. It also provides critical labour for middle and better off households, without which they could not produce their surplus crops.

Livestock is a minor source of cash for all households. Goats, pigs and chickens are raised. Chickens are the only animals owned by all wealth groups; very poor households do not own significant numbers of goats or pigs. Goats graze and browse freely; pigs are stall-fed on crop residues, maize husks and green leaves; chickens range freely, subsisting on maize husks and food scraps. The main water sources for livestock are minor rivers and streams; water is not purchased for animals.

In addition to vegetable sales and local agricultural labour, households here earn cash through self-employment activities (such as brick making, brewing, and firewood/charcoal sales for poorer households) and petty trade (such as owning kiosks, or *boda boda* for middle and better off households).

The services in this zone are similar to many rural areas in Tanzania, with the exception of access to water, which is better here than in most places. Fresh, potable water is obtained from rivers, streams and mountain springs. Sanitation facilities consist of pit latrines, most without covers and of poor quality. Health dispensaries are found in many villages, or at the ward centre, but they are not always well-stocked or staffed with qualified medical professionals. Most people use Community Health Funds (CHF). Primary schools are found in the villages and secondary schools are available in the ward centres. It is common for all households to send their children through primary school, but only middle and better off households are able to afford the extra costs of secondary school. Some better off households also send their children to college. There is no electricity, so poorer households depend on kerosene lamps, while better off households also use battery-operated torches. Households in all wealth groups have mobile phones, with better off households having multiple phones. There are no sources of credit, nor are there savings schemes available.

Markets

Market access is especially important in this zone, because households depend heavily on the sale of fresh vegetables throughout the year. On the one hand, the transportation infrastructure in this zone is good: trucks can always reach Nyandira, the central vegetable market, where households bring their commodities for sale; and from Nyandira there is a good tarmac road to Morogoro, which has easy access to the terminal market in Dar es Salaam or Dodoma. Therefore, if people reach Nyandira, they are almost guaranteed to have a market for their goods. On the other hand, the road access for farmers living in remote villages is not always secure. In the rainy season vehicles get stuck in the mud or are blocked by seasonal streams or boulders that get washed into roads.

Households sell a range of food crops and vegetables, including maize, beans, pigeon peas, green peas, Irish potatoes, tomatoes, cabbages, onions, carrots, sweet peppers, eggplants and cucumbers. Tomatoes and cabbages are particularly important cash crops. All locally-grown food crops and vegetables follow the same trade route. After harvesting, farmers must transport their goods to Nyandira, and from there they are sold

on to Morogoro, Dar es Salaam and/or Dodoma. Tomatoes are sold throughout the year, but the peak sales occur in January, from the *vuli* harvests. The peak selling time for beans is in February; for cabbages it is November; and for green peas it is July. People reach the central market on foot, by bicycle or motorcycle. Unlike in many parts of Tanzania, traders do not buy up vegetables at the farm gate. Vegetables need to be transported to market soon after harvesting, and there is a short window of opportunity for selling them. Many are vulnerable to bruising and rotting, especially in hot weather, so care needs to be taken during transport. Traders do not want to take on the risks involved, preferring to transfer these to local farmers. Traders buy up commodities once they reach the central market of Nyandira, where vegetables are collected and bundled for onward sale to Morogoro, Dar es Salaam and Dodoma. Thus all the risks of transporting fresh vegetables to market rest on the farmers, who must traverse rocky, mountainous dirt roads that often become inaccessible in the rainy season. From interior villages like Kikeo, Tchenzema, Tandari, Luale and Bumu, these risks are not insubstantial.

Livestock are sold at small mobile ward- and sub-ward level markets within the zone throughout the year. Most livestock are for local consumption and do not get sold onwards. Sales occur throughout the year, when people need extra cash for school fees, medical expenses, festivals, or unexpected emergencies.

All households also buy food during much of the year. Poorer households buy maize grain, the cheapest staple, to cover their needs for nine to ten months of the year, starting in August, even in relatively good production years. Most maize is sourced from Morogoro and Kibaigwa, and sold through the Nyandira market. Rice, purchased mostly by better off households, comes from Turiani and Kilosa via Morogoro to the Nyandira market. Non-food essentials, like salt, soap, batteries and kerosene, are sold at local kiosks that are owned by middle and better off households.

The labour market is mostly local and consists of seasonal agricultural labour. There is also a small demand from local towns and some seasonal employment is found outside the livelihood zone. It was estimated that in the reference year, 85% of seasonal labour was found within the zone on local farms. An additional 10% came from local towns, and the other 5% came from outside the livelihood zone, mainly from Mbigiri and Magole, in Kilosa District, where there is often work to be found on tomato and paddy farms. The balance shifts in bad years, with more people traveling to local towns or to areas outside the zone to find work.

Timeline and Reference Year

The baseline assessment refers to a very specific time period called the reference year. In the *Morogoro Highland Maize & Vegetable Livelihood Zone* the reference year covered the **consumption** period from February 2014 to January 2015. The production year starts with the planting season in October/November and ends with the harvest in February through April of the following calendar year. Thus, the 2014-2015 consumption year corresponds to the production year that starts with the 2013-2014 *vuli* season. During community leader interviews, informants were asked to rank the last five years in terms of seasonal performance with '1' indicating a poor season and '5' an excellent season. The table below, which summarizes the responses of the community leaders, shows year quality by production year. The production year of 2013-2014, which corresponds to the consumption year of 2014-2015 was considered an average year. In the past 10 seasons, there have been 5 average seasons, 2 below average seasons, and 3 above average seasons. The baseline information presented in this profile provides a view into how households in this livelihood zone make ends meet in an average year.

Production Year	Season	Rank	Critical Events
2014-2015	<i>Masika</i>	4	Above average rainfall, good crop yields, good producer prices, low staple food prices
2014-2015	<i>Vuli</i>	4	Above average rainfall, good crop yields, good producer prices, low staple food prices
2013-2014	<i>Masika</i>	4	Above average rainfall, good crop yields, good producer prices, low staple food prices

2013-2014	<i>Vuli</i>	3	Average rainfall, normal harvest, decent producer prices
2012-2013	<i>Masika</i>	3	Average rainfall, normal harvest, decent producer prices
2012-2013	<i>Vuli</i>	3	Average rainfall, normal harvest, decent producer prices
2011-2012	<i>Masika</i>	3	Average rainfall, normal harvest, decent producer prices
2011-2012	<i>Vuli</i>	3	Average rainfall, normal harvest, decent producer prices
2010-2011	<i>Masika</i>	2	Below average rains, with below average harvest and high staple food prices; received food aid from the government
2010-2011	<i>Vuli</i>	2	Below average rains, with below average harvest and high staple food prices

5 = an excellent season for household food security (e.g. due to good rains, good prices, good crop yields, etc.)
4 = a good season or above average season for household food security
3 = an average season in terms of household food security
2 = a below average season for household food security
1 = a poor season (e.g. due to drought, flooding, livestock disease, pest attack) for household food security

Seasonal Calendar for Reference Year

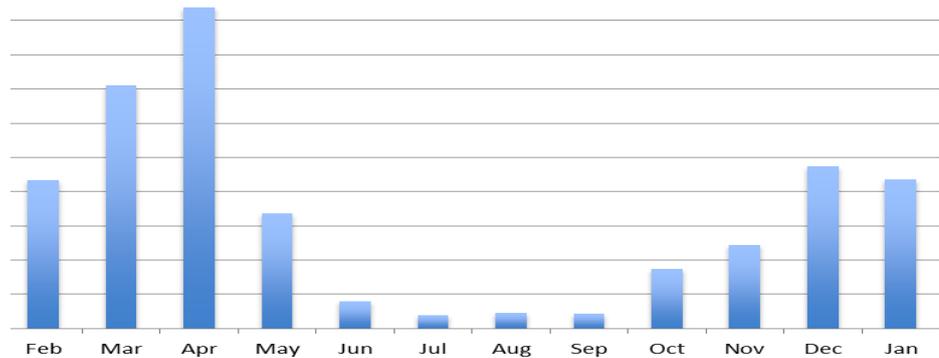
This is a bi-modal area: the first rains occur from October through December (*vuli*) and the second are from March through May (*masika*). The *masika* rains are usually heavier and more reliable. Agricultural activities are linked to the timing of the rains, but because irrigation is also used, households here are busy year-round with different crop-based activities. Land preparation occurs in September for the *vuli* crops, and in February for the *masika* crops. The October rains soften the ground enough so that people start to plant maize towards the end of October. Tomatoes are planted towards the beginning of October, often with the use of irrigation from streams. Beans are planted at the same time as these two crops, inter-cropped with both maize and tomatoes. Cabbage and Irish potatoes are planted as single stands. Cabbages are grown in two main seasons; the first corresponds to the *masika* season, planted in March and harvested in May and June; the second season relies on irrigation and is planted just after the first harvest and harvested two months later in September. Irish potatoes are planted in June, also irrigated using the water from streams and rivers, and harvested in October and November. Most maize is harvested in March and April, preceded by a month of green consumption. A period of sales follows the harvest of each crop.

The peak agricultural labour periods are, first, from October through February, corresponding to planting of the first maize crop, and planting and transplanting of the first tomato crop; weeding for both crops; the first tomato harvest; the tomato harvest and land preparation for cabbages. And, second, from June through July, which is when cabbages are harvest, tomatoes are re-planted, Irish potatoes are planted, and all the irrigated vegetables are weeded. All activities are done by hand, and land preparation, transplanting tomatoes and weeding are especially arduous. Even though middle and better off households do not cultivate large areas of land, they need extra help to manage the intensive periods of the year, and so they hire members of very poor and poor households to work for them on all of these tasks. Land preparation takes place over 2.5-4 months (at different times of year); planting/transplanting occurs for 3 months (although not consecutively); and weeding also is being undertaken for 3 months at different times of year depending on the crop and the season. The harvesting periods also take place for around 2 ½ months of the year. During these times, members of poor and very poor households work on the larger farms of middle and better off households, while, at the same time, tending to

their own fields. The ultimate result is that poorer households have lower yields due to less-intensive management on their own fields during critical periods.

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Rainy season		■	■	■					■	■	■	
Crops												
Maize	■	■	■					■	■	■	■	■
Tomatoes	■			■	■	■	■	■	■	■	■	
Cabbage	■	■	■	■	■		■	■				
Irish potatoes				■	■	■	■	■	■	■		
Other												
Agricultural labor peak	■				■	■			■	■	■	■
Stress & High Expenditure Periods												
High staple prices											■	■
Human diseases					■	■						
Festival season								■	■			
Lean season											■	■
Legend	■	■	■	■	■	■	■	■	■	■	■	■
		Land prep	Sowing	Weeding	Green Cons.	Harvest/Thresh.						

The graph to the right shows average monthly rainfall (mm) in Morogoro District based on a 20-year period (1994-2013)
Source: TZ Meteorology Department

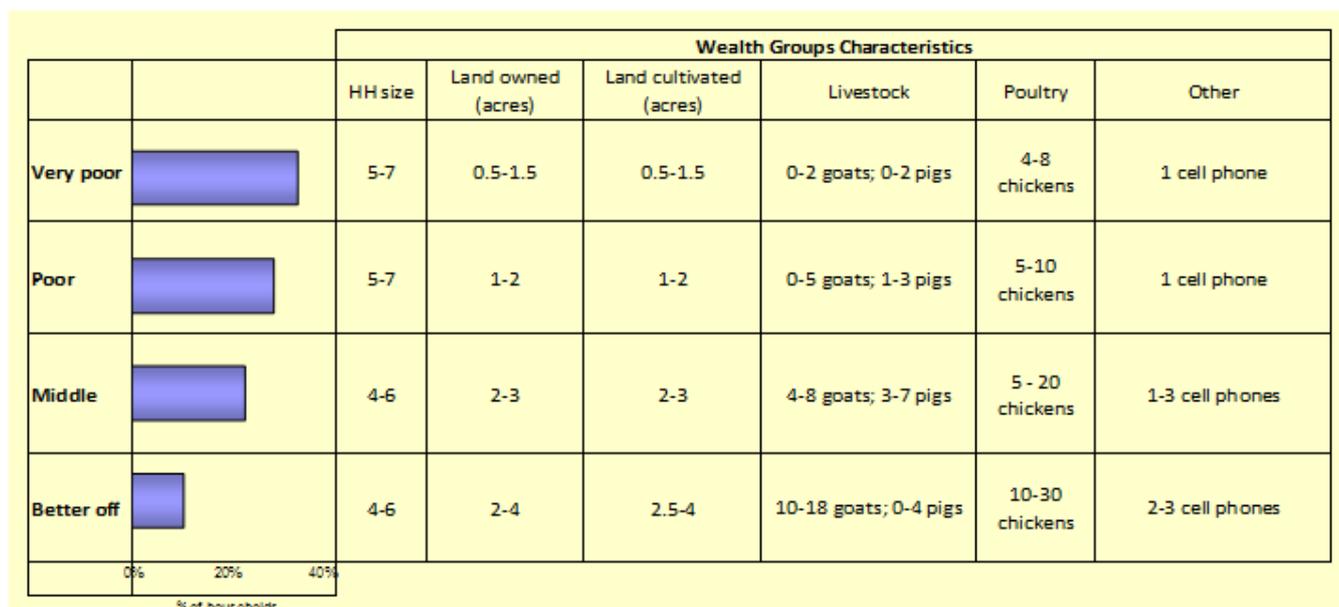


December and January is when the lean season occurs. These are the months that households have run out of their maize stocks from the previous year’s harvest. Poorer households, in fact, run out as early as June or July, but by December, all households have depleted their stocks. They need to purchase all of their staple grains just when the price of staple foods is highest (from December through January). Thus, the paid work for weeding maize and harvesting tomatoes, which is offered up by middle and better off households at this time, helps provide needed cash to poorer households, allowing them to bridge the gap until February, when the green harvest of maize is available.

The dry season starts in earnest in June and lasts through September. This is a time when most human illnesses, especially pneumonia and upper respiratory diseases, occur. The weather during this period in this high, mountainous zone is quite cold, creating the conditions for these sicknesses. It is worth keeping in mind that the most important livelihood capital that poorer households have is their own labour; when an active labourer is sick in a poor household, the income for this household rapidly drops. Because this coincides with one of the peak labour periods, it can be especially damaging for a productive household member to be sick at this time. Protecting the health and well-being of poorer households goes hand in hand with protecting their income.

The festival season takes place in September and October, when the proceeds from the previous year are available to spend, and before the intensive work of the coming agricultural season has kicked into high gear. It is a rare moment of relative downtime in the otherwise very busy schedules of people living here.

Wealth Breakdown



Note: The percentage of household figures represent the mid-point of a range.

The main determinant of wealth in this livelihood zone is how much land a household cultivates, and related to this, the type and quantity of vegetable crops grown. How much land a household cultivates is, in turn, governed by the amount of land it owns and/or is able to rent in; the size of its intra-household labour pool as well as its capacity to hire additional labour; and the amount of cash it has available to buy seeds, fertilizers and pesticides, which are especially important when it comes to the success of vegetable crops. Arable land is not easy to come by in this mountainous terrain, and plot sizes are small; even better off households do not cultivate more than 4 acres. All households use hand hoes, as the terrain is not amenable to ox ploughing.

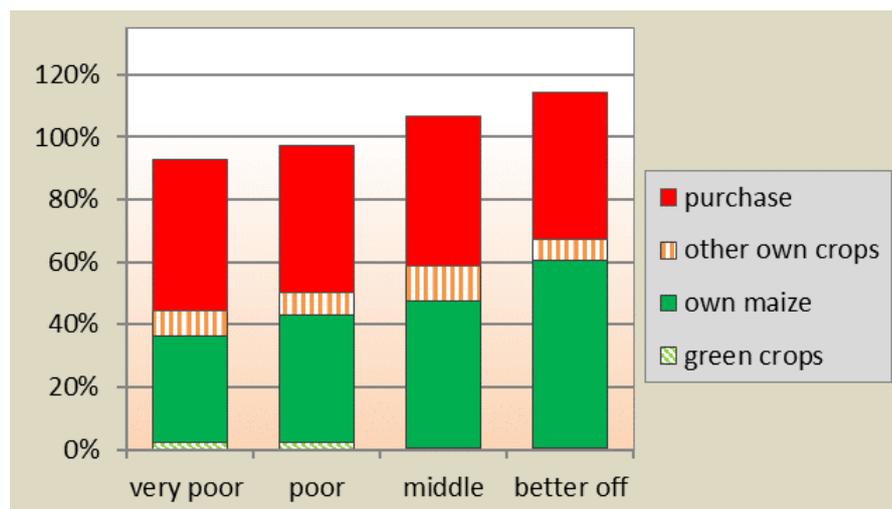
Typical better off households cultivate around 2.5-4 acres of land, using hired labour as well as intra-household labour. They devote as much of their land as possible to tomatoes and cabbages, which offer up the highest returns. These crops also demand high investments, and better off households buy the most pesticides, fertilizers and improved seeds. They also hire the most seasonal agricultural labourers. Better off households have more livestock than other households, usually keeping a herd of around 10-18 goats and a few pigs, alongside 10-30 chickens. Their household sizes are a little smaller than poor and very poor households, with around 4-6 members. These households may also own other assets, like a motorcycle for *boda boda*, or they may operate a kiosk. They typically own several cell phones, which are used to gather price and market information as well as to keep in touch with far-away relatives.

Typical very poor households, on the other hand, cultivate only 0.5-1.5 acres of land. They do not produce enough in any year to cover all of their food and cash needs. These households have very few goats, if any (0-2), and pigs (0-2) as well as some chickens (4-8). Very poor households tend to be slightly bigger in size, with 5-7 members. They face many competing labour requirements during the cropping season, because they need to work in both their own fields and in the fields of better off households, where they earn cash that is critical to their survival. These households do not have any additional assets other than, possibly, a cell phone.

The distribution of wealth in this zone is weighted towards the bottom. Very poor (30-40%) and poor (20-40%) households together make up around 50-80% of households in the zone. Middle (20-30%) and better off (8-15%) households combined represent around 28-45% of the households. In addition, since middle and better off households are slightly smaller, it is important to remember that the percent of the *population* (as opposed to the percent of *households*) represented by the upper wealth groups is even smaller than this.

Sources of Food

The graph to the right presents the sources of food for households in different wealth groups in the livelihood zone for the period February 2014 to January 2015. February represents the start of the consumption year because it is when people begin to harvest green maize and it marks the end of the hunger period. Food is presented as a percentage of 2100 kcal per person per day for the 12-month period. This was considered an average year, with average rains, crop yields and prices.



In the graph, food access is expressed as a percentage of minimum food requirements, taken as an average food energy intake of 2100 kcals per person per day.

There are only two sources of food in this livelihood zone: own crops and purchased food. Own milk and meat do not contribute to the food basket, as they do in many other zones. As you move up the wealth spectrum, reliance on own crops increases. Food purchases are important for all wealth groups, but especially for poorer households.

Maize, along with very small amounts of beans, pigeon peas, green peas, cassava and Irish potatoes, provide the calories shown in the 'own crops' bar on the graph above. Collectively, these accounted for 44-67% of the minimum calorie requirements for households in the reference year. The majority of these came from maize, which contributed (including green maize) 36%, 36% 48%, and 61% of minimum food needs for very poor, poor, middle and better off households, respectively. The other crops accounted for only around 7-11% of food needs. Thus, even in an average year, very poor and poor households are meeting, at most, only half of their annual food needs with crop production. Taking a closer look at production, typical middle and better off households produced around 600 kg and 1,000 kg of maize, respectively, in the reference year, along with 430 kg and 480 kg of pulses, respectively, and around 350-400 kg of Irish potatoes. With the exception of maize, the production values for food crops do not vary much between middle and better off households. Very poor and poor households produced around 450 kg and 540 kg of maize, respectively, 150 kg and 250 kg of pulses, respectively, and 190 kg of Irish potatoes (for both). These are not high levels of production, reflecting the fact the households have very small agricultural plots. The only households that could cover all of their food needs with their own production alone, if they consumed all (rather than selling part) of their food crops would be the better off households. (Even then, they would only be able meet around 135% of their calorie needs, which does not represent a large surplus.) The vast majority of households here produce significantly less than they need for survival in an average year.

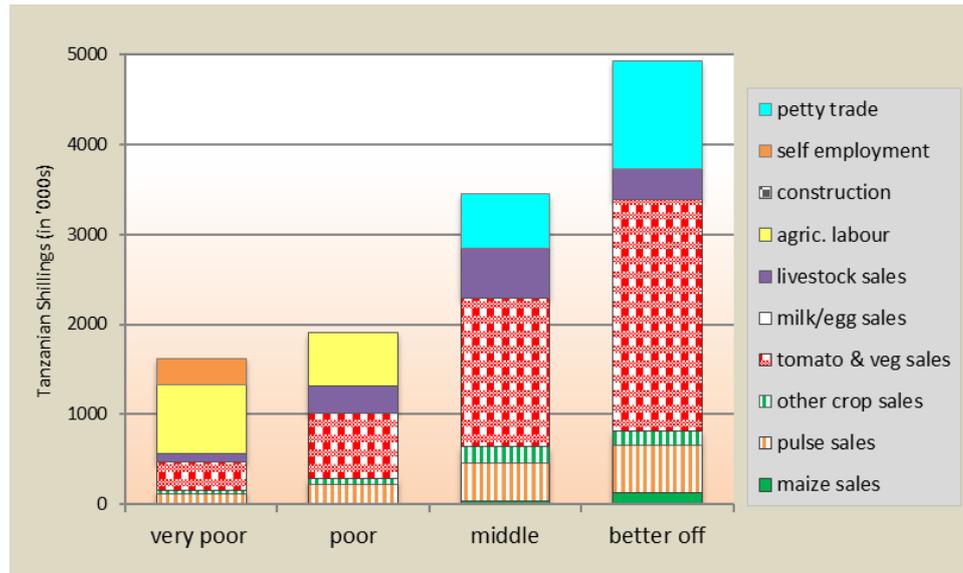
The market is, therefore, especially important in this livelihood zone, accounting for around 47-48% of minimum food needs for all households. The poorer two wealth groups purchased mostly maize grain, the cheapest staple. Of the 47-48% of minimum calories these households bought, 32-36% were in the form of maize grain, or in other words, around three-quarters of their purchased food (in calorie terms) was made up of maize grain. Middle and better off households, on the other hand, purchased only around 14% and 9% of their minimum calories in the form of maize grain. In other words, less than a third of their purchased food (in calorie terms) was made up of maize grain. For middle and better off households, the 'purchase' component was comprised of more high-value, preferred foods, such as wheat flour (2% of minimum calories), rice (13% of minimum calories), sugar (6% of minimum calories), meat (1-2% of minimum calories), oil (8-11% of minimum calories), dried fish (2% of minimum calories), and sweet potatoes (1% of minimum calories). By comparison, very poor and poor households purchased only around 11-15% of their minimum calories in the form of these higher-value food items, and much of this was oil.

Sources of Cash Income

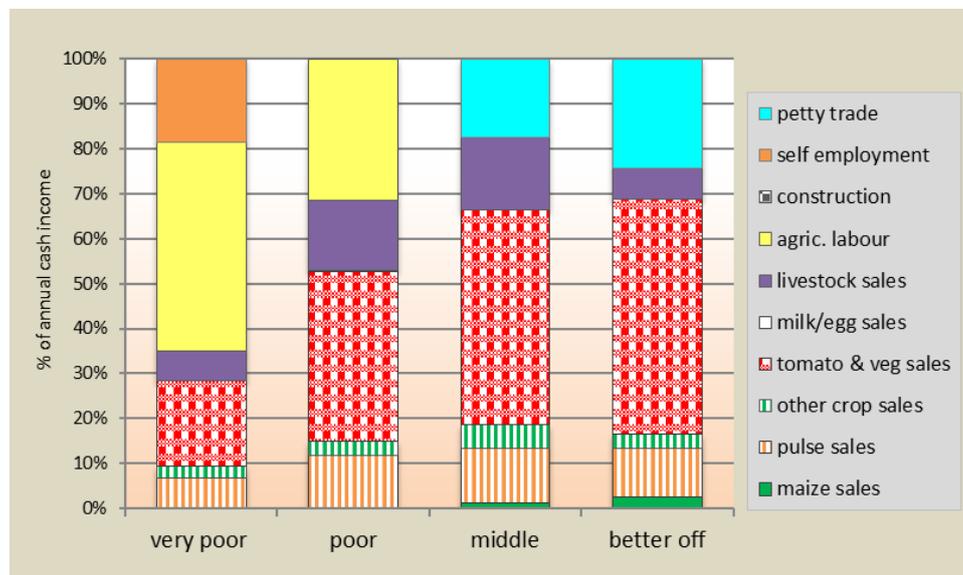
The graphs to the right present an accounting of cash income sources for all four wealth groups in the reference year, first in terms of absolute values, and next as a proportion of annual cash income. Because households need to purchase at least half of their food every year in this zone, it is especially important to know where the cash to fund those purchases comes from.

Crop sales provide the most important source of revenue for all but the bottom wealth group. Especially striking is the contribution made by sales of tomatoes and vegetables. With smaller areas under cultivation, households here choose to use a good portion of their available land for high-value vegetable production. In the reference year, the combined value of tomato and vegetable sales accounted for 16%, 28%, 38%, and 42% of the annual cash income of typical very poor, poor, middle and better off households, respectively. Maize, beans, pigeon peas, green peas, Irish potatoes and bananas are also sold. The pulses, and especially beans and pigeon peas, garner the highest price (around 1,500/kg in the reference

year) so even small amounts can earn households a meaningful amount of cash. Typical middle and better off households sold 270-410 kg of pulses, generating around 425,000 – 535,000 TZS, or 11-12% of annual cash income. Sales of maize and the other food crops brought in substantially less than this. Overall, crop sales accounted for 28% of the annual cash income of typical very poor households, 53% of the annual cash income of typical poor households; and 65-70% of the cash income of middle and better off households. In absolute terms, better off households generated around 7 times more from their crop sales than very poor households, which is



The graph provides a breakdown of total annual cash income in Tanzanian Shillings according to income source.



The graph provides a breakdown of total annual cash income as a percent of annual cash income.

INCOME SUMMARY TABLE (in Tanzanian Shillings)				
Wealth group	Very poor	Poor	Middle	Better off
Annual income per household ⁴	1,500,000 – 2,000,000	2,000,000 – 3,000,000	3,000,000 – 4,000,000	4,000,000 – 6,500,000

⁴ The average exchange rate from February 2014 - January 2015 was 1 USD = 1,777 TZS

proportionally more than the difference in land they cultivate. Better off households cultivate, on average, 3.25 times more land than very poor households, but are able to derive substantially more value per acre from their efforts. They invest more in terms of labour and inputs, and are able to better time their ploughing, labour and inputs applications, enabling them to produce more in absolute terms; and they can also grow more of the higher-value crops, which allows them to make the most of their investments.

For middle and better off households, small business and trade (shown as 'petty trade' on the graphs) was the next most important source of cash income in the reference year, comprising 17% and 24% of their annual cash income, respectively. These households are able to use some of their cash to buy household goods and commodities, like salt, soap, kerosene and batteries in bulk; they set up kiosks in the villages and generate extra income through this business. Some also make money from *boda boda*, or motorcycle hire, which is especially important for transporting agricultural commodities and people from the villages to the central vegetable market in Nyandira.

Very poor and poor households do not have the financial means to set up shops or buy motorcycles for transporting goods, so they turn instead to casual labour as a means of securing needed cash. Casual labour is, in fact, the most important source of cash income for very poor households, accounting for 45-50% of their cash income in the reference year. Poor households derived around a third of their cash income from this source. Agricultural activities take place throughout the year in this zone, and poorer households provide a good portion of the labour pool for middle and better off households. Labour is hired for land preparation, planting, weeding and harvesting. Very poor households derived a relatively even amount of their annual cash from each of these activities (around a quarter of their labour-based cash income from each). Poor households earned the most from land preparation, followed by weeding. In a bad year, harvest-related labour may be eliminated, and demand for the other activities would be much reduced.

Livestock sales provided the remainder of cash income for the top three wealth groups in the reference year. Overall, livestock sales accounted for only around 5-15% of cash income for households in this livelihood zone. Goats, pigs and chickens are sold. A typical better off household sold around 4 goats (at 45,000 TZS per head), 8 chickens (at 8,000 TZS per head) and 1 pig (at 10,000 TZS) in the reference year; middle households sold more pigs – around 4 – because they have less in the way of crop income, so try to make up for that through pig ownership. They also sold around 2-3 goats and 6 chickens. Very poor and poor households sold only around 4 chickens, along with 0-2 goats and 0-2 pigs. The price of animals did not vary much by wealth group. Livestock are not a significant differentiator in this zone, and although better off households did earn around 3 times more than very poor households from livestock sales, they actually earned less than middle households and almost the same as poor households. Vegetable sales are crucial here, not livestock sales.

One final source of cash income for very poor households was self-employment, which included mainly brick production, but also brewing and firewood/charcoal sales. These activities contributed almost a fifth of the annual cash income for these households in the reference year.

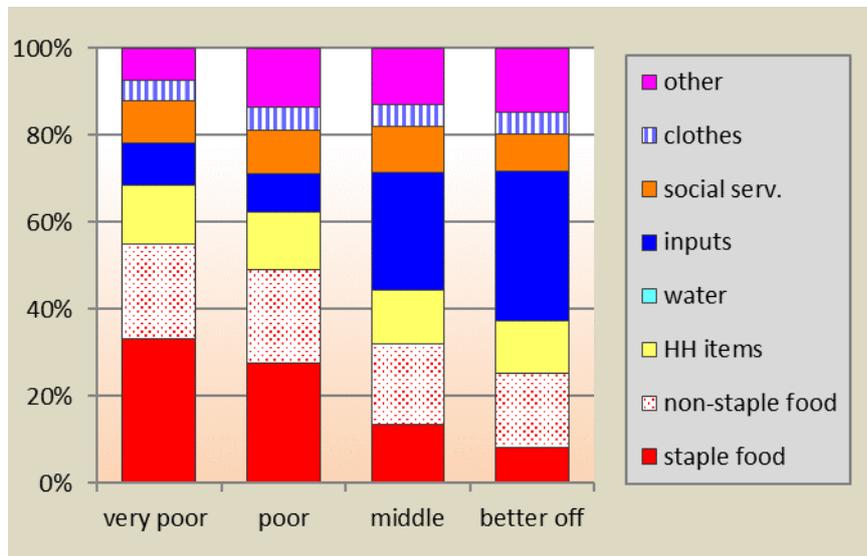
Expenditure Patterns

The graph below presents expenditure patterns for the reference year February 2014 to January 2015. While absolute expenditure increases with wealth in line with total cash income, the expenditure breakdown by percent in this graph shows the *relative* amount of income spent on different categories.

The goods and services on which households in this zone spend their cash include: staple and non-staple food, household items, productive inputs, social services, like schooling and health, clothing and other non-essential items, such as tobacco, cosmetics and festivals. As in many other areas of rural Tanzania, poorer households spend a larger proportion of their available cash on food, and those in the top two wealth groups spend a larger portion of their money on productive inputs.

All wealth groups spent some of their available cash on staple foods, which includes (in this case) maize grain, wheat and rice. In both absolute and relative terms, very poor households spent more than any other wealth group

on staple foods. In the reference year, very poor and poor households spent around 28-33% of their annual cash on staple foods; and middle and better off households spent 8%-13% on this category. The make-up of the staple food basket is not the same for all wealth groups. Very poor and poor households spent a total of 530,000-539,000 TZS on staple food; 405,000-459,000, or 75-85% of this was, on maize grain, the cheapest staple. Middle and better off households spent around 460,000 and 407,000 TZS, respectively, on staple foods, but only 144,000 and 90,000 TZS, or



The graph provides a breakdown of total annual cash expenditure according to category of expenditure

around 20-30%, on maize grain. They concentrated their spending on rice, first, which is a preferred food, and then wheat. Unlike in many zones, where middle and better off households do not need to spend cash on staple grain, in this zone all households, with the exception of some better off households, need to buy staples to fill a calorie gap, although this gap decreases as you move up the wealth spectrum. Poorer households spent more in absolute terms on staple foods, but middle and better off households spent more in absolute terms on non-staple foods. The non-staple food category included beans, Irish potatoes, sugar, meat, oil, dried fish, sweet potatoes and vegetables. Of these, the lower two groups spent the most on meat and dried fish, supplementing their heavily grain-based diet with protein, followed by oil and then sugar. Middle and better off households spent the most on meat. After this, relatively equal amounts were spent on sugar, oil and dried fish. In the reference year, the proportion of cash income spent on non-staple foods for very poor, poor, middle and better off households was around 22%, 21%, 19%, and 17%, respectively. The calories purchase for this expenditure (in relation to minimum calories required for the year) were 9%, 10%, 19% and 23%, respectively. Thus, better off households are able to buy a more nutritious and diverse diet than the other wealth groups, even though in relative terms they spend less.

Middle and better off households both spent the largest portion of their annual cash income on productive inputs, as represented by the dark blue bar in the graph. In proportional terms, their spending on productive inputs (27-34% of annual expenditure) is similar to very poor and poor household spending on staple foods (28-33% of annual expenditure). The following are included in this category: livestock drugs, land rental, seeds/tools, pesticides/fertiliser, labour hire, business investment, and phone credit. Within this set, very poor households spent money only on seeds/tools, pesticides/fertilisers and phone credit, with the most spent on seeds/tools, followed by phone credit and finally pesticides/fertilisers. Middle and better off households spent money on all items within the category (with the exception of land rental, which only applies to better off households); the majority of their inputs budget was on seeds, tools, pesticides and fertilisers (35-39% of their inputs budget), and labour hire (27-32% of their inputs budget). Fertilisers and pesticides are more important in this zone than they are in other zones because of the dependence on vegetables and tomatoes for cash income. In many zones there is no spending at all on those items, but here all households devote at least part of their budget to these goods. In absolute terms, the amount spent by better off households on productive inputs was 9-10 times the amount spent by very poor and poor households, and almost 2 times the amount spent by middle households.

The 'hh items' category (in yellow) includes basic household necessities, such as tea, salt, soap, lighting (such as batteries, solar lamps solar panels, etc.), grinding services, firewood and utensils. Within this category, very poor and poor households spent the most money on soap, which took up around a third of this budget, followed by payment for lighting and grinding, each of which made up around 15-20% of the 'hh items' budget. Middle and better off households spent the most on lighting. Middle households spent the next most on soap, whereas better off households spent the next most on firewood. Neither very poor nor poor households spent money on firewood,

collecting it themselves, and selling extra bundles to the top two wealth groups. All households spent the least on salt and tea. On an annual basis, spending on basic household goods made up 12-13% of annual expenditure.

'Social services', shown in orange on the graph, includes schooling and health costs. Households spent 9-11% of their annual cash on these costs. Schooling expenses included school fees, uniforms, stationery and transportation, where relevant. On a per capita basis, holding household size constant, better off households spent on education around 1 ½ times more than middle households and 2-2 ½ times more than poor and very poor households. Very poor and poor households usually are not able to send their children beyond primary school, whereas those in the upper wealth groups may send them at least as far as secondary school, and sometimes on to college. Secondary schools are found only at ward level, and this means paying for things like transportation, boarding, higher fees and more expensive uniforms and supplies. In addition, better off households spent 3 ½ times more on health care than very poor households on a per capita basis, indicating that these households may have had access to better clinics and private hospitals. Very poor households seek medical care at village dispensaries and ward-level health centres, which – although free or very reasonably priced - are often understocked and understaffed.

Spending on clothes and other miscellaneous items are the last two categories included here. Spending on clothes accounted for 5% of the annual budget for all households. The 'other' category includes things like cosmetics, hair, beer, tobacco, cigarettes, community obligations, transportation and festivals; in the reference year households devoted 7-15% of their cash to these items. This is discretionary spending that can be reduced or redirected in bad years to buy more essential items if necessary. In both absolute and relative terms, those in the upper three wealth groups had the most available in this discretionary budget (better off households had 6 times more in this category than very poor households); and because the reference year was an average year, even the very poor wealth group had more in this budget than it would in a bad year.

Hazards

Two hazards affect this zone on a regular basis. The first is **crop pests and diseases**. Tomato leaf miner (*tuta absoluta*) is especially destructive, as it can destroy a whole season's crop. Elegant grasshoppers, which affect maize and leaf hoppers and stem rot, which affect beans cause problems throughout the zone almost every year. The second is **livestock disease**, such as contagious caprine pleuropneumonia (CCPP) for goats, worms for pigs, and New Castle Disease, which can wipe out an entire flock of chickens. **Human diseases** are also endemic, especially malaria and upper respiratory diseases. Because household labour is so critical to income generation, especially for poorer households, losing this labour can translate into significant drops in income.

The main periodic hazards are **drought**, which can seriously damage crop production once every three years. Droughts result in a series of inter-related shocks, such as rapid increases in staple food prices, declines in livestock production, reduced labour income and reduced returns on self-employment.

Response Strategies

In response to hazards and years with bad production, households attempt to meet their minimum food needs and cash requirements through a number of strategies. These strategies are detailed for this livelihood zone below:

- All households try to **reduce expenditure** on non-essential or more expensive items first, buying less sugar and rice, for instance, and using that money to buy the cheaper staple – maize – instead, or cutting down on festivals, tobacco and beer.
- Middle and better off households try to increase their **irrigation activities**. When the rains fail, households who have the means to do so attempt to increase their production of irrigated crops. In years when rain-fed crops fail, irrigated crops fetch even higher prices than normal, so if the strategy succeeds, it can be quite effective.

- Very poor and poor households try to increase cash income through **finding more casual work**, either locally or migrating outside the zone. In particular, people may go to Mbigiri and Kilosa districts, where they find work on tomato and paddy farms. The expandability of this option is limited in bad years because of the increase in labour supply as more and more people look for work. This puts a downward pressure on wages so that even if people do find more days of work, they may earn less per day, making it hard to substantially increase cash income above normal year levels.

Key Parameters for Monitoring

The key parameters listed in the table below are food and income sources that make a substantial contribution to the household economy in the *Morogoro Highland Maize & Vegetable Livelihood Zone*. These should be monitored to indicate potential losses or gains to local household economies, either through on-going monitoring systems or through periodic assessments.

It is also important to monitor the prices of key items on the **expenditure** side, including staple and non-staple food items.

Item	Key Parameter - Quantity	Key Parameter – Price
Crops	<ul style="list-style-type: none"> • Maize – amount produced • Beans – amount produced • Pigeon peas – amount produced • Green peas – amount produced • Irish potatoes – amount produced • Sweet potatoes – amount produced • Bananas – amount produced • Tomatoes – amount produced 	<ul style="list-style-type: none"> • Maize– producer price • Beans – producer price • Pigeon peas – producer price • Green peas – producer price • Irish potatoes – producer price • Tomatoes – producer price
Livestock production	<ul style="list-style-type: none"> • Goats – herd size • Pigs - numbers 	<ul style="list-style-type: none"> • Goats – producer price • Pigs – producer price
Other food and cash income	<ul style="list-style-type: none"> • Agricultural labour (land preparation, planting, weeding) – number of jobs • Agricultural labour (harvesting) – number of jobs • Bricks – numbers produced • Petty trade – volume of trade 	<ul style="list-style-type: none"> • Agricultural wage rates (land preparation, planting, weeding) • Agricultural labour rates (harvesting) • Bricks – price per brick • Petty trade – returns on trade
Expenditure		<ul style="list-style-type: none"> • Maize grain – consumer price • Rice – consumer price • Sugar – consumer price • Oil - consumer price

Programme Implications

The longer-term programme implications suggested below include those that were highlighted by the wealth group interviewees themselves and those made by the assessment team following detailed discussions and observations in the field. Other than pasture improvement, all of the options were proposed for all wealth groups. All of these suggestions require further detailed feasibility studies.

- Timely and affordable provision of crop inputs
- Improved maintenance of existing road networks and increased construction of new roads
- Provision of health services at village level, including building dispensaries and providing qualified health professionals and sufficient and affordable supplies of medicines