KEY MESSAGES

- The objective of this report is to document the basic market context for staple food and livestock production and marketing in Tanzania. The information presented is based on desk research, a field assessment using rapid rural appraisal techniques, and a consultation workshop with stakeholders in Tanzania. Findings from this report will inform regular market monitoring and analysis in Tanzania.

- Maize, rice, sorghum, millet, pulses (beans and peas), cassava and bananas (plantains) are the main staple foods in Tanzania. Maize is the most widely consumed staple in Tanzania and the country imports significant quantities of wheat to meet local demand for wheat flour. Consumption of other staples varies across the country based on local supply and demand dynamics. Cattle, goat and sheep are the major sources of red meat consumed in Tanzania.

- Tanzania’s cropping calendar follows two distinct seasonal patterns. The Msimu season covers unimodal rainfall areas in the south, west and central parts of the country while the Masika and Vuli seasons cover bi-modal rainfall areas in the north and eastern parts of the country (Figure 5).

- As a member of the East Africa Community (EAC) and the Southern African Development Community (SADC), Tanzania plays an important role in regional staple food trade across East and Southern Africa (Annex III). The country is generally a surplus producer of staple cereals and pulses, and exports significant quantities of these commodities to neighboring countries in East and Southern Africa including Kenya, Malawi, Zambia, Uganda, Rwanda, Burundi and the Democratic Republic of Congo (Figure 2).

- A large network of traders support the collection, distribution and retailing of staple foods across the country with no significant barriers to entry (Annex I). The most significant domestic staple food marketing corridor originates from the surplus producing regions of Rukwa, Mbeya, Njombe and Ruvuma with Dar es Salaam as the key destination market (Figure 1). High transportation and market information costs are key factors limiting the efficient flow of staple foods from surplus producing areas to deficit areas within Tanzania.

The Market Fundamentals Summary provides a summary of the FEWS NET Market Fundamentals report, which presents findings to inform regular market monitoring and analysis in a specific country or region. Among other uses, the information presented can be used to support the design of food security programs, including but not limited to informing USAID Bellmon analyses for food assistance programs. More detailed definitions of key terms used throughout this report can be accessed by consulting the FEWS NET Markets and Trade Glossary.
INTRODUCTION

- Tanzania consists of a mainland and the islands of Zanzibar (Unguja and Pemba) and Mafia in the Indian Ocean (Figure 1). It is the largest country in East Africa with a total area of about 945,000 sq. km. It is bordered by Kenya (north) and Uganda (northeast), Rwanda, Burundi, and the Democratic Republic of the Congo (DRC) to the west, and Zambia, Malawi, and Mozambique to the south. The eastern boundary runs along the Indian Ocean. Broadly, the country is divided into regions, which are further subdivided into districts, then divisions, wards, urban or rural wards and finally villages. In 2017, Tanzania’s population was estimated at 51 million with an average annual growth rate of 3 percent (Figure 52).

- Mainland Tanzania includes well delineated regions: the coastal plains, which vary in width up to 64km and have tropical vegetation; the Masai grassland in the north, which varies from 213 to 1,067m above sea level, and contains two mountains, Kilimanjaro, 5,895m (19,341ft) above sea level and Africa’s highest peak, and Mount Meru, 4,565m (14,973ft); an upland referred to as the Southern Highlands in the south of the country towards Zambia and Lake Malawi. Over 50 percent of the country is made up of savannah and bush cover; and semi-desert accounts for the remaining land area, with the exception of the coastal plains. Around 53,000 Km$^2$ is inland water mostly lakes in the Rift Valley; Lake Victoria and Lake Tanganyika both in the western borders of the country.

- Tanzania’s macroeconomic performance has been strong in recent years with annual GDP growth averaging 6 percent despite a recent slowdown in economic activity (IMF, 2018). The Tanzanian shilling has been mostly stable against the U.S. dollar following a period of significant depreciation in late 2015. Similarly, the national currency has been stable against the currencies of neighboring countries, with the exception of Burundi, Mozambique, Malawi and the Democratic Republic of Congo where exchange rate variations have been more notable in recent years (Figure 50). While inflation remains moderate, food inflation fluctuated significantly between 2015 and 2017 when droughts led to decreased staple food production (Figure 3).

- Land in Tanzania is publicly vested in the president as trustee on behalf of all citizens. This therefore implies that all citizens in smallholder farming communities have user rights but do not own land. The country’s road network stretches 86,472 Km$^2$ and supports 90 percent of passenger transport and 70 percent of freight transport. There are two separate railways and five international airports. The main marine ports are located in Dar es Salaam, Mtwara and Tanga, and the country is also served by several smaller sea and lake ports (Figure 4). Over 90 percent of total ocean freight is handled by the port in Dar es Salaam (GoT, 2016).

- Seasonal rainfall in Tanzania is determined by movement of the Inter-Tropical Convergence Zone (ITCZ), a narrow strip of very low pressure and heavy precipitation that forms near the earth’s equator. The position of the ITCZ changes over the course of the year, moving southwards through Tanzania in October to December, reaching the south of the country in January and February, and returning northwards in March, April and May (McSweeney et al., 2006). This causes the north and east of Tanzania to face a bimodal rainy season from October to December (Vuli) and again from March to May (Masika). However, the south, west and central parts of the country experience one unimodal Msimu rainfall season that runs from October to May (Figures 5 and 51), similar to Southern Africa. Transition areas fluctuate between both systems.

Figure 3. Monthly inflation and TZS/USD exchange rate (2013-17)


Figure 4. Road networks, key ports, and overland border crossing points in Tanzania

Source: FEWS NET
The Southern Highlands comprising Rukwa, Kitavi, Mbeya, Iringa, Njombe and Ruvuma are the main grain basket, producing 55 to 60 percent of the total cereal food production, and between 25 to 30 percent of the total non-cereal food production (such as dry beans) in the country. These areas are at high to mid altitude and able to support both tropical and temperate crops. Rainfall ranges between 900 to 1300 mm per year, on average (Figure 53). Parts of the area lies within the eastern Rift Valley. The relatively warm and wet climate provide a favorable environment for the production of staple food crops.

Tanzania’s national staple dish is “ugali”, which is a thin or thick porridge that can be produced traditionally from ground or pounded maize, sorghum, or cassava flour. Ugali is typically consumed with cooked green leafy vegetables. Maize, rice, sorghum/millet, beans, cassava, and cooking bananas are the most important staple food crops in Tanzania (Table 1). The Tanzanian diet relies heavily on starchy staples with maize providing an estimated 32 (Lake Zone regions of Kagera, Mara and Mwanza) to 51 (Southern Highlands regions of Iringa, Mbeya, Rukwa and Ruvuma) percent of calories (USDA, 2015). For households in the Lake Zone, cassava is the other key staple, providing about 19 percent of total calories. Rice, beans, and cooking bananas are important to the diets in both zones, although banana consumption is higher in the Lake Zone. White potato consumption is low throughout the country, but consumption of sweet potatoes is somewhat higher, especially in the Lake Zone. In most areas, beans are the main source of protein.

Droughts and floods are the primary hazards affecting agriculture across Tanzania. Landslides pose a risk to small regions in the north and south of the country (CHRR, 2018). Constraints to agricultural growth in Tanzania are largely related to low productivity of land, labor and production inputs, underdeveloped irrigation potential, limited capital and access to financial services, inadequate agricultural technical support services, poor rural infrastructure; infestations and outbreaks of crop pests and diseases; erosion of natural resource base and environmental degradation. Others include gender relations; weak producer organizations, depressed prices for primary commodities in global markets and insecurity with respect to property rights to land and its use as collateral for credit; inadequate participation of youth in agriculture and limited involvement of private sector in agricultural development (GoT, 2012).

In Tanzania, agriculture markets are characterized by inadequate adherence to product quality standards, grades and post harvest management, which can limit product access to regional and international markets (GoT, 2011). Private and public food safety standards have been implemented in Tanzania. In urban areas, supermarkets play a large role in the development of private food safety standards particularly as relates to quality attributes of agricultural commodities. Rural and poor households are excluded from the benefits of higher food standards since they tend to shop in traditional open markets where higher hygienic standards are not always applied. (Kaminski et al., 2015).

### Table 1. Food commodity balance - MT cereal equivalent, Tanzania (2014/15 – 2017/18 average)

<table>
<thead>
<tr>
<th></th>
<th>Maize</th>
<th>Rice (milled)</th>
<th>Sorghum/Millet</th>
<th>Wheat</th>
<th>Cassava</th>
<th>Bananas</th>
<th>Pulses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opening Stocks</strong></td>
<td>368,855</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td>5,541,203</td>
<td>1,751,772</td>
<td>625,946</td>
<td>74,717</td>
<td>1,397,770</td>
<td>1,035,180</td>
<td>2,134,428</td>
</tr>
<tr>
<td><strong>Imports</strong></td>
<td>49,996</td>
<td>208,359</td>
<td>1,442</td>
<td>869,246</td>
<td>36</td>
<td>172</td>
<td>7,988</td>
</tr>
<tr>
<td><strong>Total Supply</strong></td>
<td>5,960,054</td>
<td>1,960,132</td>
<td>627,389</td>
<td>943,962</td>
<td>1,397,807</td>
<td>1,035,352</td>
<td>2,142,415</td>
</tr>
<tr>
<td><strong>Losses</strong></td>
<td>775,768</td>
<td>115,818</td>
<td>62,246</td>
<td>193,223</td>
<td>138,302</td>
<td>158,158</td>
<td>105,936</td>
</tr>
<tr>
<td><strong>Exports</strong></td>
<td>256,094</td>
<td>223,150</td>
<td>6,816</td>
<td>139,929</td>
<td>5,395</td>
<td>253</td>
<td>234,725</td>
</tr>
<tr>
<td><strong>Net Supply</strong></td>
<td>4,928,192</td>
<td>1,621,164</td>
<td>558,328</td>
<td>610,815</td>
<td>1,254,110</td>
<td>899,941</td>
<td>1,801,755</td>
</tr>
<tr>
<td><strong>Domestic Requirements</strong></td>
<td>4,561,965</td>
<td>1,226,957</td>
<td>579,261</td>
<td>745,115</td>
<td>1,055,580</td>
<td>943,813</td>
<td>1,356,110</td>
</tr>
<tr>
<td><strong>Domestic Balance</strong></td>
<td>366,226</td>
<td>394,207</td>
<td>(20,934)</td>
<td>(134,301)</td>
<td>198,530</td>
<td>(43,872)</td>
<td>445,645</td>
</tr>
</tbody>
</table>

Notes: Net supply subtracts losses and exports from total supply values. Loss estimates do not account for feed, seed and industrial use. Trade figures account for both formal (UN COMTRADE) and informal (FEWS NET/WFP/FAO) trade. Trade values may still be underreported as they do not account for informal trade with countries in Southern Africa. Estimate for domestic requirements assumes the following average per capita kg requirement for each commodity; maize (86), rice (21), sorghum/millet (10), wheat (15), cassava (21), bananas (19), pulses (29).

MAIZE

- White maize is the most important cereal in Tanzania, accounting for about 70% of annual cereal production (GoT, 2018). The country is surplus producing in the commodity. There is a strong consumer preference for maize over drought-resistant grains like sorghum and millet. Per capita consumption is estimated at between 80 – 135 kg/person/year (USDA, 2018). Average annual production is typically a little over 5,000,000 MT.

- Maize production has grown in recent years owing to increased area planted and use of improved varieties. Overall productivity levels are low as fertilizer use remains limited. Estimates of post harvest loss range between 10 to 15 percent of annual production. The main Msimu harvest accounts for 60 – 70 percent of annual production, while the smaller Vuli and Masika harvest together account for 30 – 40 percent of annual production (GoT, 2015 and 2018).

- Strategic grain reserves are managed by the National Food Reserve Agency (NFRA), which enters the market during major harvest to buy maize. The NFRA’s purchase price for maize is generally higher than prevailing market prices, and is based on the estimated cost of producing maize plus a 5 percent margin. Maize sales by the NFRA begin around August or September each Marketing Year, with the most significant sales occurring during the lean season between October and February (Figure 54). Recent evidence suggests the NFRA’s impact on maize prices has largely been insignificant despite having a fairly noteworthy presence in some local markets (Pierre et al., 2017).

- Export bans are often used during years of poor production as a policy instrument for regulating maize availability and prices. The result has been trader averseness to seeking large export contracts while encouraging bribery and illegal trade and increased use of bush “panya” routes (USDA, 2018).

- Maize exports from Tanzania are an important supply source for neighboring maize deficit markets in Eastern and Southern Africa, particularly during years of drought (Figure 42). Exports account for roughly 20 percent of annual production with the remainder consumed and traded domestically. External maize trade peaks between May and August, and occurs principally through informal, unregistered and unregulated channels (Wilson and Lewis, 2015a and FEWS NET/FAO/WFP, 2018).

- The maize marketing channel includes many intermediary buyers and processors between producers and consumers, each taking a margin, which reduces overall efficiency of the system (USDA, 2018). The milling sector is made up of hammer mills that operate mostly in rural areas and are considered the lowest cost and most inferior option, small millers who process over 90 percent of locally consumed maize, and a small number of large millers that provide a higher quality product for urban middle and higher income households (Enzama, 2016).

- Local maize prices are generally lowest immediately following the main Msimu harvest between July and September. Prices peak towards the end of the lean season between February and March (Figure 30). Prices are generally lowest in the major producing regions including Songea, Mbeya and Sumbawanga, and are highest in urban and deficit markets such as Dodoma and Dar es Salaam (Figures 6). Tanzania’s offers competitive maize prices within East Africa (Figure 7).

- Maize productivity levels in recent years have been negatively affected by poor agronomic practices, weak market information including on standards and quality as well as pests and diseases such as maize lethal necrosis and the Fall Army Worm (FAW).
RICE

- Rice is the second most important staple crop in Tanzania with average annual production estimated at 1,700,000 MT. An estimate 30 percent of annual production is consumed within areas of production while the rest is traded across the country with Dar es Salaam serving as the main retail market. Local rice quality is ranked by region of origin as follows; Kyela (from Mbeya) is the best quality, Morogoro considered good quality and Shinyanga as lower quality since it tends to contain larger amounts of foreign material.

- Production mainly occurs in the Southern Highlands (Mbeya, Katavi, Iringa) and Lake Zone (Geita, Mwanza, Shinyanga and Central (Morogoro and Tabora) regions and to a lesser extent in the Coastal and Kilimanjaro regions.

- Production in the Southern Highlands occurs in three main forms; small scale farmers in lowland areas using rain-fed natural flooding and water harvesting conditions with yields between 1 – 3 tons per ha; dryland mixed farming without irrigation in upland Iringa where yields are typically below 1 ton per ha; year round non-rain dependent irrigation schemes in the Mbeya and Morogoro regions with estimated yield of 3 – 6 tons per ha.

- Tanzania’s rice market is largely competitive with production and marketing dominated by many small scale producers and traders, although millers and wholesalers exercise the greatest influence (Figure 23). Further up the chain are wholesalers and processors who operate in both the domestic and export markets. Informal vertical linkages exist between traders based on personal relationships and trust.

- Product differentiation is limited to the percent of broken rice, whether aromatic or non-aromatic and imported versus local. Limited branding occurs with the exception of the small amount of retailing through supermarkets in urban areas (Trevor and Lewis, 2015b). At the wholesale level, rice is sold in bags of 100kg, while retailers use a variety of small containers of varying weight.

- Tanzania mainly imports long grain rice from Pakistan with smaller quantities coming from Thailand, Vietnam and India. Significant quantities of rice is exported regionally from Tanzania to neighboring countries in East Africa (Kenya, Rwanda, Burundi, Uganda and the DRC), with occasional flows to Malawi and Zambia (Figure 43). A significant amount of informal rice trade occurs through bush “panya” routes from surplus producing areas to neighboring importing countries where good quality Tanzanian rice is generally preferred over other imports (Trevor and Lewis, 2015b).

- Export bans and high import tariffs are important trade policy tools that influence rice marketing in Tanzania. Within the East African Community, rice is considered a “sensitive product” and faces a 75 percent ad valorem tariff or USD 345 per MT or whichever is higher. Tanzania’s regional rice exports have attracted higher EAC external tariffs in recent years due to trader practice of combining cheaper Asian imports with locally produced Tanzanian rice for a better profit margin.

- Local rice prices are generally lowest between July and October immediately following the main Msimu harvest and peak between February and April (Figure 31). Prices are generally lowest in the major producing regions including Mpanda, Shinyanga and Morogoro, and are highest in urban and deficit markets such as Njombe, Dodoma and Dar es Salaam (Figures 8). Tanzania’s rice prices are generally competitive and attract demand across East Africa (Figure 9).

- The main constraints to rice production in Tanzania include poor production to post harvest handling practices, limited mechanization and poor management of labor resources, poor water management strategies as well as pests and diseases.
WHEAT

- Wheat is the third most consumed cereal after maize, and rice. It is disproportionately consumed by wealthier households in urban areas, usually in flour form or through products like pasta, breakfast cereals and chapatti (USDA, 2018). Tanzania’s high levels of dependence on imported wheat means global price shocks can have significant impacts on foreign reserve.

- Wheat is not a priority crop for local agricultural development and therefore experiences limited government intervention. Tanzania’s level of wheat self-sufficiency has decreased significantly since the early 2000s as current production is only able to cover 10 to 20 percent of local requirements (Figure 10).

- Average annual wheat production in recent years has been below 100,000 MT. Over 90 percent of locally produced wheat originates from large commercial farms in the northern highlands (Arusha, Kilimanjaro and Manyara) or from small to medium farms in the southern highlands (Iringa, Mbeya and Rukwa) (USDA, 2018). The level of mechanization in wheat production ranges from large scale mechanized production to small scale production using hand held tools. Wheat area planted has historically been erratic partly from domestic price movements, which are highly correlated with global wheat prices (European Commission, 2016).

- Tanzania’s wheat marketing was largely state controlled through the early 1990s, when it was liberalized to encourage more active private sector participation. The milling sector is dominated by two Dar es Salaam based companies that play an important role in the regional export market (FAO, 2013).

- Wheat marketing occurs through two main independent channels. The first is from small scale farmers who sell to local collectors that carry the product to small millers before the product reaches retailers and final consumers. The second are larger commercial farmers and importers who sell directly to wholesalers and large miller that are Dar es Salaam based before the product is either exported or sold to retailers and final consumers (Figure 24).

- Tanzania’s wheat imports largely originate from Russia, Australia, Canada, Germany and Brazil, while smaller quantities are sometimes imported as food aid from the U.S. (Figure 44). Imported wheat grain is re-exported regionally in flour form largely through informal channels. Imported wheat incurs a common EAC external ad valorem tariff of 35 percent, while wheat traded within the EAC faces a tariff of 10 percent (European Commission, 2016).

- Seasonality in local wheat prices is largely linked to global price trends, the performance of local production and the cost of transporting local production to Dar es Salaam (Figure 11). There is weak price integration for wheat across key markets in Tanzania (Table 5). Tanzania’s high level of dependence on imported wheat means prices, while correlated with global markets, are generally unresponsive to fluctuations in exchange rates. (European Commission, 2016).

- Prices are generally lowest in the major producing regions including Iringa and Sumbawanga, and are highest in urban and deficit markets such as Geita and Morogoro (Figure 38). Higher wheat prices are sometimes observed closest to the Kenyan border, during periods when more competitive Tanzanian prices lend to increased demand from Kenya. The main constraints to increasing wheat production levels include expensive input costs, insufficient farm machinery, high fuel prices and erratic crop prices (Warsanga et al., 2017).
Sorghum and Millet

- Tanzania is generally self-sufficient in both sorghum and millet production (Figure 12 and 55). Sorghum is considered the only staple crop with negative income elasticity and is generally absent from the diet in urban areas, although consumption is higher in the major producing areas of the Central region (Dodoma, Singida and Tabora and Kigoma) and the Lake Zone region (Mara, Simiyu, Mwanza, Geita, Kagera and Shinyanga).

- Millet is more widely consumed in urban areas as it is used as weaning food for babies and for ceremonial occasions (Gierend and Orr, 2015). The heavy consistency of both sorghum and millet make both staples popular among farming and nomad communities.

- Sorghum and millet are mainly grown at the subsistence level with low yield for home consumption. Average annual production is estimated at 600,000 - 800,000 MT, with only 17 percent traded. Pearl (or Bulrush) millet is mostly consumed at home as it is considered a good substitute for maize, although smaller quantities are sold in the market when prices are high. Finger millet and sorghum are mostly grown for trading.

- Marketing occurs two to three months after harvesting. Prices are negotiated between farmers and traders along the marketing chain and generally not publicized with the exception of contracts between trader or processors and a few organized farmer groups (Figure 25). Beer manufacturers favor sorghum in the production of cheaply priced opaque beers targeted at low income groups and to compete with beers produced by smaller local breweries.

- Grain color is an important quality determinant among actors in the marketing channel. Red, tan, brown and white sorghums are consumed across Tanzania; red and brown are most preferred and associated with higher tannin levels are subject to fewer bird and mold attacks, and are also preferred by local brewers. At the retail level, small tins are used as the local unit of measure.

- There are weak horizontal and vertical linkages in the sorghum and millet value chain despite ongoing efforts to create farmer organizations, aggregate production (medium scale traders and large breweries) and support commercialization. Post-harvest handling is generally done by women while men undertake most of the marketing activities.

- Sorghum and Millet are largely traded locally within Tanzania with a relatively small quantity exported to neighboring countries (Figure 45). Intra-EAC trade for both products occurs with no tariffs, sorghum and millet trade with SADC carries ad valorem tariffs of 10 percent and zero respectively. Trade with COMESA occurs on an MFN basis with a 25 percent tariff.

- Local sorghum and millet prices follow a seasonal pattern and are generally lowest during the main harvest and post harvest period (Figure 33 and 34). Prices are generally lowest in the main producing regions such as Shinyanga (Figure 13). Millet typically fetches a higher price than sorghum at the market level (Figure 39 and 40). White sorghum prices are regionally competitive, offering an opportunity for more regional exports.

- There has been very little innovation in the production and marketing of both staples over the years. Key production constraints include poor access to improved seeds, sand contamination, nitrogen deficiency, pests and diseases including birds, smuts and weeds like striga. The result has been erratic supply, which remains a key constraint in the industrialization of both sorghum and millet.
PULSES

- Pulses are a major food and income source for many households in Tanzania. Dry beans are most significant and account on average for 60 – 75 percent of annual production of pulses. There is strong consumer preference for local bean varieties with thinner skin (includes large brownish or reddish colored beans, associated with shorter cooking time) and a softer gravy.

- The main types of pulses grown include dry beans, cowpeas, chickpeas and pigeon peas, which are usually intercropped with maize and tubers. Dry beans are mostly grown in the Southern Highland Zone (Mbeya, Ruvuma, Iringa and Rukwa regions), Lake Zone (Kagera region) and Northern Zone (Arusha, Kilimanjaro, Manyara and Tanga regions). Production of pulses in Tanzania is dominated by smallholder farmers and covers roughly 12 percent of annual cropped area (Figure 14).

- Approximately 40 percent of annual pulse production is destined for own consumption, while 48 percent is traded domestically and 12 percent exported to regional markets including Kenya and Zambia (Molenaar, 2017). Generally, crops are dried before being traded and only a small quantity of fresh crops enter the market.

- The market for pulses is generally competitive, with the exception of seed production and distribution that is managed by a few traders. Small-scale traders buy and gather dried beans from farmers and transport to regional assemblers in urban areas. Regional assemblers usually engage in marketing on behalf of one or many marketing agents who could be processors, wholesalers or retailers (Figure 26). In most cases, bean processing is limited to drying, cleaning, sorting, and packaging although there are a few processing firms that also engage in canning.

- Traders are able to generate economic rents at the retail level through use of containers of varying weights as units of measurement. There is also evidence of traders tampering with measuring scales at a loss to farmers due to minimal enforcements of laws on weights and measures. At the wholesale and export level, measurements are more standardized with the use of 90 – 100 kg bags. Tanzania offers competitive local dry beans (mixed) prices within East Africa with Kenya serving as the most important destination market (Figure 46). The country also exports significant quantities of dried peas and other pulses to India, Pakistan, and the United Arab Emirates on an annual basis (UN COMTRADE, 2018).

- The low input approach to production plays an important role in keeping Tanzania’s pulse and beans prices competitive. Small scale farmers are able to access prevailing price information through various market information platforms while information on future prices and demand requirements is more limited. Local dry bean prices are generally lowest immediately following the main Msimu harvest between July and September, and peak towards the end of the lean season between February and March (Figure 35). Prices are generally lowest in the major producing regions including Songea, Mbeya and Bukoba, and are highest in urban and deficit markets such as Dodoma, Lindi and Dar es Salaam (Figure 15).

- Some key constraints faced by producers in this sector include low smallholder yield due to poor seed quality, poor crop management (late weeding), pests and diseases, low soil fertility and droughts (Hillocks et al., 2006). Households recycle seeds and combine different varieties on the same plot, which lead to the predominance of mixed as opposed to single variety beans that face higher demand and prices at market level. In 2015, the formal seed sector was unable to meet smallholder demand for high quality self-pollinated legume seeds; consequently farm households were unable to benefit from legume breeding programs.
CASSAVA

- Cassava is the third most important food crop after maize and rice. It is mainly produced for home consumption with surplus traded in either domestic or regional markets (Figure 16). It is multiuse as a staple food, cash crop, famine reserve crop, livestock feed, industrial raw material (mainly flour) and firewood from its dried stems (USAID/COMPETE, 2010).

- Average annual production is estimated at a little over one million metric tons in cereal equivalent terms. Cassava is consumed either fresh or in flour form as a staple, while its leaves are cooked as a vegetable to complement starches. During period of food shortages, cassava flour is typically combined with either maize or sorghum/millet at a ratio of up to 50 percent to improve affordability.

- Cassava is widely grown in all farming systems in Tanzania due to its adaptability to various soils and agro-ecological conditions (Figure 47). The main cassava producing areas are the Lake Victoria zone (Mwanza, Mara, Kagera and Shinyanga regions), the Southern zone (Lindi and Mtwarra regions and Tunduru district in Ruvuma region), the Eastern zone (Morogoro, Tanga, and Coastal regions). Most production is done by smallholder farms on marginal soils under mostly mixed cropping systems. Farmers typically do not use any inputs (fertilizers or pesticides) apart from labor in the production of cassava. Roots are processed within two to three days of harvesting due to their high perishability. Post harvest loss is estimated at up to 30 percent largely from rotting, particularly when there is insufficient labor for timely processing (Masamha et al., 2018).

- Cassava chips can be stored for two to three months before insect damage sets in and for up to a year after being smoked. Dried cassava chips are more easily marketed and can fetch a higher price because traders find it easier to transport these. High quality cassava flour can be stored for up to one year (Roberts, 2014). Tanzania is generally a net exporter of cassava although the quantities traded are relatively small (Figure 17).

- Cassava marketing is dominated by small traders who buy large quantities of cassava at very low prices from farmers and sell to food vendors, retailers, wholesalers and millers in urban markets. The shortest channel involves farmers selling directly to consumers and local food vendors. Another important channel involves farmers selling fresh cassava to wholesalers and medium to large millers, who in turn engage in the export of both cassava chips and cassava flour to neighboring countries including Rwanda, Ugandan and the Democratic Republic of Congo (Figure 27).

- Market entry is limited mainly by capital and the high perishability of cassava post harvest. Transaction costs along the cassava marketing chain are mainly due to high transportation costs. Most cassava processing plants are small to medium scale with little sophistication due to high labor intensity. There is generally a high turnover in cassava sales due to the combination of low value to bulk ratio, risk of damage, and relatively high perishability of cassava. Traders can secure good economic returns by maximizing the number of sale transactions within a short period of time even when profits per transaction remain low.

- There is limited variability in cassava prices throughout the year, however the price of dried cassava chips and cassava flour are sensitive to weather patterns; increasing during the rainy season and decreasing during the dry season, when the majority of harvesting occurs. Farm gate prices are typically low from the combination of limited farmer knowledge of local markets and challenges involved with storing or transporting the bulky cassava crop to more distant markets.

- Cassava yields have in recent years been affected by cassava mosaic and brown streak diseases, although availability of disease resistant varieties is increasing. There is no horizontal and vertical coordination along the cassava value chain, making it difficult for farmers to have the bargaining power or economies of scale to supply bulk produce to traders or processors.
BANANA

- Banana is an important staple food that is mostly produced for home and alcohol consumption (Figure 18). Average annual production in recent years is estimated at 1,000,000 MT in cereal equivalent terms. Maize is the main substitute for bananas since it is readily available, followed by rice and finally cassava and sweet potatoes for their affordability (Kilimo Trust, 2012). Overall, about 30% of Tanzania’s population derive their carbohydrates from green bananas.

- About 60% of harvested bananas are consumed in the home as cooked or fresh (as dessert) with minimal processing. Brewing (including illicit spirits) “mega” in Kilimanjaro and Arusha areas and “lubisi” in Keera areas account for 30%. These are further distilled into a gin commonly known as “gongo”. Roasting into simple fast foods accounts for about 2% and 8% is sold as fresh bananas to urban consumers; processors who produce dried banana chips and flour; and to exporters (Bill and Mellinda Gates Foundation, 2014).

- Banana cultivars can be divided into four groups including cooking bananas (matooke), brewing bananas (ng’ombe), roasting bananas and sweet (dessert) bananas. Matooke bananas constitute the majority, and is typically peeled before boiling and can be mashed before eating with beans, meat or fish.

- Farm households dedicate on average .5ha for banana production under mainly rain fed conditions with the exception of northern Tanzania where there is a traditional furrow irrigation system. Production is largely concentrated in remote areas with poor road networks, meaning harvested bunches are not collected promptly, and post harvest loss is estimated at up to 30 percent. The Kagera and Kilimanjaro regions supply an estimate 60 percent of annual banana production (Figure 48). The banana fruit is highly perishable leaving little time between harvest and the onset of deterioration. This together with relatively low bulk to value ratio has a major influence on the ease and cost of transportation.

- Banana marketing is dominated by producers who sell to rural collectors and assemblers, who in turn sell to retailers, processors and exporters before the product reaches final consumers (Figure 28). Transportation at the wholesale level is estimated at 10 percent of selling price, particularly for product going to Dar es Salaam (Warsanga, 2014). There is generally little value addition in spite of potential price advantages (Figure 19). The banana marketing system is generally competitive with many farmers and traders, although there can be localized market concentration based on trader ability to pay on time. Traders try to avoid storage and waste by trading in quantities and bunches at appropriate stages of ripening to ensure product will reach the targeted market on time. Access to capital and product perishability are the main barriers to entry. Exports are generally limited and can vary significant from year to year depending on the performance of annual production.

- Traders transport bananas at night to avoid the heat, which hastens ripening of bananas, and to avoid formal and informal fines associated with vehicle overload. The product is then sold early in the morning by wholesalers to retailers, processors as well as exporters. Bananas are graded by type, size and identifiable spots on a bunch. The absence of cold storage facilities for controlled ripening of bananas is replaced by careful planning of transport between source and destination markets, taking into account distance and likely travel time.

- Production and supply is also affected by diseases (bacterial wilt, sigatoka and nematodes) and inefficient coordination within the value chain. Poor access to market information limits farmer power to capture a reasonable share of price paid by consumers. Additionally, low farm gate prices make it difficult for farmers to purchase the required inputs to support higher level farm level productivity (Warsanga, 2014). Supply disruptions can occur during the rainy season as transport is restricted by damaged infrastructure in production areas.
LIVESTOCK

- Tanzania’s livestock sector is dominated by traditional breeds and processes with cattle accounting for about 50 percent of total livestock production (Figure 20). The most common cattle breed is the Tanzanian Short Horn Zebu.

- Livestock production is divided into four different groups; agro-pastoralist households, accounting for about 80 percent of production, pastoralist households account for 14 percent while the remaining 6 percent is from commercial ranches and the dairy sector. Sheep and goats adapt to many agro-ecological zones and their production is more widely distributed. Herders are beginning to migrate to the southern and coastal regions as a result of high human population density and overgrazing in the north (SAGCOT, 2012).

- Agro-pastoralism is practiced in the coastal and semi-humid areas extending from Kagera to the greater Morogoro regions by more sedentary rural households with smaller land holdings and limited pastures for livestock (GoT, 2011). Pastoralism is predominant in the arid and semi-arid areas from the greater Shinyanga to Manyara regions. Pastoralists view animals as household assets rather than business assets and engage in nomadism and transhumanism.

- Dairy production is focused in the Kagera, Mara, Kilimanjaro, Arusha, Tanga and Mbeya regions, and carried out by roughly 250,000 small scale farmers who produce milk purely for commercial purposes. The last production system includes commercial ranches by a few government and privately owned entities who focus on rearing fast growing breeds, which are supplied to the market for meat production.

- Primary livestock markets are managed by local authorities while secondary and border markets are managed by the Tanzanian Ministry of Livestock and Fisheries. The livestock marketing channel is generally competitive at all levels with lack of capital as the main constrain to entry (Figure 29). There is however poor horizontal and vertical coordination between livestock producers and processors, partly due to weak coordination by private trader organizations and weak upstream linkages from input suppliers to processors. Most markets lack the required infrastructure to enforce existing laws on weighing, grading and auctioning of livestock. It is generally difficult to quantify livestock trade with neighboring countries, particularly Kenya given the frequency of grazing across national boundaries. Anecdotal evidence, however, suggests that prices tend to be higher on the Kenyan side and so animals tend to be sourced from Tanzania for slaughter in Kenya (Figure 49).

- The crowding of livestock on trucks with limited access to water and feed during transportation can create stressful conditions resulting in up to 15 percent of animal weight loss and below average meat quality. The inconsistency and poor quality of government inspection has resulted in slaughter and butcher facilities operating under minimal hygiene conditions and limited use of cold storage for transporting meat. The combined effect is a prevalence of ungraded, poor quality meat reaching the market and profit recapture through relatively higher consumer prices.

- Livestock pricing systems remain largely opaque with prices determined through spot market negotiations between livestock owners and traders. Cattle prices are on average between 500,000 – 900,000 TZS per head while sheep and goat prices range between 20,000 – 90,000 TZS per head (Figure 21). Generally, there is greater fluctuation in consumer prices for meat when compared with producer prices for livestock. This creates further opportunities for economic gains as one moves up the marketing channel. Livestock growth continues to be constrained by several factors including poor animal husbandry, poor rangeland management, disease and pest infestation, inadequate extension services, and low capital investments.
DATA COLLECTION AND INFORMATION VERIFICATION METHODS

The analysis presented in this report draws on the combined knowledge provided by key informants, secondary data, and a literature review (grey literature and other published documents and reports). The data collection and verification process took place in four phases:

- FEWS NET collected secondary historical data related to staple food and cash crop production and marketing (sub-national production volumes, trade flows, and price data) as well as relevant key reports and publications. These data and reports were reviewed to provide FEWS NET staff with general background information.

- FEWS NET organized a national-level workshop with key informants (private sector, the broader humanitarian and development community, government, and USAID and FEWS NET staff) over the course of two days to help improve understanding of the key issues outlined above, including cross-cutting issues affecting staple food and livestock markets as well as issues relating to commodity market structure, conduct and performance outcomes. The commodity specific marketing channels and production and trade flow maps presented in this report were developed during this workshop.

- Following completion of the workshop and review of secondary data and literature, FEWS NET identified remaining information gaps, and attempted to address these through follow-up conversations with key informants (those present at the workshop and newly identified individuals) and rapid field assessments.

- A consolidated report was drafted by FEWS NET staff and reviewed by key partners prior to being finalized for publication.

LIMITATIONS AND INFORMATION GAPS

Tanzania is typically a surplus producer of key staple foods that are also in high demand in the neighboring countries including Kenya, Burundi, Rwanda, DRC and Malawi. However, the actual amount that can be traded both domestically and regional is never clear. A better estimation of marketable surpluses will enhance markets and trade analysis of staple foods at both the domestic and regional levels. The publication of Tanzania’s national food balance sheet by the Ministry of Agriculture is infrequent and often late. Having this information on an annual basis will be very valuable for developing the commodity and food balance sheet, which is critical for estimating tradeable surpluses by commodity.

MARKET MONITORING PLAN

FEWS NET regularly monitors staple food and livestock market dynamics in both presence and remote monitoring countries. It is neither necessary nor possible for FEWS NET to effectively monitor all commodity markets all the time and/or outright. Thus, FEWS NET’s markets and trade team focuses on the monitoring of selected indicators for a given marketing year.

These key indicators refer to market operations and major events liable to affect supply and demand dynamics and price levels and, thus, price variability on reference markets. FEWS NET also regularly monitors drivers of trade from surplus to deficit areas. Some of these indicators have upper thresholds, which are used together with other types of data to indicate/suggest at what point or threshold national or local food availability and/or access should start to raise concerns. The findings from this monitoring process are regularly presented in FEWS NET’s Price Watch and Price Watch Annex. They are also used as basic inputs in integrated food security project analysis.

Agricultural market information in Tanzania is fragmented and split across several public and private agencies. The cost of obtaining such information remains high, particularly for smallholder farmers who are unable to easily access these systems (MITM, 2008). Statistics on a variety of socio economic indicators are available through the Tanzania National Bureau of Statistics. The Ministry of Industry and Trade is the lead provider of commodity price data under its Trade Promotion and Marketing Division. The Ministry of Agriculture is responsible for assessing crop production and regularly publishes the Annual Agriculture Sample Survey (AASS) report in conjunction with other government agencies. Information on livestock production and prices can be accessed through the Livestock Information Network Knowledge System (LINKS), managed by the Ministry of Industry and Trade with support from development partners such as USAID. The Bank of Tanzania publishes quarterly and annual report on agricultural production, food stocks, external trade, and inflation. Statistics on the export and import of food and cash crops is also available through the customs department under the Ministry of Finance. Monitoring also occurs with varying frequency through private sector actors (such as the Tanzania Chamber of Commerce, Industry and Agriculture or TCCIA), farmer organizations, cooperative societies and NGOs engaged in the agricultural sector.

Table 2 below provides an overview of general indicators to monitor with respect to the broader staple food and livestock marketing system in Tanzania.
Table 2. General category of indicators to monitor for staple food markets in Tanzania

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator and Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food price inflation</td>
<td>• Monitoring the inflation rate on a monthly basis and real prices of staple food commodities to determine household purchasing power.</td>
</tr>
<tr>
<td>Domestic production and supply levels for maize, sorghum, millet, rice, wheat and pulses (particularly dry beans)</td>
<td>• June-August: Carryover stocks. • November-December inputs use in the main producing southern highlands • December-February rainfall performance and crop development. • March-April: Pre harvest estimates in the main producing unimodal rainfall areas of southern highlands for the May-to-August (Msimu) harvest, and northern producing areas for the June-to-August (Masika) harvest, and development of the commodity or food balance sheet. • May-to-August: Harvest prospects, stock levels and marketing behavior in surplus-producing areas and consumption markets. • February-March: Harvest prospects for the February-to-March (Vuli) harvest. • Official estimates of post harvest losses for staple cereals and pulses. • NFRA purchases and export plans; government policies and cross-border trade.</td>
</tr>
<tr>
<td>Global rice and wheat supply</td>
<td>• Year-round: Monitoring of international rice and wheat market trends, exchange rate and any ad hoc government policies that could influence import volumes.</td>
</tr>
<tr>
<td>Export Demand</td>
<td>• Year-round: Competitiveness of domestic prices in regional markets (Kenya, Rwanda, Burundi, Uganda, DRC, Malawi and Zambia). • Marketing costs and margins to regional markets.</td>
</tr>
<tr>
<td>Consumption norms</td>
<td>• Year-round: Consumer preferences for certain types of staple foods. These preferences are likely to change slowly over time, but may be influenced by price changes.</td>
</tr>
<tr>
<td>Other cereal uses</td>
<td>• Demand for livestock feed and other industrial uses will influence cereal availability for food consumption.</td>
</tr>
<tr>
<td>Staple food price levels</td>
<td>• In addition to year round monitoring of local and imported cereal prices, it will be important to monitor prices for key cereal substitutes like cassava and cooking bananas as well as prices for dry beans and other key pulses.</td>
</tr>
<tr>
<td>Structure and conduct of different actors along the marketing chain</td>
<td>• To understand these observations and determine the future performance of markets, it is important to understand features of an industry that influence the nature of competition between buyers and sellers, and the pattern of commercial behavior that marketing agents adopt to adjust to a given market structure. This can be done during a rapid appraisal.</td>
</tr>
<tr>
<td>Pastoral situation and livestock trade</td>
<td>• Monitoring of indicators relating to the state of vegetation, water availability, and migratory patterns for pastoralist households. • Other important indicators relating to the prevalence of bush fires, animal health and transportation infrastructure will influence livestock trade.</td>
</tr>
<tr>
<td>Population movement</td>
<td>• The presence of refugees from Burundi or DRC that may put pressure on market systems in markets along the borders with these countries.</td>
</tr>
<tr>
<td>Macroeconomic indicators</td>
<td>• Fluctuation of the Tanzanian shilling relative to currencies of key trade partners both within East and Southern Africa region and internationally.</td>
</tr>
<tr>
<td>Regional policy developments</td>
<td>• Trade and other sector specific policies like export bans should be monitored for a better understanding of their potential impact on staple food availability and prices.</td>
</tr>
<tr>
<td>Weather patterns</td>
<td>• Weather related shocks such as floods, prolonged dry spells and droughts in East and Southern Africa will influence levels of national production and regional exports from year to year.</td>
</tr>
</tbody>
</table>
ANNEX I. MARKETING CHANNELS

**Figure 22. Maize Marketing Channel, Tanzania**

![Maize Marketing Channel Diagram]

**Source:** FEWS NET (2018).

**Figure 23. Rice Marketing Channel, Tanzania**

![Rice Marketing Channel Diagram]

**Source:** FEWS NET (2018).

**Figure 24. Wheat Marketing Channel, Tanzania**

![Wheat Marketing Channel Diagram]

**Source:** FEWS NET (2018).

**Figure 25. Sorghum / Millet Marketing Channel, Tanzania**

![Sorghum / Millet Marketing Channel Diagram]

**Source:** FEWS NET (2018).
**Figure 26.** Beans Marketing Channel, Tanzania


**Figure 27.** Cassava Marketing Channel, Tanzania


**Figure 28.** Bananas Marketing Channel, Tanzania


**Figure 29.** Livestock Marketing Channel, Tanzania

ANNEX II. SEASONAL INDICES AND PRICE CHARTS FOR SELECTED COMMODITIES

a. Seasonal Indices

**Figure 30.** Seasonal Index - Mbeya, Maize grain

**Figure 31.** Seasonal Index - Mbeya, Rice

**Figure 32.** Seasonal Index – Arusha and Dar es Salaam, Wheat

**Figure 33.** Seasonal Index – Dodoma and Shinyanga, White Sorghum (WS) and Red Sorghum (RS)

**Figure 34.** Seasonal Index - Shinyanga, Millet

**Figure 35.** Seasonal Index – Dar es Salaam and Mbeya, Dry beans (mixed)


b. Price Charts

**Figure 36.** Wholesale local maize prices (TZS/100kg) for selected markets (2013-17)

**Figure 37.** Wholesale local rice prices (TZS/100kg) for selected markets (2013-17)

Figure 38. Wholesale local wheat prices (TZS/100kg) for selected markets (2013-17)


Figure 39. Wholesale local white sorghum prices (TZS/100kg) for selected markets (2013-17)


Figure 40. Wholesale local millet prices (TZS/100kg) for selected markets (2013-17)


Figure 41. Wholesale local dry beans (mixed) prices (TZS/100kg) for selected markets (2013-17)

ANNEX III. PRODUCTION AND TRADE FLOW MAPS

Figure 42. Tanzania Local Maize Production and Trade Flow Map

Note: FEWS NET Production and Trade Flow Maps provide a summary of the geography of marketing systems that are relevant to food security outcomes during an average marketing year or season. The maps are produced by FEWS NET in collaboration with stakeholders from local government ministries, market information systems, NGOs, and private sector partners, using a mix of qualitative and quantitative data.

Figure 43. Tanzania Rice Production and Trade Flow Map

Note: FEWS NET Production and Trade Flow Maps provide a summary of the geography of marketing systems that are relevant to food security outcomes during an average marketing year or season. The maps are produced by FEWS NET in collaboration with stakeholders from local government ministries, market information systems, NGOs, and private sector partners, using a mix of qualitative and quantitative data.

Figure 44. Tanzania Wheat Production and Trade Flow Map

Note: FEWS NET Production and Trade Flow Maps provide a summary of the geography of marketing systems that are relevant to food security outcomes during an average marketing year or season. The maps are produced by FEWS NET in collaboration with stakeholders from local government ministries, market information systems, NGOs, and private sector partners, using a mix of qualitative and quantitative data.

Figure 45. Tanzania Local Sorghum/Millet Production and Trade Flow Map

Note: FEWS NET Production and Trade Flow Maps provide a summary of the geography of marketing systems that are relevant to food security outcomes during an average marketing year or season. The maps are produced by FEWS NET in collaboration with stakeholders from local government ministries, market information systems, NGOs, and private sector partners, using a mix of qualitative and quantitative data.

Note: FEWS NET Production and Trade Flow Maps provide a summary of the geography of marketing systems that are relevant to food security outcomes during an average marketing year or season. The maps are produced by FEWS NET in collaboration with stakeholders from local government ministries, market information systems, NGOs, and private sector partners, using a mix of qualitative and quantitative data.

Figure 47. Tanzania Local Cassava Production and Trade Flow Map

Note: FEWS NET Production and Trade Flow Maps provide a summary of the geography of marketing systems that are relevant to food security outcomes during an average marketing year or season. The maps are produced by FEWS NET in collaboration with stakeholders from local government ministries, market information systems, NGOs, and private sector partners, using a mix of qualitative and quantitative data.

Figure 48. Tanzania Local Bananas Production and Trade Flow Map

Note: FEWS NET Production and Trade Flow Maps provide a summary of the geography of marketing systems that are relevant to food security outcomes during an average marketing year or season. The maps are produced by FEWS NET in collaboration with stakeholders from local government ministries, market information systems, NGOs, and private sector partners, using a mix of qualitative and quantitative data.

Figure 49. Tanzania Livestock Production and Trade Flow Map

Note: FEWS NET Production and Trade Flow Maps provide a summary of the geography of marketing systems that are relevant to food security outcomes during an average marketing year or season. The maps are produced by FEWS NET in collaboration with stakeholders from local government ministries, market information systems, NGOs, and private sector partners, using a mix of qualitative and quantitative data.

## ANNEX IV. PRICE CORRELATION COEFFICIENTS

### Table 3: Wholesale maize price correlation coefficients for key markets (2013 – 2017)

<table>
<thead>
<tr>
<th></th>
<th>Songea</th>
<th>Sumbawanga</th>
<th>Dar es Salaam</th>
<th>Mbeya</th>
<th>Moshi</th>
<th>Dodoma</th>
<th>Iringa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Songea</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sumbawanga</td>
<td>0.871*</td>
<td>0.795*</td>
<td></td>
<td>0.870*</td>
<td>0.771*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dar es Salaam</td>
<td>0.889*</td>
<td>0.795*</td>
<td>0.762*</td>
<td>0.765*</td>
<td>0.771*</td>
<td>0.814*</td>
<td></td>
</tr>
<tr>
<td>Mbeya</td>
<td>0.902*</td>
<td>0.809*</td>
<td>0.870*</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Moshi</td>
<td>0.729*</td>
<td>0.762*</td>
<td>0.765*</td>
<td>0.771*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dodoma</td>
<td>0.915*</td>
<td>0.830*</td>
<td>0.965*</td>
<td>0.896*</td>
<td>0.814*</td>
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</tr>
<tr>
<td>Iringa</td>
<td>0.884*</td>
<td>0.839*</td>
<td>0.915*</td>
<td>0.956*</td>
<td>0.792*</td>
<td>0.927*</td>
<td>1</td>
</tr>
</tbody>
</table>


Note: * denotes significance at the 5 percent level.

### Table 4: Wholesale rice price correlation coefficients for key markets (2013 – 2017)

<table>
<thead>
<tr>
<th></th>
<th>Arusha</th>
<th>Dodoma</th>
<th>Mbeya</th>
<th>Mwanza</th>
<th>Iringa</th>
<th>Sumbawanga</th>
<th>Dar es Salaam</th>
<th>Morogoro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arusha</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dodoma</td>
<td>0.772*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mbeya</td>
<td>0.708*</td>
<td>0.768*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mwanza</td>
<td>0.766*</td>
<td>0.785*</td>
<td>0.728*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iringa</td>
<td>0.808*</td>
<td>0.802*</td>
<td>0.804*</td>
<td>0.787*</td>
<td></td>
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</tr>
<tr>
<td>Sumbawanga</td>
<td>0.720*</td>
<td>0.742*</td>
<td>0.760*</td>
<td>0.762*</td>
<td>0.752*</td>
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<tr>
<td>Dar es Salaam</td>
<td>0.770*</td>
<td>0.874*</td>
<td>0.851*</td>
<td>0.841*</td>
<td>0.785*</td>
<td>0.906*</td>
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<tr>
<td>Morogoro</td>
<td>0.778*</td>
<td>0.822*</td>
<td>0.771*</td>
<td>0.780*</td>
<td>0.726*</td>
<td>0.854*</td>
<td>0.922*</td>
<td>1</td>
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</tbody>
</table>


Note: * denotes significance at the 5 percent level.

### Table 5: Wholesale wheat price correlation coefficients for key markets (2013 – 2017)

<table>
<thead>
<tr>
<th></th>
<th>Arusha</th>
<th>Dar es Salaam</th>
<th>Geita</th>
<th>Mbeya</th>
<th>Morogoro</th>
<th>Njombe</th>
<th>Shinyanga</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arusha</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dar es Salaam</td>
<td>0.111</td>
<td></td>
<td>0.215</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Geita</td>
<td>-0.153</td>
<td>0.227</td>
<td>0.078</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mbeya</td>
<td>-0.231</td>
<td>0.345*</td>
<td>0.246</td>
<td>0.160</td>
<td>0.594*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morogoro</td>
<td>-0.292*</td>
<td>0.197</td>
<td>0.214</td>
<td>0.122</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Njombe</td>
<td>-0.029</td>
<td>0.160</td>
<td>0.239</td>
<td>0.209</td>
<td>0.078</td>
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<tr>
<td>Shinyanga</td>
<td>-0.143</td>
<td>0.362*</td>
<td>0.161</td>
<td>0.239</td>
<td>0.209</td>
<td>0.078</td>
<td>1</td>
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</table>


Note: * denotes significance at the 5 percent level.
Table 6: Wholesale beans price correlation coefficients for key markets (2013 – 2017)

<table>
<thead>
<tr>
<th></th>
<th>Arusha</th>
<th>Dar es Salaam</th>
<th>Geita</th>
<th>Kigoma</th>
<th>Mbeya</th>
<th>Shinyanga</th>
<th>Tabora</th>
<th>Njombe</th>
<th>Dodoma</th>
<th>Mtwara</th>
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</thead>
<tbody>
<tr>
<td>Arusha</td>
<td>1</td>
<td></td>
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</tr>
<tr>
<td>Dar es Salaam</td>
<td>0.757*</td>
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<tr>
<td>Geita</td>
<td>0.271*</td>
<td>0.378*</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Kigoma</td>
<td>0.598*</td>
<td>0.597*</td>
<td>0.395*</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Mbeya</td>
<td>0.466*</td>
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<tr>
<td>Shinyanga</td>
<td>0.593*</td>
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<td>0.623*</td>
<td>0.401*</td>
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</tr>
<tr>
<td>Tabora</td>
<td>0.657*</td>
<td>0.726*</td>
<td>0.501*</td>
<td>0.419*</td>
<td>0.536*</td>
<td>0.370*</td>
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<td></td>
</tr>
<tr>
<td>Njombe</td>
<td>0.620*</td>
<td>0.810*</td>
<td>0.403*</td>
<td>0.568*</td>
<td>0.537*</td>
<td>0.516*</td>
<td>0.615*</td>
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<tr>
<td>Dodoma</td>
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<td>0.836*</td>
<td>0.370*</td>
<td>0.623*</td>
<td>0.643*</td>
<td>0.643*</td>
<td>0.651*</td>
<td>0.686*</td>
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<tr>
<td>Mtwara</td>
<td>0.534*</td>
<td>0.733*</td>
<td>0.318*</td>
<td>0.556*</td>
<td>0.443*</td>
<td>0.547*</td>
<td>0.678*</td>
<td>0.665*</td>
<td>0.773*</td>
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</table>

Note: * denotes significance at the 5 percent level.

Table 7: Wholesale sorghum (red and white) and millet price correlation coefficients for key markets (2013 – 2017)

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<td>0.649*</td>
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<td>Morogoro (RS)</td>
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<td>0.730*</td>
<td>0.594*</td>
<td>0.338*</td>
<td>0.677*</td>
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<td>Mtwara (RS)</td>
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<td>0.261</td>
<td>-0.004</td>
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<td>0.488*</td>
<td>0.300</td>
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<td>Shinyanga (RS)</td>
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<td>0.545*</td>
<td>0.547*</td>
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<tr>
<td>Morogoro (M)</td>
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<td>0.722*</td>
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<td>0.918*</td>
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<td>Shinyanga (M)</td>
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<td>0.488*</td>
<td>0.441*</td>
<td>0.271</td>
<td>0.802*</td>
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Note: * denotes significance at the 5 percent level.
RS = Red Sorghum, WS = White Sorghum, M = Millet
ANNEX V. OTHER RELATED MAPS AND CHARTS

**Figure 50.** Monthly Exchange Rates between Tanzanian Shillings and BIF (Burundi Shillings), MWK (Malawian Kwacha), RWF (Rwandan Franc), UGX (Ugandan Shillings), CDF (Congolese Franc), KES (Kenyan Shillings), MZN (Mozambique Metical) and ZAR (South African Rand)


**Figure 51.** Tanzania Seasonal Calendar

Source: FEWS NET
**Figure 52.** Population density in Tanzania


**Figure 53.** Average annual rainfall in Tanzania (2000 – 2017)


**Figure 54.** Average monthly food stocks held by the National Food Reserve Agency (2013 – 17)


**Figure 55.** Millet production and price map

REFERENCES


-------------. “Livelihood Zones Analysis: Tanzania.” Rome, Italy.


