MINISTRY OF AGRICULTURE, NATURAL RESOURCES, LIVESTOCK AND FISHERIES

RAPID ASSESSMENT OF FOOD CROPS PERFORMANCE IN THE 2016 LONG RAINS (*MASIKA*) SEASON

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ABSTRACT

Food security, one of human security dimensions, has been given more attention recently due to the current global warming phenomena that causes severe flooding, drought, and other natural disasters. Such disasters have affected the production of food and hence causing the shortage of food supply that ultimately deteriorates the livelihoods in many countries especially developing countries including Zanzibar.

In the recent past, there have been repeated occurrences of weather related shocks in Zanzibar causing low domestic food production and signs of hunger in some areas like Micheweni and Kaskazini A. In the 2016 production season the monthly rainfall data indicate that the long rains were extremely sporadic, erratic with significant cuts at the critical stages of crop growth and maturity despite the higher amount compared with other seasons. The total precipitation for long rains in the 2016 season was higher by 2% than the five years average from 2011 to 2015 but poorly distributed to the extent of posing a huge threat to food availability and access, vegetation, pasture and water for livestock and to the entire livelihood. To this effect, the ministry of Agriculture, Natural Resources, Livestock and Fisheries Zanzibar through the Department of Food Security and Nutrition conducted a rapid assessment of the field performance of rice and other six major food crops, their harvest forecast and its impact on the food security situation within Zanzibar.

Farming households survey was conducted in 29 rice growing areas within 9 districts, 5 districts in Unguja and 4 districts in Pemba with the objective of identifying the magnitude of effects caused by poorly distributed rainfall on rice production and other major food crops, the level of seasonal food shortages and coping strategies adopted by households to increase food availability. Data was collected using structured questionnaires from 400 households selected by the simple random technique and data were analyzed using descriptive statistics in SPSS computer software

The findings confirmed that areas with good rice harvest were either those under irrigation farming systems or those valleys which remain moist longer after cessation of rains, typically in some valley areas of Pemba. Upland rain fed rice areas were the most affected such that in many of the upland rice fields the harvest was completely zero.

Generally 73.3% of total area planted with rice, 39% of cassava area, 25% of bananas area, 64.4% of sweet potatoes area, 47% of yams area and around 20% of cocoyam crop were affected and not expected to be harvested. The effect was significantly higher in rain fed than in irrigation system and also there was significant difference among districts.

Expected harvests were rice, 4,343.8 metric tons of paddy (2,606.3 metric tons of milled rice), cassava, 90,325 metric tons, bananas, 33,962.6 metric tons, sweet potatoes, 15,535.7 metric tons, yams, 1,193 metric tons an cocoyams, 4,924.8 metric tons.

The quantity of rice harvest is enough to sustain the household for one month on average. Added to other crops (cassava, bananas, sweet potatoes, yams and cocoyams), the available food is able to sustain the household for 3.7 months on average but details shows that some households have the amounts for only one month. Individual farmers' response showed that 22.3% have food for less than a month and 26.6 have enough for one month. About 30% can

survive for three month on their own production this season but only one-twentieth said they are food secure for the whole year.

The effects of failure in crops were already seen in some of the households where they have shifted from three meals in the normal season to two or one meal. Moreover, many households have shifted to other means of sustaining their livelihood such as looking for casual labour, selling their assets and valuables, seeking assistance from relatives and committing themselves to long term buying food on credit.

Parallel to these results the survey also found that provision of agriculture related technologies especially in rice is not efficient. Tractor service is to 60% of farmers and less than 50% in Pemba. The use of improved seeds is at 60%, while the use of fertilizers both phosphorus and nitrogen is at negligible rate.

In such a situation, policy makers, food security actors and human right stakeholder are urgently called upon to positively respond to the predicament of the affected farmers, accelerate special and targeted public assistance programs including providing relief food, food for work and cash for food schemes as a short term solution. In the long term, there is need for continue undertaking more investments in irrigation infrastructures and improve the provision of subsidized tractor mechanization, adequate seeds and fertilizer services and expand the range of crops covered while considering research and extension of more valuable crops and strengthening agricultural marketing systems for the farmers to generate more income.

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1. INTRODUCTION

Majority of people in Zanzibar (about 70%) live in rural areas and depend directly on agriculture as their main livelihood and economic activity. For these people food security is determined by the level of agricultural production which is dominated by rain-fed production of food crops like rice, cassava, bananas, sweet potatoes, yams, legumes (cowpeas, green gram and pigeon peas), fruits and vegetables. Other crops such as maize, millet and sorghum are also grown but to a lesser extent. Apart from crop production, livestock keeping and fisheries make an important component in the peoples' livelihood in Zanzibar.

Most parts of Zanzibar fall under the bimodal rainfall pattern, with the short rains (*Vuli*) season normally starting from October through December and the long rains (*Masika*) from March to June. This rainfall pattern is very ideal for production of many of the tropical crops such that in normal seasons (good amount and good distribution of rainfall) Zanzibar is able to produce enough to meet the country demand for cassava, bananas, sweet potatoes, yams, legumes (cowpeas, green gram and pigeon peas), fruits and vegetables. However, in the recent years there has been a big fluctuation in the overall production due to the current global warming phenomena that seems to cause severe losses in agricultural production.

Reports have shown that climate variability and change puts an additional pressure on food production and affects all four components of food security in many ways in Zanzibar. Erratic rainfall, floods, increasingly warm conditions, increasing intensity and frequency of drought and storms and sea level rise (estimated at 1-2 mm/year) are likely to increase the problem of food insecurity as this condition affects livelihoods, purchasing power, distribution systems, health, freshwater availability for farming and domestic use, important agricultural areas and marine resources, and ultimately affect the stability of food resources (Hanjra and Qureshi, 2010; Ziervogel and Ericksen, 2010; Ericksen, 2008). Therefore, the poor, who have low coping strategies and those who are dependent on climate sensitive ecosystems such as agriculture, are highly vulnerable to food insecurity.

Of the many affected crops in Zanzibar, rice has been a major concern because is the most preferred staple, produced by almost every farming household. Given low domestic production of rice (estimated to be only 16% of annual requirement) and the people's preference over other food commodities, the country is consistently failing to meet her rice needs from domestic production and as such, rice importation has remained a significant determinant of rice availability and food security in the Isles.

In light of that situation, Revolutionary Government of Zanzibar has started to relook and restructure its agricultural development strategies to fill the current shortage of rice production and also the shortage of other major food crops mentioned above and consequently decrease dependency on rice importation and stabilise the balance of payment[1].

In an effort to achieve that goal, the Revolutionary Government of Zanzibar has in recent time introduced the inputs subsidy programme that covers subvention for mechanization services, quality seeds, fertilizers and herbicides. This initiative is expected to benefit smallholder farmers with access to technologies to expand production both extensively (increase utilised land area) and intensively (increase land productivity) and as such boost domestic rice

[1] **Around US$ 40 million spent on rice importation annually**

production and in the long-run slow down the country's high dependence on rice imports and reduce hunger, malnutrition and poverty among vulnerable households.

During Masika season of 2016 a total of 31,303.55 acres (12,724.0 acres in Unguja and 18,579.55 acres in Pemba) were reportedly planted with rice crop. Out of this, 1,274.05 acres were planted under irrigation and the rest were cultivated under rain fed.

Rainfall data indicated that the total amount of 2016 long rains season (March to June) was slightly higher (767.7 mm) compared to the average (751.9 mm) of the five years (2011 – 2015) for the same period. This amount is theoretically ideal and adequate for production of many crops that are grown in Zanzibar. Despite good amount, the long rains of the 2016 season were extremely sporadic, erratic with significant cuts at the critical stages of crop growth and maturity, resulting into substantial failure in the development and maturity of some crops including rice to the extent of calling a rapid assessment of the crops condition and food situation.

2. OBJECTIVES OF THE ASSESSMENT

The overall objective of the assessment was to provide an update on the food crops performance for the long rains (*Masika*) season in 2016 and inform on the food situation in the country.

Specific Objectives were:

a) To establish the condition of field performance for rice and other major food crops for the 2016 long rains season.

b) To establish the proportion of major crops severely affected by the untimely and poor distribution of long rains during 2016 season

c) To identify alternative coping strategies adapted by farmers following the crop failure in the 2016 long rains season.

3. METHODOLOGY

3.1. Survey Coordination

The assessment was done by a team of technical staff from the Department of Food Security and Nutrition and the Department of Agriculture of the Ministry of Agriculture, Natural Resources, Livestock and Fisheries (MANRLF) under supervisory of the Directors from these two departments. The assessment team constituted 40[2] members, 18 in Unguja and 22 in Pemba combining different technical expertise including Planning Officers, Food Security Analysts, District Agricultural Officers, Subject Matter Specialist (in crops) and Block Extension Officers.

[2] **Thirty seven data collectors and three supervisors**

3.2. Study Area, Sampling Procedures and Survey Design

The assessment covered a total of a total of 29 rice growing areas; 14 in Unguja and 15 in Pemba within nine[3] districts; five in Unguja and four in Pemba. These areas were selected based on their potentiality of rice production as they serve rice farmers from 286 shehias (121 shehias in Pemba and 165 shehias in Unguja). Apart from rice production, these areas are well known for the production of other major food crops such as cassava, bananas, sweet potatoes and yams and therefore their potential contribution to the national food security.

The survey adopted a community-based cross-sectional study to collect both quantitative and qualitative data of rice production while capturing the same information for other food crops. The sample size for this study was 400 small-holder farmers engaged in cultivating rice and other six major food crops; cassava, bananas, sweet potatoes, cocoyams, yams and cowpeas. The sample size was determined using a formula for sample estimation for a single population of 70,633 rice growing farmers assuming 95% confidence level of respondents' turnouts and 5% margin of error. Respondents were randomly selected using stratified sampling technique from respective districts and rice growing areas. Number of surveyed growing area per district and number of respondents per growing area are shown in Table 1.

Of the total number of respondents, 47.9 percent were men and 52.1 percent were women. Average age of respondents was 50 years and the minimum and maximum age was 18 and 90 years, respectively. Regarding rice production ecology, 80.6% of respondents were from rain fed areas and the rest 19.4% were from irrigation schemes.

Table 1: Study area and sampled population

	Districts	Number of Shehia	Rice growing areas	Number of sampled growing areas	Number of respondents
Pemba	Micheweni	27	132	3	48
	Wete	32	88	6	83
	Chake Chake	29	145	3	55
	Mkoani	33	76	3	47
Total Pemba		**121**	**441**	**15**	**233**
Unguja	North A	36	5	2	25
	North B	29	6	3	54
	South	21	2	2	10
	Central	40	22	5	58
	West	39	25	2	20
Total		**165**	**60**	**14**	**167**
Grand total		**286**	**501**	**29**	**400**

3.3. Data collection tools

Household questionnaire: A semi-structured questionnaire (Appendix I) was used to collect primary data on rainfall performance, field condition of rice and other six major food crops,

[3] **Urban district is not producing rice, therefore was not included in the survey**

food availability, households' sources of income and coping strategies. The questionnaire apparently in English was translated into local language (Kiswahili) and contextualized to the local situation.

Documents review: Secondary data on rainfall patterns, the number of rice farmers, areas under rice cultivation (irrigated and rain fed) were obtained from different documents.

3.4. Assessment timeline

There was one round of data collection for two weeks and this took place in the month of July during the harvest time of many of the food crops including rice. Two survey teams, one in Unguja and another in Pemba were collecting data simultaneously during the survey.

3.5. Data processing, analysis and report writing

Data collected were entered into Ms Office Excel for processing and cleaning. From 400 questionnaires 10 of them were rejected (outliers) and the information from the remaining 390 respondents (Appendix II) was analyzed using SPSS computer software. Descriptive statistics were used to compare farmers' responses on different questions asked in the survey questionnaire such as the rainfall intensity, rainfall distribution, area planted, effect of rainfall this season, area affected, crop condition, expected harvest, extent of food availability, income sources and copping strategies in case of food shortages.

4. RESULTS AND DISCUSSION

4.1. Rain fall performance

Rainfall intensity and monthly distribution for long rain (*Masika*) season in 2016 is shown in Table 2. Results show that for the period of March to June (the main growing period of rice) the average rainfall for the two Island; Unguja and Pemba was much higher (767.7 mm) compared to the average of the previous five years; 2011-2015 (751.9 mm) for the same period. Though the Island of Unguja received higher and intense rains (884.4 mm) compared to Pemba (650.9 mm). In contrast, the Pemba Island had lower amount of rainfall compared to both the average of the two islands for the current Masika season and the average of the previous five years from March to June (Table 2).

The effect of rainfall on crop production is measured not only by the amount of rainfall received but importantly the extent of rainfall distribution over the crop growing period and so the period that soil remains moist enough. During this Masika season, both Unguja and Pemba the rainfall received was ideally enough for production of most of the annual crops, unfortunately it was poorly distributed with heavy rain in very short period and extended drought in unexpected months.

As seen in Table 2, Unguja received 117% of the five years average rainfall but more than 70% was received in April while May and June had only 3% and 0.8%, respectively. Pemba received about 87% of the five years average amount but also more than 70 % of this amount was received in April. May received 21.6% and June which was the critical stage (the flowering and grain filling period) of rice received only 0.7% of the total amount of March to June.

Table 2: Monthly rainfall amount and distribution for long rain (*Masika*) season

Season	Mar	Apr	May	Jun	Total March-June
Average 2011-2015	202.4	244.2	281.6	23.7	751.9
Unguja 2016	218.1	630.9	27.6	7.8	884.4
Pemba 2016	20.5	485.3	140.4	4.7	650.9
Average 2016	119.3	558.1	84.0	6.3	767.7

These results were in conformity with farmers' response on the two questions about their views on the rainfall amount and distribution this Masika season. Eighty percent of interviewed farmers responded that the rainfall was higher than normal, 17.5% said that it was lower than normal and only 1.7% said that it was normal. Sixty four percent of farmers responded that the rainfall was badly distributed.

Inter-month comparison showed that in Unguja the amount of rainfall was more than double (258%) in the month of April compared to the average of the same month in five years from 2011 to 2015 while, in Pemba the month of April received 198.7% of the average of April in five years period. In contrary, the month of May received only 9.8% and 49.8% of the average of May for past five years in Unguja and Pemba, respectively, and in June the proportion was 32.8% for Unguja and only 19.8% for Pemba.

As regards to food crops production the poorly distributed rainfall during this season had the following general effects on food production:

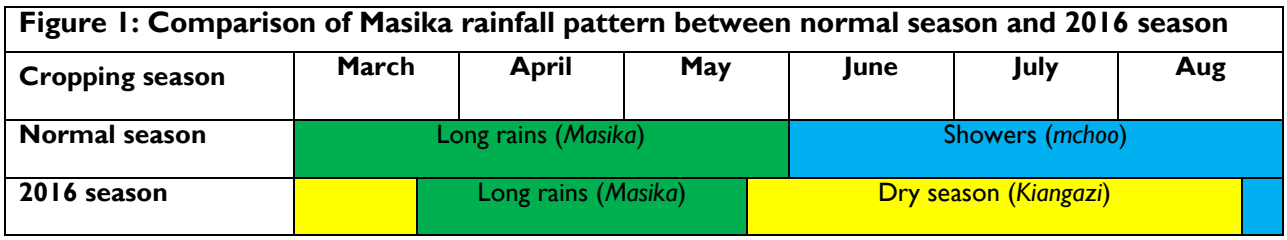
a) Heavy rains in April caused floods which affected young crops already planted and/or delayed planting until May and also destroyed some crops like cassava at all stages due to excess moisture.

b) Drought/shortage of moisture in May and June caused failure in flowering and grain filling for cereal crops like rice and maize.

c) Extended drought from May to July negatively affected the cultivation of succeeding crops like sweet potatoes and cowpeas which are normally planted at the end of heavy rains.

d) Production of vegetables as a means of crop diversification and for income generation among farmers will probably be affected this season due to abrupt cessation of Masika rains and lack of showers which are normally extended for one to two months from June as shown in the normal season in Fig. 1.

Figure 1: Comparison of Masika rainfall pattern between normal season and 2016 season



4.2. Field crops performance

4.2.1. Performance of rice crop

4.2.1.1. Area planted with rice in 2016 season

A total of 31,303.55[4] acres (12,724.0 in Unguja and 18,579.55 acres in Pemba) were reportedly planted with rice crop during Masika season of 2016. Out of this, 1,274.05 acres were planted under irrigation and the rest were cultivated under rain fed. Acres planted by each district are shown in Table 3.

Table 3: Area planted with rice crop by district and overall in 2016 long rains season

Main area	District	Area planted (acres)	
		Rain-fed	Irrigation
Unguja	North A	1,828.50	132.5
	North B	4,295.00	-
	Central	3,998.25	365.0
	South	175.00	-
	West	1,204.50	725.25
	Total	**11,501.25**	**1,222.25**
Pemba	Wete	5,286.50	31.1
	Micheweni	3,930.00	7.2
	Chake Chake	4,693.25	5.0
	Mkoani	4,618.50	8.0
	Total	**18,528.25**	**51.3**
Zanzibar overall		**30,029.50**	**1,274.05**

4.2.1.2. Household land holding for rice in 2016 season

Analysis of the rice area planted per household (Table 4) revealed that average area per household planted with rice for the 2016 Masika season in Zanzibar was 0.90 acres with the largest acreage (2.5 acres) and the lowest figure was 0.25 acre. Unguja has relatively large area per household (0.98 acre) compared with Pemba (0.84 acre). Central district has the largest average land holding (1.06 acres/hh) followed by North B (1.03 acre/hh) and Wete (1.0 acre/hh). The least average land holding (0.68 acres/hh) was found in Mkoani district.

[4] **Department of agriculture Zanzibar**

Table 4: Rice land holding (acres/hh) by district and overall in 2016 long rains season			
Districts	**Average**	**Maximum**	**Minimum**
Zanzibar overall	0.90	2.50	0.25
Unguja	0.98	2.50	0.25
Pemba	0.84	2.50	0.25
North A	0.90	2.00	0.25
North B	1.03	2.50	0.25
Central	1.06	2.00	0.25
South	0.72	1.75	0.25
West	0.94	2.25	0.25
Wete	1.00	2.50	0.25
Micheweni	0.76	2.00	0.25
Chake Chake	0.80	2.50	0.25
Mkoani	0.68	2.00	0.25

4.2.1.3. Effect of rainfall pattern on the rice crop

Responding to the question about the effect of weather this Masika season, 4.2 % of interviewed farmers said that their rice crop was affected by floods, 68.1 % said their crop was affected by drought, 14.7 % told that they were affected by both floods and drought but in different periods and only 13.1 % of them responded to have not been affected by any of the two conditions.

For those affected by floods and/drought, the absolute damage happened on the crop stand already in the field while other farmers reported to have delayed in planting waiting for the rains to pass or for the rains to come. Floods damaged the crop at very young stage and the abrupt cuts of rains damaged the crop at flowering stage.

4.2.1.4. Rice crop condition in the 2016 Masika season

Generally the crop condition was described as bad by 69.9 % of respondents. Only 4.7% of interviewed farmers said their crop performed better. The crop condition in the South and Chake Chake districts was reported as average by 70% and 61.8% of respondents, respectively, as shown in Table 4.

Comparing the two Island, Unguja reported 7% good condition, 33.8% average condition and 58% bad condition. In Pemba 87.8% of farmers reported bad condition, 12.2% reported average condition and no farmer had reported good condition. Probably these results are due to the fact that in Pemba large area under rice cultivation is on the uplands (Kangagani, Vitongoji, Chambanai, Ole, Koowe, Msaani and Pujini) while in Unguja the large area is rain fed lowland with significant area under irrigation.

Table 5: Responses of farmers on the rice crop condition

Districts	Farmers response on rice crop condition in 2016 long rains season (n=390)		
	Good	Average	Bad
Zanzibar overall	4.7%	25.4%	69.9%
Unguja	7.7%	33.8%	58.5%
Pemba	0%	12.2%	87.8%
North A	0%	4.2%	95.8%
North B	0%	3.8%	96.2%
Central	0%	11.1%	88.9%
South	0%	70.0%	30.0%
West	0%	25.0%	75.0%
Wete	4.8%	14.3%	81.0%
Micheweni	14.6%	33.3%	52.1%
Chake Chake	5.5%	61.8%	32.7%
Mkoani	8.5%	36.2%	55.3%

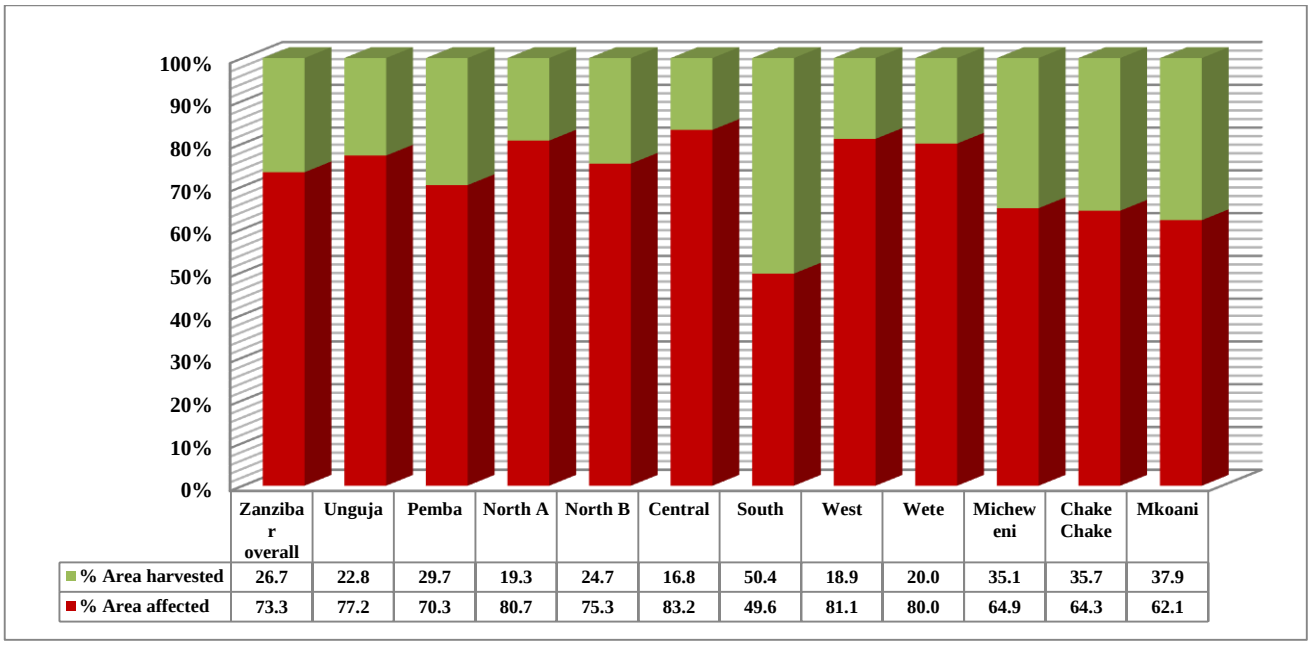
4.2.1.5. Proportion of rice planted area affected and area harvested during Masika season of 2016

Both rain fed and irrigated rice were affected by erratic and poorly distributed rainfall during Masika season of 2016, though significantly different. For overall in Zanzibar, great proportion of rain fed rice (73.3% of planted area) did not grow to maturity while in irrigated rice that effect was only 19.8% as shown in Fig. 2 and Fig. 3. Proportional affected area in Unguja was 77.2% and 23% for rain fed and irrigation, respectively, and in Pemba the affected area was 70.3 in rain fed farms and 18.6% in irrigation schemes.

For individual districts, the results demonstrated that Central district had the largest proportion of rain-fed rice affected (83.2%) followed by West district (81.1%), North A (80.7%) and Wete (80.0%). The least ratio of affected area in rain-fed rice was observed in the South district (49.6). Apart from South district, no other district had its rain fed rice planted area affected by less than 50%, though Micheweni, Chake Chake and Mkoani districts were less affected than the rest of districts as seen in Fig. 2.

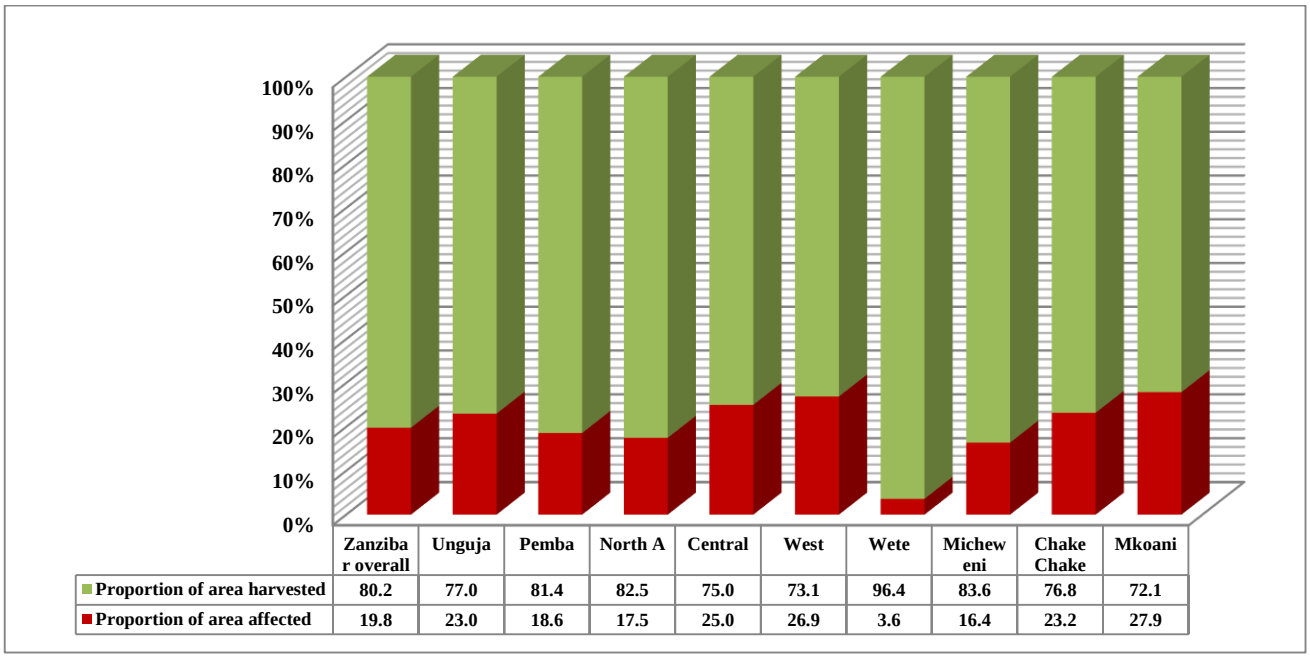
Mkoani district had the highest proportion of affected area of irrigated rice (27.9%) followed by West district (26.9%), Central district (25.0%) and Chake Chake (23.2%). Wete district had the least proportion of its irrigated rice affected (3.6%) as shown in Fig. 3.

Figure 2: Proportion of rain-fed rice area affected and area harvested in 2016 long rains



	Zanzibar overall	Unguja	Pemba	North A	North B	Central	South	West	Wete	Michweni	Chake Chake	Mkoani
% Area harvested	26.7	22.8	29.7	19.3	24.7	16.8	50.4	18.9	20.0	35.1	35.7	37.9
% Area affected	73.3	77.2	70.3	80.7	75.3	83.2	49.6	81.1	80.0	64.9	64.3	62.1

Figure 3: Proportion of irrigated rice area affected and area harvested in 2016 long rains



	Zanzibar overall	Unguja	Pemba	North A	Central	West	Wete	Michweni	Chake Chake	Mkoani
Proportion of area harvested	80.2	77.0	81.4	82.5	75.0	73.1	96.4	83.6	76.8	72.1
Proportion of area affected	19.8	23.0	18.6	17.5	25.0	26.9	3.6	16.4	23.2	27.9

4.2.1.6. Expected production of rice in the 2016 long rains season

Expected paddy (rough rice) production for the 2016 Masika season is presented in Table 6. From 30,029.5 acres planted under rain-fed, only 37.9% (11,381.18 acres) were harvested and out of 1274.05 acres of irrigation rice, 80.2% (1021.9 acres) were also harvested. In addition to the difference in the proportion of area affected, the results also indicated the difference in

land productivity between rain-fed and irrigated rice. The area harvested and the quantities as reported by farmers during the survey indicated that in rain-fed rice the average yield was 434.3 kg/acre (1.1 ton/ha) and that of irrigated rice was 787.2 kg/acre (1.94 tons/ha).

Considering the total area harvested over Zanzibar and the resulted yield, the expected production is 4,343.8 metric tons (3,598 tons from rain fed rice and 754.8 tons from irrigated rice). Out of the total quantity harvested, 1,761.8 tons are expected in Unguja and 2,582 tons in Pemba.

Production per district (Fig. 4) exposed that generally Pemba districts performed better than Unguja districts. This is probably due to the fact that at least there were rains up to the mid of the month of May 2016 (140.4 mm) while the whole month of May in Unguja received only 27.6 mm. Mkoani district had largest harvested quantity (764.7 tons) followed by Chake Chake (730.7 tons) and Micheweni (903.8 tons). Production of Mkoani district was largely contributed by large area being typically lowland valleys which remain moist over long period after cessation of rains.

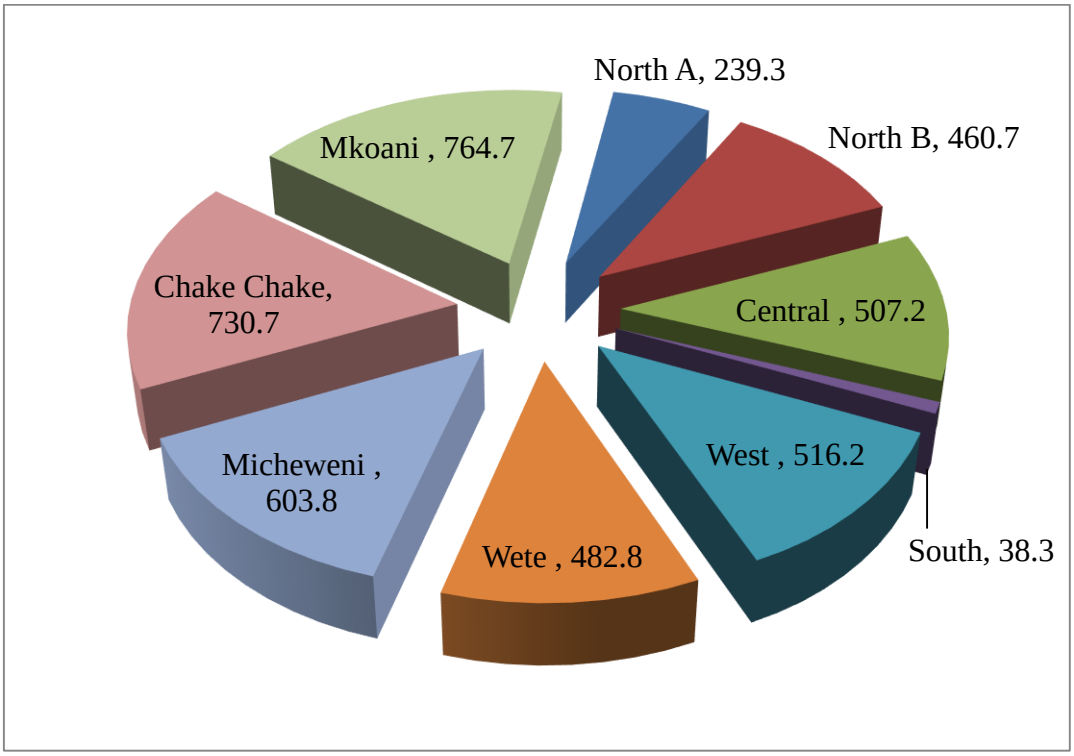
Table 6: Expected rice production in 2016 long rains season

Main area	Rain fed rice			Irrigated rice			Total production (tons)
	Area planted (acres)	Area harvested (acres)	Production from rain fed (tons)	Area planted (acres)	Area harvested (acres)	Prod. from irrigation (tons)	
Zanzibar overall	30,029.50	8,017.88	3589.0	1,274.05	1,021.79	754.8	4,343.8
Unguja	11,501.25	2,622.29	1,042.9	1,222.75	941.52	718.9	1,761.8
Pemba	18,528.25	5502.89	2,546.1	51.30	41.76	35.9	2582.0
North A	1,828.50	352.90	1,53.3	1,32.50	109.31	86.1	239.3
North B	4,295.00	1,060.87	460.7	-	-	-	460.7
Central	3,998.25	671.71	291.7	365.00	273.75	215.5	507.2
South	175.00	88.20	38.3	-	-	-	38.3
West	1,204.50	227.65	98.9	725.25	530.16	417.3	516.2
Wete	5,286.50	1,057.30	459.2	31.10	29.98	23.6	482.8
Micheweni	3,930.00	1,379.43	599.1	7.20	6.02	4.7	603.8
Chake Chake	4,693.25	1,675.49	727.7	5.00	3.84	3.0	730.7
Mkoani	4,618.50	1,750.41	760.2	8.00	5.77	4.5	764.7

In Unguja the North A district had the largest area harvested (1,060.87 acres) but its production (460.7 tons) was less than the Central (507.2 tons) and West district (516.2 tons) which had smaller harvested area than North A. This is due to the fact that the whole area harvested in North A was rain fed while in the Central and West districts some of the harvested acres were of irrigated rice which were less affected an also had comparatively

higher yield. The central and districts are two districts that showed higher production in Unguja. However, the West district out yielded the quantity harvested in the Central district despite the Central district having large area harvested in the rain fed rice. This is due to the West district having large area harvested was from irrigated rice as seen in Table 6.

Figure 4: Expected rice production per district in the 2016 long rains season (m. tons)



4.2.2. Performance of cassava

4.2.2.1. Cassava area planted and land holding

Cassava plays a very important part in ensuring food security and livelihood systems of both rural farm households and urban dwellers in Zanzibar. It ranks the third most important source of the country's total calories after rice and coconut and the first in the root crops. It is grown in all nine districts (five districts in Unguja and four districts in Pemba) and information on its performance was found to establish suppleness of household access to food on the event of failure of rice production during the long rain season of 2016.

In Zanzibar cassava is grown in both seasons; Vuli (short rains) and Masika (long rains) but different from rice, majority of cassava is planted in vuli season and harvested after 7 to 12 months depending on the variety. In the year 2015/2016 a total of 114,673.9 acres (45,869.6 ha) of cassava were planted, 35,544.2 acres (31%) in Unguja and 79,129.7 acres (69%) in Pemba). Area planted per district is as shown in Table 7.

Table 7: Area planted with cassava by district and overall in 2016 season

Region	District	Area planted (acres)
Unguja	North A	11,106.1
	North B	7,121.8
	Central	3,595.0
	South	3,441.4
	West	10,279.9
	Total	**35,544.2**
Pemba	Wete	17,016.8
	Micheweni	23,869.0
	Chake Chake	12,222.3
	Mkoani	26,021.6
	Total	**79,129.7**
Zanzibar		**144,673.9**

Data collected from this rapid assessment has shown that the overall average land holding for cassava is 0.95 acre/household with maximum 5 acres/household and the minimum was 0.2 acre/household (Table 8). Meanwhile the land holding for Unguja and Pemba were 0.86 and 1.01 acres/household, respectively.

On the basis of individual districts, Wete had the largest mean land holding (1.2 acres/household) which was above the overall average of Zanzibar, followed by West (1.0 acre/hh), North B (0.95 acre/hh), Micheweni (0.95 acre/hh), Mkoani (0.92 acre/hh) and Central (0.9 acre/hh). The least average land holding (0.4 acre/hh) was shown in South district (Table 7). Mkoani has the largest area planted with cassava (26,021.6 acres) but small household land holding compared with Wete, West, Micheweni and North B, which implies that there are more cassava farmers in Mkoani district.

Table 8: Cassava land holding (acres/hh) by districts and overall in 2016 season

Districts	Average	Maximum	Minimum
Zanzibar overall	0.20	0.95	5.00
Unguja	0.25	0.86	3.00
Pemba	0.20	1.01	5.00
North A	0.25	0.69	1.00
North B	0.25	0.95	2.50
Central	0.25	0.90	3.00
South	0.25	0.40	0.50
West	0.50	1.00	2.00
Wete	0.25	1.20	5.00
Micheweni	0.25	0.95	2.50
Chake Chake	0.20	0.84	2.00
Mkoani	0.25	0.92	4.00

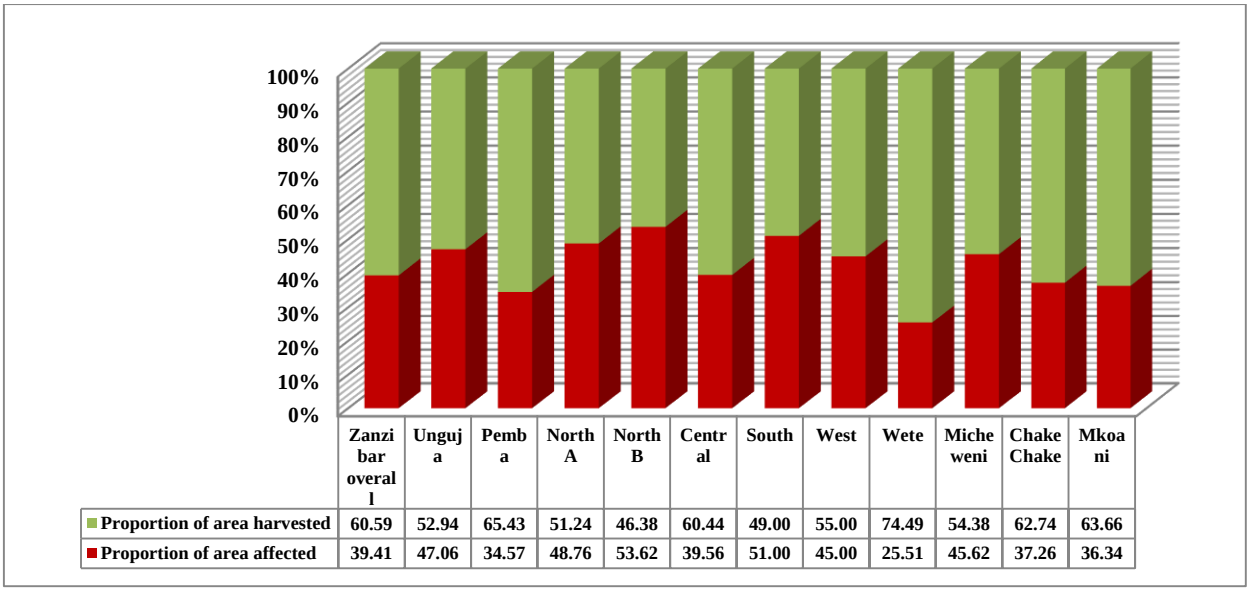
4.2.2.2. Cassava crop condition and proportion of area affected and area harvested

Describing the cassava crop condition, 58.4% of interviewed farmers said their crop was bad, 36.9% said average and only 4.7% responded that the crop was good. Analysis has also shown that proportion of area that was affected by poorly distributed rainfall was 39.41% overall, 47.06% in Unguja and 34.57% in Pemba. District wise, North B was the most affected (53.62%) followed by South (51.0%) and North A (48.78%) as shown in Fig. 5. The least affected district was Wete where only 25.51% of planted area was battered.

4.2.2.3. Expected cassava production in 2016 season

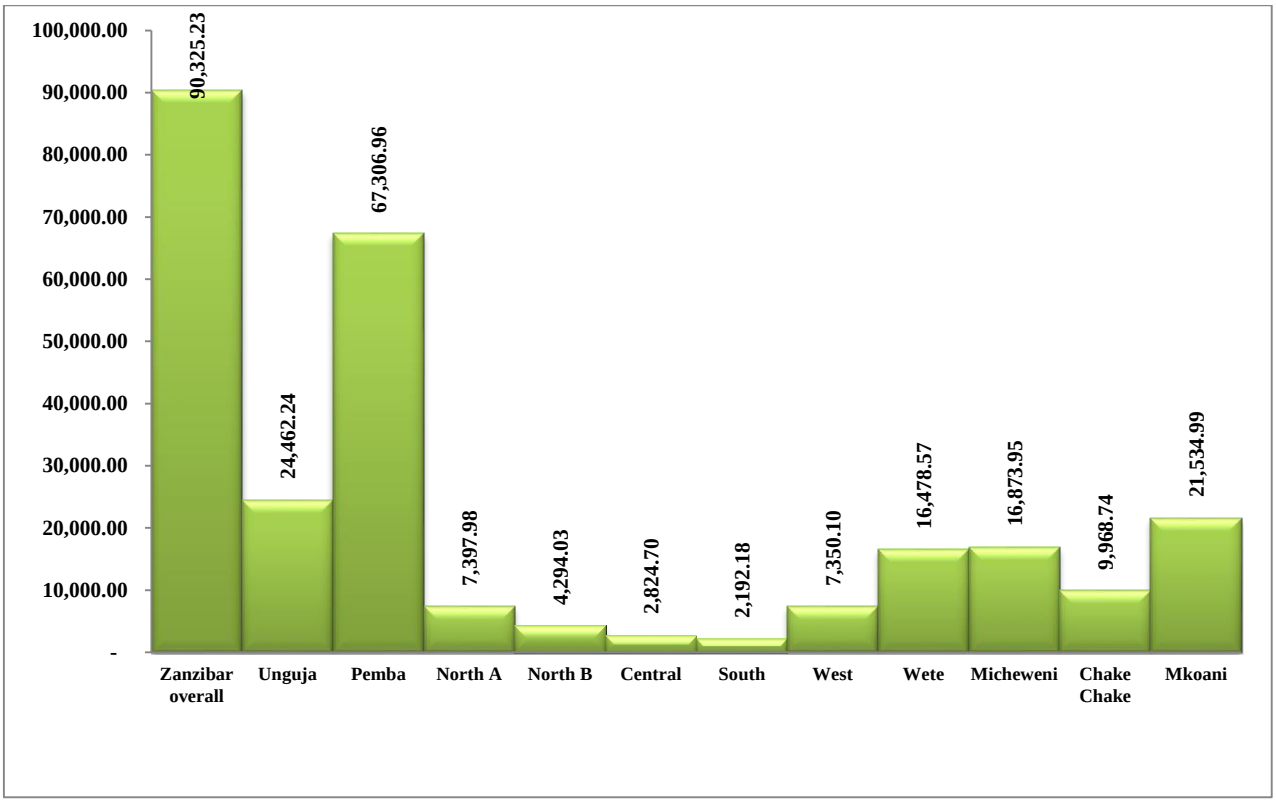
Nearly 40 % of 114,673.9 acres planted with cassava were totally affected and the expected production is based on rest 60% of the area planted. Meanwhile the survey revealed that poorly distributed rainfall affected not only the crop stand but the yield on the harvested area was also reduced compared to the yield trends in the normal seasons. From data collected the yield went down to 1.3 tons/acre from the current years' yield of 2-3 tons/acre. On the basis of this yield and the area harvested, the total production of cassava is expected at around 90,325.23 metric tons, with 74% (66,840.7 tons) of this quantity expected in Pemba. This quantity is almost 40,000 tons less than the production of the previous year (2015).

Figure 5: Proportion of cassava area affected and harvested in 2016 season



	Zanzibar overall	Unguja	Pemba	North A	North B	Central	South	West	Wete	Micheweni	Chake Chake	Mkoani
Proportion of area harvested	60.59	52.94	65.43	51.24	46.38	60.44	49.00	55.00	74.49	54.38	62.74	63.66
Proportion of area affected	39.41	47.06	34.57	48.76	53.62	39.56	51.00	45.00	25.51	45.62	37.26	36.34

Figure 6: Expected cassava production (m. tons) by district in the 2016 season



4.2.3. Performance of bananas

4.2.3.1. Banana area planted and land holding

During the 2016 season 34,672.75 acres were planted with of banana crop, 62.4 % of the total area (21,645.3 acres) planted in Pemba and 37.6% (13,027.4 acres) were planted in Unguja. Due to the nature of banana crop being perennial, only part of this area were new plantations.

Average land holding for bananas was 0.42 acre/household with maximum 2 acres/household and minimum zero acre/household meaning that some of rice farmers do not grow bananas. The bananas land holding was slightly large (0.43 acre/hh) in Pemba compared with that observed in Unguja (0.40 acre/hh). In terms of individual district, South district was leading by growing 0.7 acre/household followed by Chake Chake (0.51 acre/hh), Mkoani (0.4 acre/hh) and Central and west (0.44 acre/hh) each. The least land holding was that of Micheweni (0.32 acre/hh) as shown in Table 9.

Table 9: Bananas land holding (acres/hh) by district and overall in 2016 season

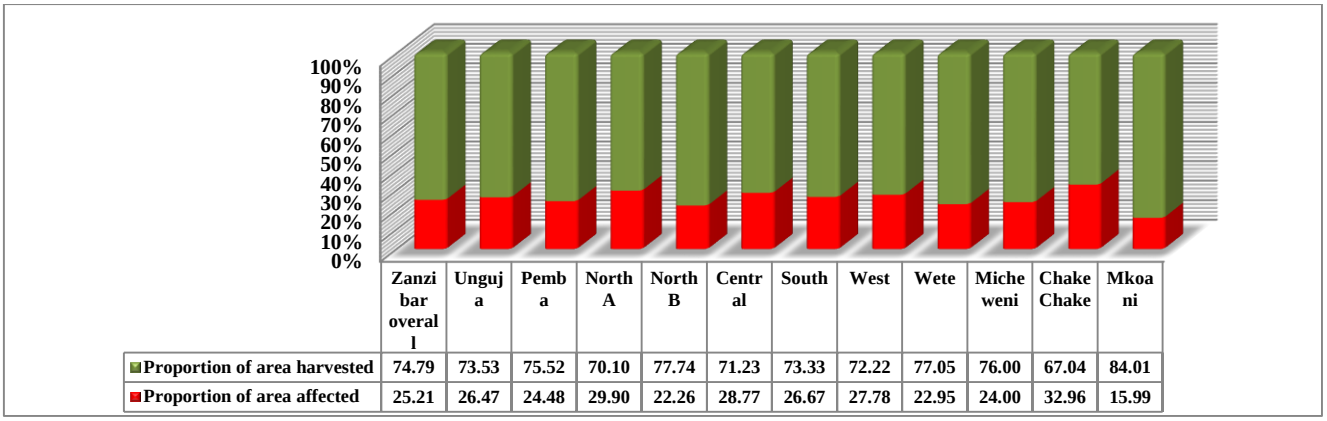
Districts	Mean	Maximum	Minimum
Zanzibar overall	0.42	2.00	0
Unguja	0.40	2.00	0
Pemba	0.43	2.00	0
North A	0.36	2.00	0
North B	0.33	1.50	0
Central	0.44	2.00	0
South	0.70	2.00	0
West	0.44	1.50	0
Wete	0.41	1.00	0
Micheweni	0.32	1.00	0
Chake Chake	0.51	2.00	0
Mkoani	0.46	1.50	0

4.2.3.2. Banana crop condition and proportion of area affected and area harvested

For Zanzibar in general, the growth condition of bananas was described by 53.9 % of farmers as bad, 42.9% as average and by 3.1% reported good growing condition. In Unguja 61.5% of farmers reported bad condition while in Pemba the bad condition was described by 49.1% of interviewed farmers. Many farmers in South district (80%) reported that the bananas growth condition was bad followed by Central district (75%), Micheweni 64% and West district (62.5%).

With regards to crop performance the survey revealed that one-fourth (25%) of the planted area was affected on overall, 26.47% in Unguja and 24.48% in Pemba as indicated in Fig. 7. Individual district performance of banana crop divulged that Chake Chake district was most the affected (32.96% of the planted area) followed by North A (29.9%), Central (28.77%) and West (27.78%). Mkoani district had the least affected area (15.99%).

Figure 7: Proportion of banana area affected and area harvested in 2016 season



	Zanzibar overall	Unguja	Pemba	North A	North B	Central	South	West	Wete	Micheweni	Chake Chake	Mkoani
Proportion of area harvested	74.79	73.53	75.52	70.10	77.74	71.23	73.33	72.22	77.05	76.00	67.04	84.01
Proportion of area affected	25.21	26.47	24.48	29.90	22.26	28.77	26.67	27.78	22.95	24.00	32.96	15.99

4.2.3.3. Expected banana production in 2016 season

Result from this survey indicated that the effective yield this season was 1.3 tons/acre. Expected areas to be harvested are 73.5% and 75.5% of the planted area in Unguja and Pemba, respectively. Banana production is estimated at 33,692.6 metric tons; 12,447.7 tons from Unguja and 21,244.9 tons from Pemba. This amount is around 14,000 tons less the production in the 2015 seasons. It was reported by the farmers during this survey that apart from bad weather condition, they are highly disappointed by theft of their banana crop to the extent of reducing their efforts and inputs in the management of banana crop despite higher price of bananas on the market.

4.2.4. Performance of sweet potatoes

4.2.4.1. Land holding and crop condition

Sweet potatoes are normally planted at the end of long rains and growing better under moderate moisture conditions during scattered showers received in the months of June and July. It is one of the major crops that farmers produce for cash income apart from being used for household consumption. In the recent years, introduction of nutritionally rich varieties, like the orange flesh sweet potatoes has increased the popularity of this crop among people and therefore increased its demand and production. Substantial production of sweet potatoes undertakes in Northern parts in both Unguja and Pemba (Donge, Bambi, Makangale, Konde and Wingwi) but small plots for home consumption are scattered everywhere depending on availability of rainfall during its period of cultivation. In some areas sweet potatoes are cultivated as a successor crop to upland rice.

Overall land holding for Zanzibar was 0.27/household from 0.3 acre/household in 2015 and the maximum was 2.5 acres. The average land holding in Unguja (0.28 acre/hh) was almost similar to that of Pemba (0.27 acre/hh) but the maximum land holding (2.5 acre/hh) was found in Pemba. Results for individual district revealed that Micheweni district has the largest average land holding (0.6 acre/hh) as shown in Table 10. This is due to the presence of large areas of sweet potatoes production for cash in Makangale, Konde, Kinowe, Mgogoni, Wingwi and Kiungoni. Mkoani district had the least average land holding (0.01 acre/hh), Chake Chake was the second least (0.13 acre/hh) and is normal trend in Pemba that large amount of sweet potatoes produced in Wete and Micheweni (North of Pemba) is sent to Chake Chake and Mkoani markets in the south.

During the 2016 season, the condition was very unfavourable for sweet potatoes production. This was evidenced by a reduced number of farmers growing this crop in the surveyed area from 184 in 2015 to 138 in 2016 in the same sample of 390 interviewed farmers. From 138 farmers who cultivated sweet potatoes in 2016 season, only 6.55 reported that their crop growing condition was average and the rest said that the crop condition was totally bad.

4.2.4.2. Proportion of sweet potatoes planted area affected and area harvested

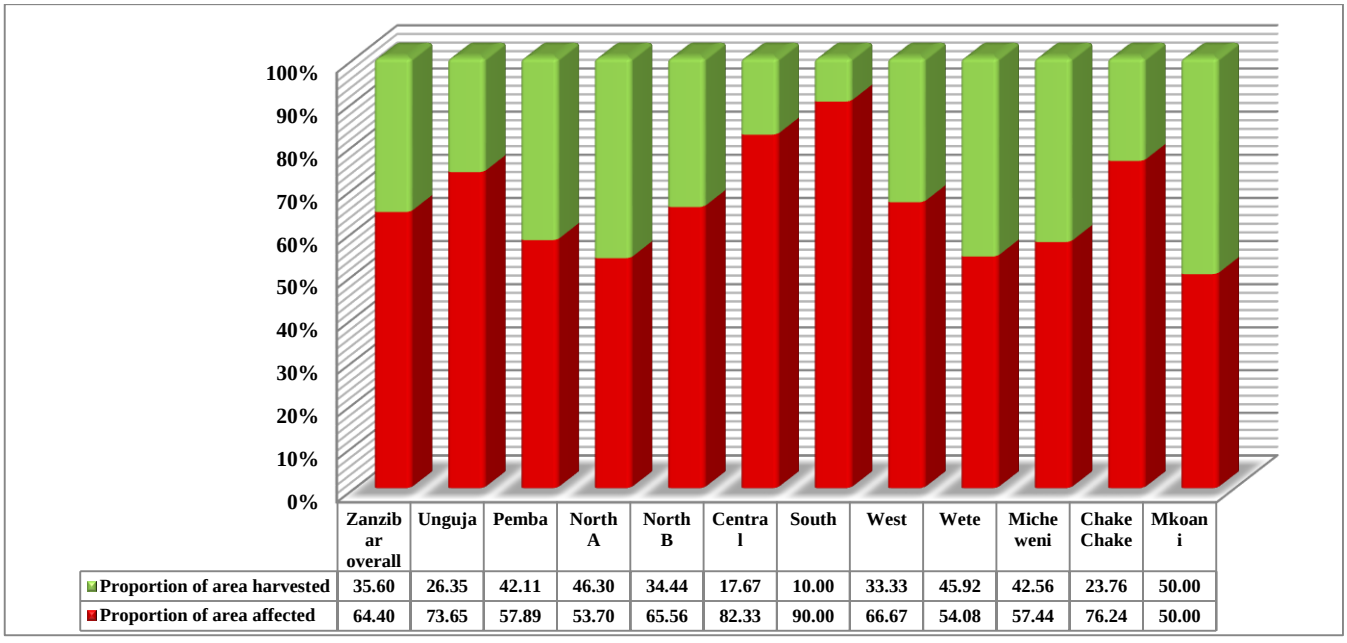
Results revealed that sweet potatoes were the most affected of the root crops. Probably, because of extended dry period for almost the whole period the crop was in the field (May to

July). The overall average affected proportion was 64.4% of the planted area, 73.65% of the planted area being affected in Unguja and 57.89% in Pemba. In all nine districts, more than 50% of the planted area was affected (Fig. 8). South distinct was the most hit area where 90% of sweet potatoes farms were affected by poorly distributed rainfall. The least affected district was Mkoani but this district has very little effect on the total production as it has very minimum land holding for sweet potatoes.

Table 10: Sweet potatoes land holding (acres/hh) by district and overall in 2016 season

District	Average	Maximum	Minimum
Zanzibar overall	0.27	2.50	0
Unguja	0.28	2.00	0
Pemba	0.27	2.50	0
North A	0.19	0.75	0
North B	0.23	1.50	0
Central	0.35	2.00	0
South	0.28	0.50	0
West	0.34	2.00	0
Wete	0.31	2.00	0
Micheweni	0.60	2.50	0
Chake Chake	0.13	1.00	0
Mkoani	0.01	0.50	0

Figure 8: Proportion of sweet potatoes area affected and area harvested in 2016 season



	Zanzibar overall	Unguja	Pemba	North A	North B	Central	South	West	Wete	Micheweni	Chake Chake	Mkoani
Proportion of area harvested	35.60	26.35	42.11	46.30	34.44	17.67	10.00	33.33	45.92	42.56	23.76	50.00
Proportion of area affected	64.40	73.65	57.89	53.70	65.56	82.33	90.00	66.67	54.08	57.44	76.24	50.00

4.2.4.3. Expected sweet potatoes production in 2016 season

Exact figure for sweet potatoes acreage in 2016 is not readily available. However, average production for the last three years (2013, 2014 and 2015) is 58,186.1 metric tons with minimum 53,656.6 tons in 2013. In estimating the sweet potatoes production, this survey considered two things; the production was reduced by the same proportion of area affected (64.4%) and the percentage reduction in the number of farmers normally cultivating sweet potatoes (25%). In view of these two factors the expected sweet potatoes production in 2016 season is 15,535.7 metric tons, about 40,000 tons loss from the production of the year 2015.

4.2.5. Performance of yams

4.2.5.1. Land holding and crop condition

Yams are common among root and tuber crops in Zanzibar. However, its production is not widely spread over the country. It is mostly grown in South district and in parts of Central district in Unguja. This was evidenced by a large proportion (85.34%) of farmers in the survey sample found not growing this crop. The average land holding during 2016 season was 0.07 acre/hh in overall, 0.14 acre/hh in Unguja and 0.02 acre/hh in Pemba. The maximum land holding was 1 acre. The south district had the largest land holding (0.26acre/hh) followed by North B (0.16 acre/hh), West (0.16 acre/hh) and Central (0.13 acre/hh) as shown in Table 11. Survey showed that famers in Mkoani district do not grow yams at all.

Regarding the crop condition, among farmers who grow yams, 1.78% said that their crop was good, 41.07% reported average condition and 57.14 claimed bad condition.

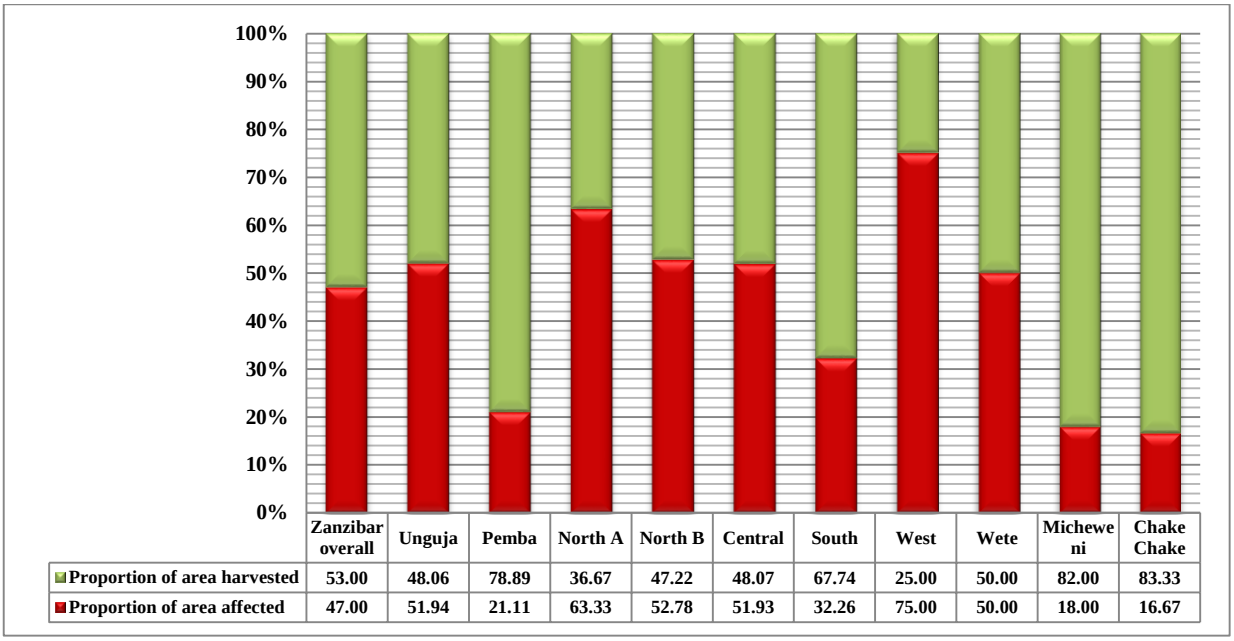
Table 11: Yams land holding (acre/hh) by district and overall in 2016 season

Districts	Average	Maximum	Minimum
Zanzibar overall	0.07	1.00	0
Unguja	0.14	1.00	0
Pemba	0.02	1.00	0
North A	0.07	0.50	0
North B	0.16	1.00	0
Central	0.13	0.88	0
South	0.26	0.07	0
West	0.16	1.00	0
Wete	0.01	1.00	0
Micheweni	0.05	1.00	0
Chake Chake	0.02	0.50	0
Mkoani	0.00	0.00	0

4.2.5.2. Proportion of yams planted area affected and area harvested

Analysis for area affected indicated that Chake Chake and Micheweni had the least proportion of area affected and therefore the large proportion area harvested but this does not have impact on the total country production of yams because the two districts have negligible land holding for this crop. South, West and Central districts, the major producer of yams; their acreage was affected by 32.26%, 75% and 51.93%, respectively as shown in Fig. 9. Overall proportion of area affected was 46.9%, with Unguja affected by 51.94% and Pemba 21.11%.

Figure 9: Proportion yams planted area affected and area harvested in 2016 season



	Zanzibar overall	Unguja	Pemba	North A	North B	Central	South	West	Wete	Michewe ni	Chake Chake
Proportion of area harvested	53.00	48.06	78.89	36.67	47.22	48.07	67.74	25.00	50.00	82.00	83.33
Proportion of area affected	47.00	51.94	21.11	63.33	52.78	51.93	32.26	75.00	50.00	18.00	16.67

4.2.5.3. Expected yams production in 2016 season

Similar to sweet potatoes, acreage under yams cultivation in the 2016 season was not yet established at the time of this survey. However, in recent years, the average acreage for yams production has reached 900 acres. Data for the recent three years show that yams production went down from 2,351.5 metric tons in 2013 to 2,115.8 metric tons in 2014 and slightly increased to 2,408.5 metric tons in 2015. Due to the effect of poorly distributed rainfall which reduced the yams harvested area by 47% and the yield reported during this survey, expected production in 2016 season is at 1,193 metric tons; 982.6 metric tons in Unguja and 209.9 metric tons in Pemba.

4.2.6. Performance of cocoyams

4.2.6.1. Land holding and crop condition

Cocoyams are well adapted crop across many agro-ecological zones of Zanzibar except in the coral areas. It is highly preferred food by the people especially during the month of Ramadhan and is sold at very high price. Disappointingly, in spite of the wide adaptability of cocoyam in Zanzibar, its nutritional and economic benefits for the farmer and its role in the food security and livelihood of the rural poor, this crop has received very little attention from researchers and planners compared with rice and cassava. Production of cocoyams has therefore remained to a very small scale mainly as home gardens.

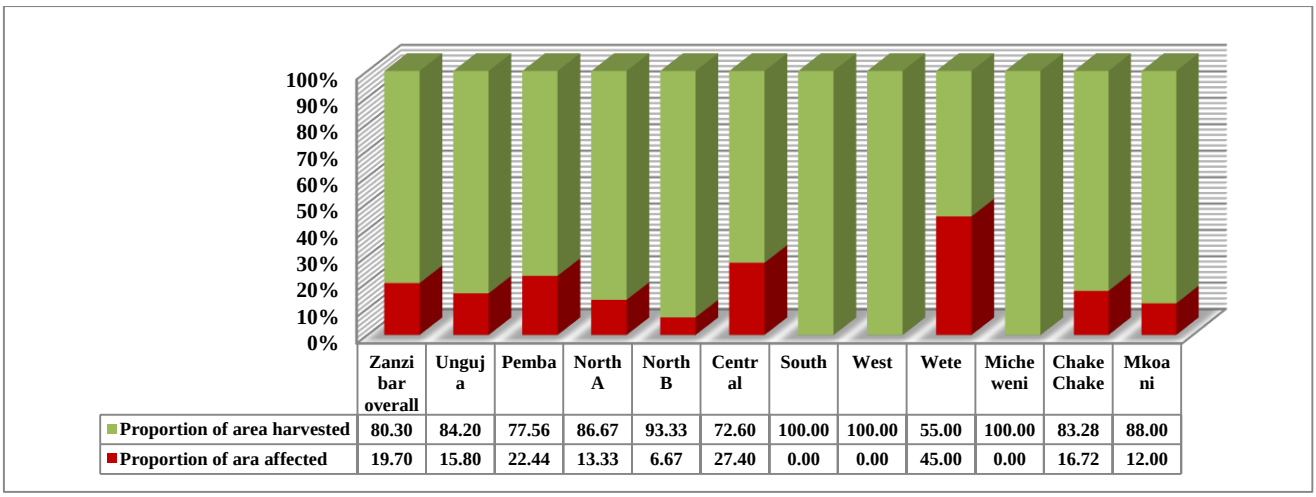
Evidence from this survey has exposed that of the 382 farmers interviewed; only 48 farmers were growing cocoyams. Production area per household considering the whole sample was only 0.03 acre (121 m^2) with maximum land holding per household being 0.5 acre. For individual districts the area planted per household is shown in Table 12.

Table 12: Cocoyams land holding (acre/hh) by district and overall in 2016 season

Districts	Average	Maximum	Minimum
Zanzibar overall	0.03	0.50	0
Unguja	0.03	0.50	0
Pemba	0.03	0.50	0
North A	0.04	0.50	0
North B	0.02	0.25	0
Central	0.03	0.25	0
South	0.02	0.25	0
West	0.03	0.25	0
Wete	0.03	0.50	0
Micheweni	0.03	0.50	0
Chake Chake	0.06	0.50	0
Mkoani	0.01	0.25	0

The effect of weather condition on cocoyams crop during 2016 season was very small compared with other crops. This is probably due to the fact that the cocoyams in Zanzibar are planted in upland areas where floods are not a problem and on the other hand the cocoyam crop can resist dry condition for substantial period than it does at excessive moisture. Analysis of the data collected from farmers revealed that on average only 19.7% of the planted area was affected and the rest 80.3% was expected to be harvested. Proportion of planted area that was harvested was higher in Unguja (84.21%) than in Pemba (77.56%). Proportional areas harvested and affected by districts are shown in Fig. 10. South, West and Micheweni districts had 100% of their planted area expected to be harvested. Wete was a bit hit by drought and had the least proportional area expected to be harvested but still it was more than 50% of planted area.

Figure 10: Proportional cocoyams acreage affected and harvested in 2016 season.



	Zanzibar overall	Unguja	Pemba	North A	North B	Central	South	West	Wete	Micheweni	Chake Chake	Mkoani
Proportion of area harvested	80.30	84.20	77.56	86.67	93.33	72.60	100.00	100.00	55.00	100.00	83.28	88.00
Proportion of ara affected	19.70	15.80	22.44	13.33	6.67	27.40	0.00	0.00	45.00	0.00	16.72	12.00

4.2.6.2. Expected cocoyams production in 2016 season

With little attention on cocoyams crop in Zanzibar, exact acreage under cocoyams production is vague. However, on the basis of the proportion of area affected based on household land holding observed in this survey, the quantity that is expected in the 2016 season is 19.7 % less than the last season production. It is therefore estimated to harvest 4924.8 metric tons in total.

4.2.7. Performance of cowpeas

Cowpeas grow best in almost all area of Zanzibar. But due to limited land and the biggest advantages of the cowpea, i.e. its excellent drought tolerance, this crop is mainly grown as a successor crop to rice both in lowland and upland when the soil moisture regime is not enough for other crops. The planting period starts in July and extends over the whole period of Vuli (short rains). This survey coincided with the off-season of this crop and therefore data for the acreage planted and harvested and other associated information were not yet.

5. HOUSEHOLD FOOD AVAILABILITY FROM OWN PRODUCTION

Most people in rural areas of Zanzibar get a majority of their food needs from their own production. Rice, cassava, bananas, sweet potatoes, yams, cocoyams and some legumes are the main food commodities produced. Leaving behind rice which for large proportion is imported; all other crops in this list are by 100 percent produced domestically. When production of these crops is inadequate, people may become hungry.

In most cases production of these crops is at peasantry level (for household sustenance) but forcibly a portion from the harvest is sold to raise income to fulfil other basic needs. In measuring the food availability from the year 2016 production season this survey considered not only the quantity harvested but also the quantities retained for household consumption and the calories available in the retained quantities in relation to the total calories required in the household for specific period of time (one year or before another harvest). Farmers' views about the period before they run out of food were also considered.

5.1. Farmers' response on the food situation

Results presented in Fig. 11 show that on overall, 22.3% of farmers said that the food they have is enough for less than 30 days and 26.75% reported to have enough quantity for one month. About 30% said they will run out of food after three months and one-in twenty said they can stay food secure for one year and above for the quantity they have. The results further indicated that after 3 months 75% of the farming households will have no food at all from their own production.

Response of farmers on the food situation at district level is shown in Table 13. North A is leading to have more people whose food balance from own production is not enough even for one month. This group is 83.3% of all farming household in this district followed by North B (53.85%). Wete district has few households of this group. Cumulative proportion shows that after three months from the time of this survey, more than 90% of farming households in North A and North B will be running out of food from their own production and they will depend directly on food purchase. The same condition will face 83% of households in Mkoani,

78.6% in Wete, 77.1% in Micheweni, 74.1% in the Central, 70% in the South, 69.1% in Chake Chake and 68.8% in West district.

Figure 11: Overall response of farmers on food availability

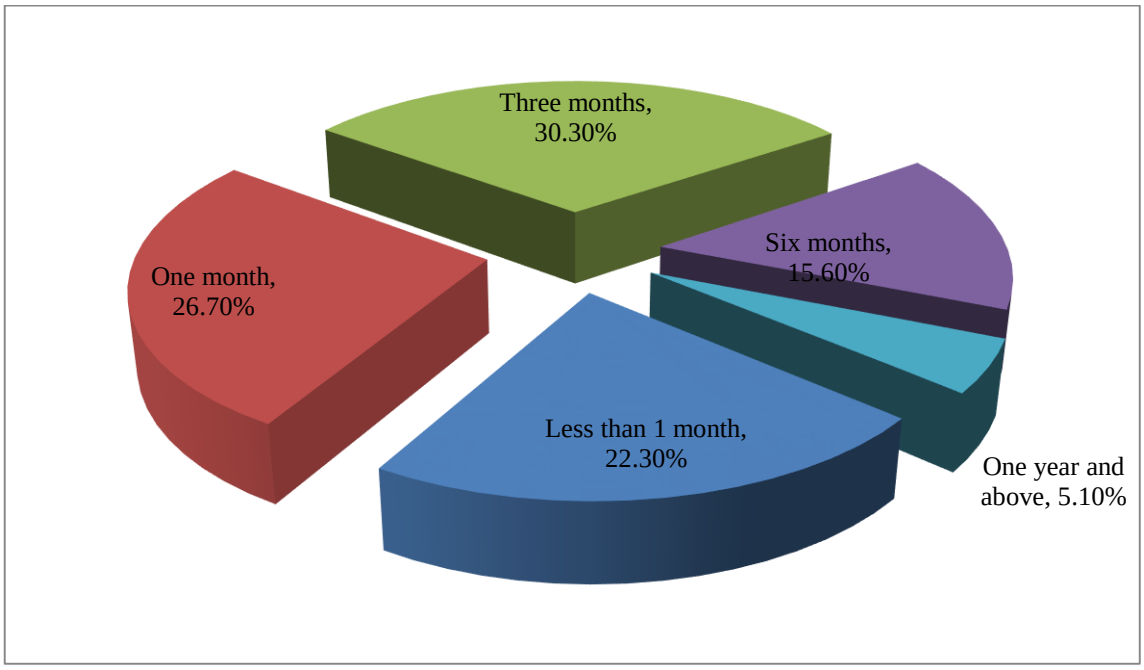


Table 13: Farmers' response on food availability at district level

Districts	Retained food is enough for				
	Less than 1 month	One month	Three months	Six months	One year and above
North A	83.3%	8.3%	4.2%	4.2%	0%
North B	53.8%	34.6%	3.8%	7.7%	0%
Central	24.1%	22.2%	27.8%	13.0%	13.0%
South	0%	30.0%	40.0%	10.0%	20.0%
West	31.2%	31.2%	6.2%	18.8%	12.5%
Micheweni	12.5%	35.4%	29.2%	10.4%	12.4%
Mkoani	12.8%	25.5%	44.7%	10.6%	6.4%
Wete	4.8%	27.4%	46.4%	21.4%	0%
Chake Chake	9.1%	21.8%	38.2%	30.9%	0%

5.2. Household food availability based on quantities produced, sold and retained for household consumption.

5.2.1. Availability of rice

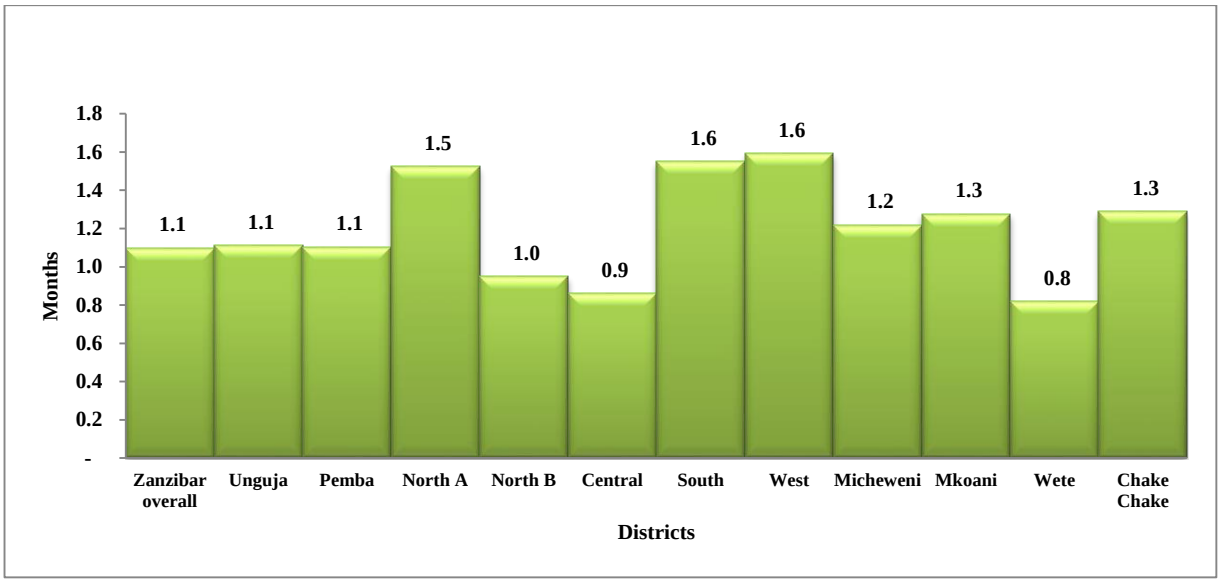
Harvest data collected from this survey have shown that the average rice production per household was 131 kilograms of paddy (78.6 kg of milled rice). On average, 4.4 kg of milled rice was sold per household and therefore each household retained 74.2 kg (269,942 Kcal) for home consumption (Table 14). Considering the total calories required per household per month (243,618 Kcal), the quantity saved by the household is enough for only 1.1 month and there is no difference between Unguja and Pemba. However, about 41% of farm household harvested the amounts that are below this average.

Rice availability at district level shows that on average the farm households in North A, South, West can be sustained by their rice harvest for nearly 1.5 month. The rest of the districts can be sustained for 0.8 month (Wete) to 1.3 month (Mkoani and Chake Chake) as shown in Fig. 14

Table 14: Quantity of milled rice harvested, sold and retained for household consumption in 2016 Masika season

District	Kg harvested/hh	Kg sold/hh	Kg retained/hh	Kcal. retained/hh
Zanzibar overall	78.6	4.4	74.2	269,942
Unguja	78.2	3.8	74.5	271,034
Pemba	78.8	4.9	73.9	269,069
North A	102.0	0.0	102.0	371,280
North B	63.6	0.0	63.6	231,504
Central	57.7	0.0	57.7	210,101
South	103.8	0.0	103.8	377,832
West	143.4	36.8	106.6	388,097
Micheweni	81.6	0.0	81.6	297,024
Mkoani	85.4	0.0	85.4	310,783
Wete	65.7	10.8	54.9	199,836
Chake Chake	90.5	4.3	86.2	313,622

Figure 12: Number of months that farm households will be sustained by retained quantity of rice from own production in 2016 season



5.2.2. Availability of cassava

Table 15 presents the quantity of cassava harvested, sold and the amount retained for household consumption at national and at distinct level. Results revealed that overall mean production of cassava in 2016 season is 758.9 kg/household, but 476.2 kg/household was sold or intended to be sold. The overall quantity retained for consumption is 282.7 Kg/household (421,223 Kcal/hh) and this can sustain the household for 1.7 month. In Pemba the quantity retained can be used for 2 months before it vanishes and in Unguja the amount spared for household consumption is enough for only 1.3 month (Fig. 12).

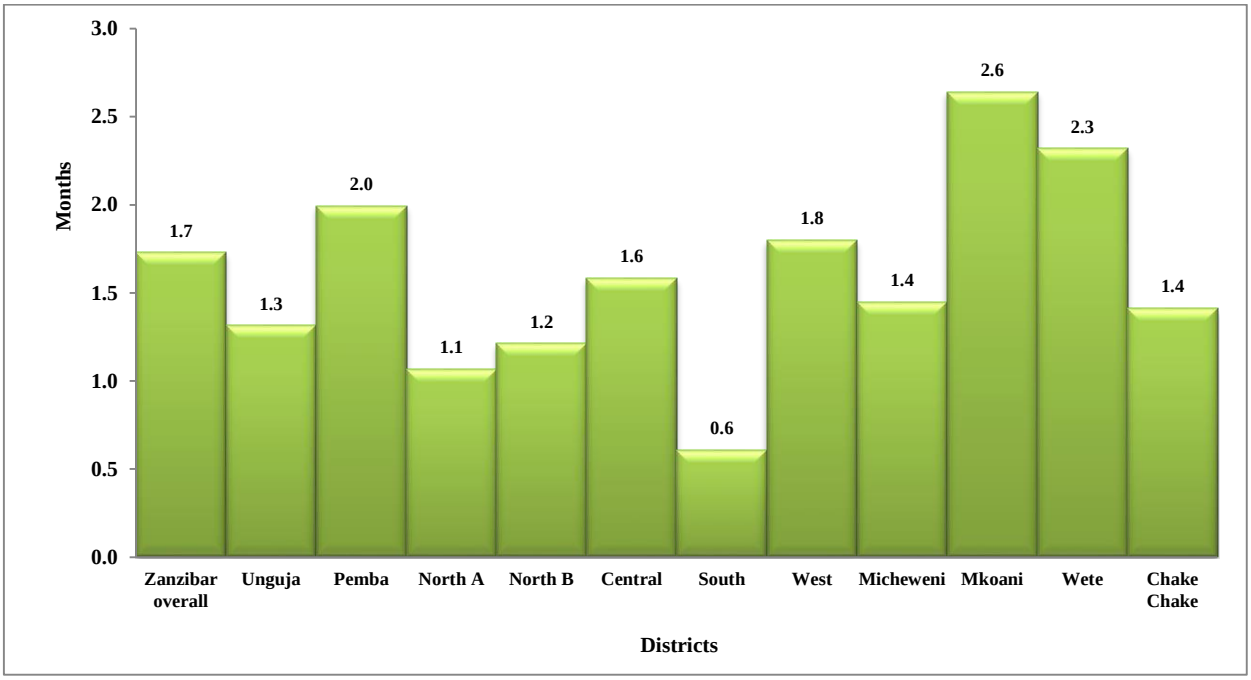
Availability of cassava for food in the districts indicates that the lowest quantity of cassava retained for household consumption was in the South district, upon which farming households can go for only 0.6 month before they run out of food. In Wete and Mkoani districts the quantities retained are able to sustain households for 2.3 to 2.6 months (Fig. 12) and for the rest of the districts they will go for 1.1 to 1.8 months before their balance of cassava is fade away.

Table 15: Quantity of fresh cassava harvested, sold and retained for household consumption in 2016 Masika season

District	Kg harvested/hh	Kg sold/hh	Kg retained/hh	Kcal. retained/hh
Zanzibar overall	758.9	476.2	282.7	421,223
Unguja	465.4	250.5	214.9	320,201
Pemba	944.5	618.6	325.9	485,591
North A	366.9	192.4	174.5	260,005
North B	407.2	209	198.2	295,318
Central	550.5	291.8	258.7	385,463
South	166	66.4	99.6	148,404

West	940	646	294	438,060
Micheweni	455.7	218.8	236.9	352,981
Mkoani	1788	1356.2	431.8	643,382
Wete	1053.2	674	379.2	565,008
Chake Chake	484.9	253.9	231	344,190

Figure 13: Number of months that farm households will be sustained by retained quantity of cassava from own production



5.2.3. Availability of bananas

Banana is among major food crops in Zanzibar but because it fetches higher price the quantities sent to the market is most of the time larger than what is retained for household consumption.

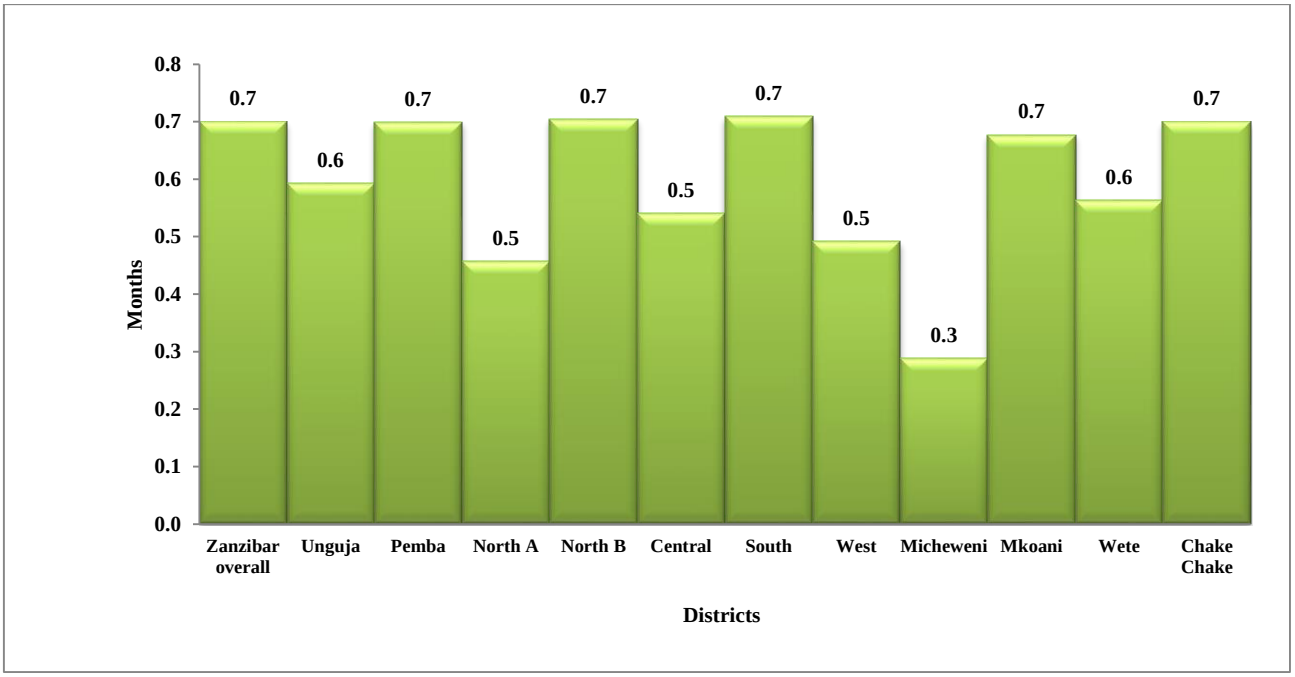
The overall average harvest in the 2016 season is 241 kg/household and more than 50% (123.3 kg/hh) is going to the market. The remaining for household consumption 122.3 Kg is equivalent to 160,380 Kilocalories which can sustain the household for 0.7 of a month. In Unguja the amount retained is slightly lower and is able to sustain the household for 0.6 of a month.

The results show that no district is above the overall average for the quantity of bananas retained for consumption. The household in North B, South, Mokani and Chake Chake districts are similar to the overall average; they have retained the quantities that can run the household for 0.7 months. Micheweni have very little from banana harvest and can be sustained to only 0.3 of a month. The rest have enough for half a month (Fig. 14)

Table 16: Quantity of fresh bananas harvested, sold and retained for household consumption in 2016 Masika season

District	Kg harvested/hh	Kg sold/hh	Kg retained/hh	Kcal. retained/hh
Zanzibar overall	241.1	122.3	118.8	160,380
Unguja	225.8	118.8	107.0	144,450
Pemba	250.8	124.6	126.2	170,370
North A	190.8	108.3	82.5	111,375
North B	263.8	136.7	127.1	71,585
Central	184.1	86.6	97.5	131,625
South	270.0	142.0	128.0	172,800
West	310.0	221.3	88.7	119,745
Micheweni	86.7	34.7	52.0	70,200
Mkoani	358.4	236.2	122.2	64,970
Wete	260.0	158.3	101.7	137,295
Chake Chake	228.0	93.6	134.4	181,440

Figure 14: Number of months that farm households will be sustained by retained quantity of banana from own production



5.2.4. Availability of sweet potatoes

Poorly distributed this season had a marked effect on the production of sweet potatoes compared to other root crops. The average per household harvest is 41.2 Kg (43,260 Kcal.). In Unguja the households produce 11.3 Kg and in Pemba 60.1 Kg on average (Table 17).

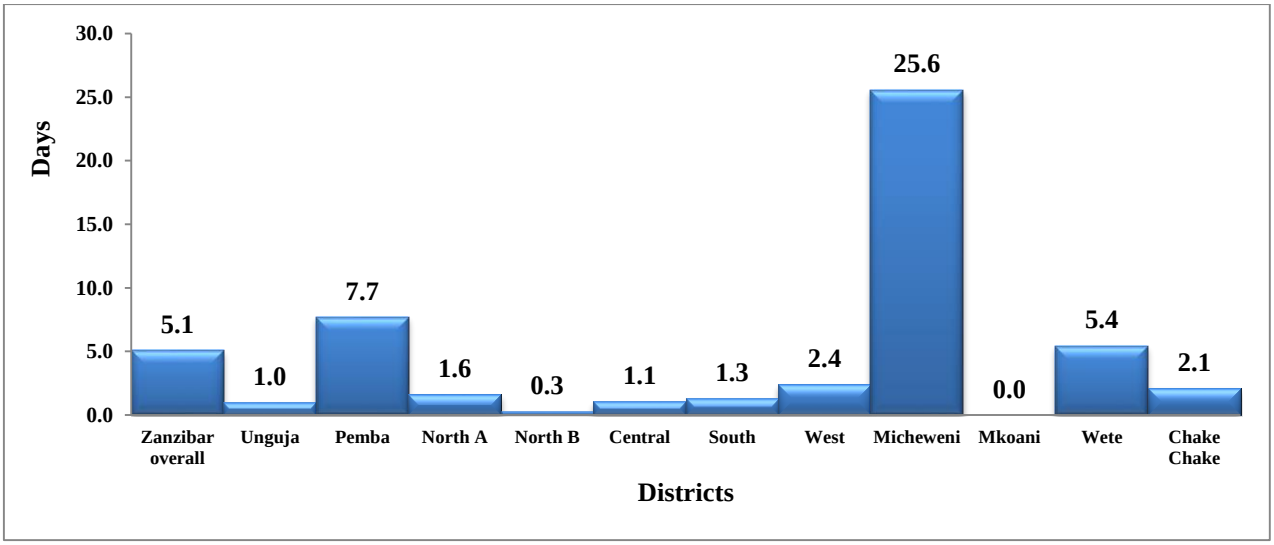
In addition, sweet potatoes are low energy crop (1050 Kcal/Kg) compared to other root crops, thus many kilograms are needed to sustain the daily or monthly calorie requirement of the household. In such a case, the calories harvested and retained for household consumption during Masika season in 2016 are enough to sustain the household for very few days (less than a month). In Zanzibar general the quantity is for only 5.1 days/household.

At district level, the largest quantity, 197.7 Kg/household (207,585 Kcal/hh), was produced by the household in Micheweni and the whole amount was retained for home consumption. Regarding the monthly calorie need per household, this quantity can sustain the household for 25.6 days. Sweet potatoes availability in other districts are as shown in Fig. 15.

Table 17: Quantity of fresh sweet potatoes harvested, sold and retained for household consumption in 2016 Masika season

District	Kg harvested/hh	Kg sold/hh	Kg retained/hh	Kcal. retained/hh
Zanzibar overall	41.2	1.8	39.4	41,370
Unguja	11.3	3.7	7.6	7,980
Pemba	60.1	0.6	59.5	62,475
North A	21.9	9.4	12.5	13,125
North B	4.3	1.9	2.4	2,520
Central	8.3	0.0	8.3	8,715
South	10.0	0.0	10.0	10,500
West	46.8	28.1	18.7	19,635
Micheweni	197.7	0.0	197.7	207,585
Mkoani	0.0	0.0	0.0	-
Wete	42.0	0.0	42.0	44,100
Chake Chake	19.1	2.7	16.4	17,220

Figure 15: Number of days that farm households will be sustained by retained quantity of sweet potatoes from own production



5.2.5. Availability of yams

Yam is another important food crop in Zanzibar but the harvests in 2016 Masika season was very disappointing. Results have shown that at overall, the average production per household is only 11.3 Kg (5220 Kcal/household). Considering the household energy requirement per day (8,121 Kcal.) in Zanzibar, this amount can sustain the household for only 0.6 day (about 7 hours).

The households in the main producing area of yams (South district) can have 7 days using their yams harvest to sustain the household food need as shown in Table 18.

Table 18: Quantity of fresh yams harvested, sold and retained for household consumption in 2016 Masika season

District	Kg harvested/hh	Kg sold/hh	Kg retained/hh	Kcal. retained/hh	The food from yams will last for (days)
Zanzibar overall	11.3	6.8	4.5	5,220	0.6
Unguja	26.5	16.4	10.1	11,716	1.4
Pemba	1.6	0.6	1.0	1,160	0.1
North A	3.3	3.3	0.0	-	0.0
North B	22.7	9.6	13.1	15,196	1.9
Central	16.1	10.2	5.9	6,844	0.8
South	179.0	130.0	49.0	56,840	7.0
West	0.0	0.0	0.0	-	0.0
Micheweni	4.2	3.1	1.1	1,276	0.2
Mkoani	0.0	0.0	0.0	-	0.0
Wete	0.0	0.0	0.0	-	0.0
Chake Chake	3.3	0.0	3.3	3,828	0.5

5.2.6. Availability of cocoyams

The overall average indicates that every household got only 24.4 Kg. However, 15 Kg was sold in each household and the retained amount is for 1.3 day. Regardless the amount sold, the total quantity harvested adds insignificant value in the households' food requirement as it was generally very small. Hardly some districts have the amounts of cocoyams for 1.7 to 1.8 day

Table 19: Quantity of cocoyams harvested, sold and retained for household consumption

District	Kg of cocoyams harvested/hh	Kg of cocoyams sold/hh	Kg of cocoyams retained/hh in 2016	Kcal retained from own production	The food from cocoyams will last for (days)
Zanzibar overall	24.4	15.2	9.2	10,304	1.3
Unguja	35.8	23.8	12.0	13,440	1.7
Pemba	17.1	9.8	7.3	8,176	1.0
North A	40.2	27.7	12.5	14,000	1.7

North B	34.8	21.4	13.4	15,008	1.8
Central	37.2	26.3	10.9	12,208	1.5
South	10.0	0.0	10.0	11,200	1.4
West	52.5	40.0	12.5	14,000	1.7
Micheweni	28.8	18.3	10.5	11,760	1.4
Mkoani	3.0	1.5	1.5	1,680	0.2
Wete	8.2	4.6	3.6	4,032	0.5
Chake Chake	32.4	17.6	14.8	16,576	2.0

5.3. The state of households food security in relation to total calories retained for household consumption in Masika 2016 season

A typical farm household in Zanzibar is engaged in the production of variety of crops. However, only a handful of them (those considered in this survey) are the most important and are produced in relatively large area. Cumulatively the quantities of produced rice, cassava, bananas, sweet potatoes, yams, cocoyams and some legumes determine the state of food security at household and also at the national level.

This section analyses the household state of food security categorized in districts by considering the total calories from main food crops harvested and retained in the household for consumption as indicated in Table 20.

Results indicate that the total food produced from six major crops (rice, cassava, bananas, yams, sweet potatoes and cocoyams) during the 2016 Masika season is enough to sustain the households for only 3.7 months on average. Previous in the farmers' response on the food situation, majority said that they have food for 2.5 months which is closer to the average (3.7 months) obtained by considering calories produced and the household calories need per month[5]. Slight difference exists between Unguja and Pemba where in Pemba the households have enough food for 4 months while in Unguja they have enough for 3.2 months. In both sides the households are going to face about 7 months of no food unless another source of food is in place.

At district level the households in Mkoani district are better than the rest as they have enough balance for up to 4.6 months followed by the West district where the households can survive for 4 months before their food reserve is depleted. None of the districts in Unguja can go beyond 3 months before their food balance from the harvest of 2016 season is finished (Table 20).

5.4. Households sources of income and purchasing power

What exists as a result of erratic rainfall in 2016 Masika season is a "double burden" on the farmers. It is a normal situation that domestic production of rice is far behind the needed quantity; however, in good seasons farmers would get enough for up to 7 months while the rest is compensated by purchase from imported rice. The main source of income as stipulated

[5] **Adult equivalent in Zanzibar is 3.8/hh; food energy requirement is 243,618 Kcal./hh/month**

in this survey is agriculture. More than 30% of interviewed farmers said that their first priority source of income is the selling of agricultural crop while 21% depend on selling of livestock products. 17.7% do petty business, 6.3% are doing as labourers mainly in agriculture and 4% are doing fishing.

These results prove that more than 50% of rural households depend directly on agriculture related activities for their income. In the case of failure in crop production, majority of the rural households' finds themselves in the most vulnerable condition as a result of their income depletion and lack of purchasing power to afford the market food prices which normally increase when domestic supply goes down. The result of this is a high probability of households experiencing an inadequate nutrition outcome in the near future.

5.5. Current number of meals in the households

The survey found that the poor rainfall this season has already affected the households' consumption pattern. There existed a difference in the number of meals in the farm households between the normal season and this season where great proportion of field crops was affected by bad weather condition. The assessment found that the number of household which normally take three meals (63.1%) has gone down to 37.9% and the rest has shifted to the group of two or one meal a day. In the normal season the proportion of households which take one meal a day is 1% but during the assessment this group was already increased to 2.8%. North A and Micheweni districts have less proportion of households receiving three meals; they have 12.5% and 27.1%, respectively, while North B is leading by having more households receiving one meal a day (11.5%). These results are probably related to the failure in the crop production in this season.

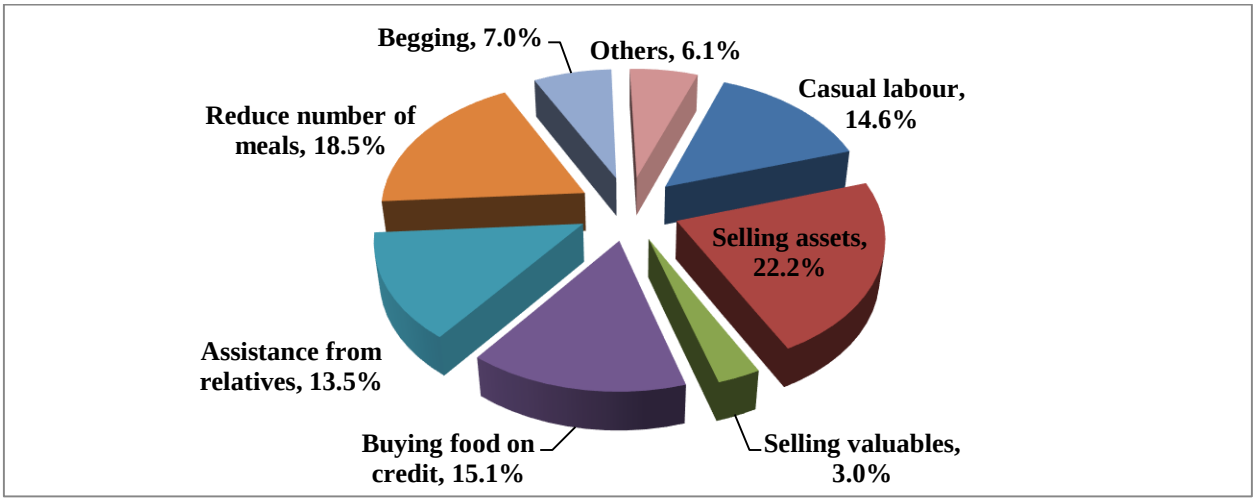
Table 20: The state of household food security: number of months the households' food balance will last

Region/District	Kilocalories obtained from quantities of major food crops retained for household consumption in the 2016 season							Kcal req./hh/ month	Number of months the food will last
	Rice	Cassava	Bananas	Sweet potatoes	Yams	Cocoyams	Total Kcal. retained/hh		
Zanzibar overall	269,942	421,223	160,380	41370	5220	10304	908,439	243,618	3.7
Unguja	271,034	320,201	144,450	7980	11716	13440	768,821	243,618	3.2
Pemba	269,069	485,591	170,370	62475	1160	8176	996,841	243,618	4.1
North A	371,280	260,005	111,375	13125	0	14000	769,785	243,618	3.2
North B	231,504	295,318	171,585	2520	15196	15008	731,131	243,618	3.0
Central	210,101	385,463	131,625	8715	6844	12208	754,956	243,618	3.1
South	377,832	148,404	172,800	10500	56840	11200	777,576	243,618	3.2
West	388,097	438,060	119,745	19635	0	14000	979,537	243,618	4.0
Micheweni	297,024	352,981	70,200	207585	1276	11760	940,826	243,618	3.9
Mkoani	310,783	643,382	164,970	0	0	1680	1,120,815	243,618	4.6
Wete	199,836	565,008	137,295	44100	0	4032	950,271	243,618	3.9
Chake Chake	313,622	344,190	181,440	17220	3828	16576	876,876	243,618	3.6

5.5. Coping strategies

The assessment went further to find how farmers in Zanzibar cope with food shortage following crop failure from the climate change effects and adjust to the various changes affecting their livelihoods. In such a question, unique coping strategies were found to be adopted by households. Some coping strategies are positive and others are negative and have a detrimental effect on their livelihoods. Strategies included relying on labour works, buying food on credit, selling of assets, selling of valuable goods, assistance from relatives, begging and reduced number of meals eaten in a day. The weights of these strategies were related to the frequencies they were mentioned by farmers where "selling assets" scored the highest frequency (22.2%), showing to be the most adapted strategy followed by "reduced number of meals" (18.5%), "buying food on credit" (15.1%), "seeking for casual labour" (14.6%) and "assistance from relatives" (13.5%). The weights of other strategies are as shown in Fig. 16.

Figure 16: Weights of coping strategies adopted by farmers following crop failure



6. OTHER FINDINGS

6.1. The use of improved technologies in rice production

Rice farmers would make good harvest by growing rice varieties with high yield and taking shorter to mature. This needs to be accompanied by application of other technologies such as adequate amounts of fertilizer, pesticides timely land preparation and planting. During the 2016 long rains season farmers were asked if they have used these technologies and the following were their responses:

6.1.1. Improved seeds

On average, 60% of rice planted area was planted with improved seeds. The main source mentioned was the seed supplied by the government through the Ministry of Agriculture. In Unguja the rate of use of improved seed of rice was 76.6% and in Pemba it was 49.2% of the rice planted area. Still in Micheweni and Chake Chake large area were planted with local seeds. The use of improved seeds in these districts was 34% and 36.5% of the planted area, respectively.

6.1.2. Fertilizers

The use of Urea in TSP fertilizer in rice production ranged from zero to 80Kg per acre. The average application is 10 Kg TSP/acre which is a very low rate, and that most of the rice farmers do not apply TSP at all. Application of Urea was 18.9 Kg Urea/acre on average with minimum zero Kg and maximum 104 Kg Urea/acre. Similar to the TSP, the use urea is at very low rate though few farmers have shown to apply urea at luxury rate such as this of 104 Kg urea/acre (48 Kg N/acre).

6.1.3. Organic fertilizers

This survey has indicated that the use of natural fertilizers in rice production is very rare.

6.1.4. Mechanization services

Agricultural mechanization reduces drudgery which makes it difficult for some work in agricultural production to be accomplished successfully. The level of mechanization depends on the scale of agricultural production but at least in Zanzibar farmers expect to get tractor services for ploughing their rice plots. It helps to reduce human labour especially for the farmers in Zanzibar who are engaged in the production of many crops at the same time using limited human labour. However, the survey indicated that the tractor services for at least primary field operations are not effective. From 309 rain fed rice farmers 183 (59.2 got tractor services this season, the rest used hand hoe operation during land preparation. From those who received the service, 26.8% said they got the service very late. In Unguja the tractor service was received by 76.1% of rain fed rice farmers but in Pemba this service was provided to only 49.7% of farmers. In Micheweni and Chake Chake only 24.3% and 38.9% of the rice farmers, respectively got tractor services this season.

7. CONCLUSION

This survey has shown that for the next time erratic rains and prolonged drought have taken their terrible toll on food crops in Zanzibar. Erratic rains in the very short period had caused floods and damage to the crop stand like rice and cassava at their early stages of establishment. The then devastating drought has scorched most of the food crops of all types; cereals and root crops. Crops such as rice, cassava, bananas, sweet potatoes, cocoyams, yams and cowpeas which are the most important for food in Zanzibar have been decimated by extended drought when they are still at vegetative stage. Apart from weather effects, the survey has revealed that application of technology for climate change adaptation is at very minimum. In case of rice crop many farmers stayed longer waiting for tractor mechanization services the condition that resulted into late planting. The level of using improved seeds and fertilizers is also very low and this had effect on the final yield of the harvested areas. The total quantity of food harvested from all six major crops can hardly sustain the households for 3 months on average while leaving the rural people with limited sources of income to purchase food for the remaining period before the next harvest.

Due to short supply of food from domestic production, there are concerns about resulting higher food price to hit the poor farming households the hardest, thus sparking the high rate of food insecurity and malnutrition and vulnerability to other shocks such as diseases.

8. RECOMMENDATIONS

The survey findings provide another compelling argument to start scaling up the effects of climate by designing and implementing appropriate technologies and strategies that will reduce the negative effects and increase food production.

Based on the survey findings, the following recommendations are made:

a) Rice production in Zanzibar is always based on the general agronomic recommendations. Due to differences in agro-climatic conditions and soil type, broad/general recommendations that assume homogeneity of farming conditions can be erratic and partly contributing to poor crop production. For a proper impact of the technology there is need for careful targeting of specific areas. Introduction of new varieties of rice for example, need to go hand in hand with testing their suitability for different rice ecology (irrigation, upland rain fed or lowland rain fed) and specific fertilizer requirements instead of throwing these varieties and leave farmers to decide where and how to use them. There is need for introducing and breeding new rice varieties but more importantly the researches to establish specific agronomic packages at changing climate are very important towards increasing rice production.

b) Meanwhile, the research should consider reintroduction as well as promotion of native high yielding, drought tolerant and disease resistant varieties of rice and other crops. These can be used in both the breeding programme and multiplication for distribution to the farmers.

c) Due to population pressure the land resource in Zanzibar is becoming more limited and scarce. As a result farmers are trying to maximize production by cultivating many crops in very small area. In such a case, many of the farmers find themselves growing crops which are not suitable for their lands conditions and therefore production reduced instead of increasing. The survey found rice farms in very shallow soils at the premises of semi-coral area. It is recommended that land zoning, research for land-crop suitability and production specialization is very important.

d) Variety maintenance especially for rice has been a problem in Zanzibar. Every season the government has been spending a lot of money to import rice seed. In some of the seasons the contracts of seeds import are made very late such that there is no time to verify the varieties purity, health and viability where in some cases these seeds have failed to germinate and cost the farmers. In the recent years some amount of rice seed has been produced domestically by farmers but yet their purity is not satisfied. The survey results recommend on the recruitment of seed specialists and establishment of rice seed farms while putting very close supervision of farmers who are already engaged in rice seed production

e) Timely planting as a measure of escaping the effect of bad weather requires early land preparation. Most of rice growing areas in Zanzibar are characterized by heavy draft soils which require at least two tillage operations (ploughing and harrowing). Currently the tractor services are partial and cost incurring for the farmers. Tractor/mechanization services are only concentrated on ploughing, the operation that leaves the land with heavy blocks of soils and increase the farmers time or money to make harrowing, and in most

cases farmers are very late in planting. It is recommended that the subsidy in mechanization services should consider all field operations required for land preparation in rice crop. While tractor services are necessary in heavy draft soils, The Government may explore the use of animal draught power for land preparation for upland crops in areas of light sandy soils.

f) Expand the range of crops covered by the tractor mechanization services as way of promoting alternative short-term crops such as sweet potatoes, yams and beans for consistent food supply in case of rice failure. Currently more household land is being allocated to rice production compared to other crops.

g) In the short-term, Government may need to consider partnering with the private tractor owners (with approximately 10 tractors) through service delivery contracts and also guarantee farmers associations to acquire loan facilities for the purchase tractors to close the supply gap. On the other hand, it should also plan to gradually withdraw the subsidies as production is increased.

h) Due to the Zanzibar economic status the Government is not in a position to afford the input subsidy at adequate levels as a result the current supply of inputs (seeds, fertilizer and herbicides) through subsidy programme is far below the actual need of farmers' acreage. This has lead to misuse of these inputs as they are applied at very low rates by farmers to cover the whole acreage and thus have little impact on increasing the production of rice. There is need for the Government to improve the agricultural input subsidy programme by involving private sector and special contracts. Meanwhile, for the positive impact of this programme, efforts are needed to emphasize extension services and ensure proper and efficient utilization of these inputs. Where extension is weak farmers have been found allocating these inputs especially fertilizer to the other crops instead of the intended crop, the rice.

i) It may be necessary for Government to rejuvenate organic agriculture. It is of paramount importance to safeguard early the negative effects of persistent application of inorganic fertilizers on the soils. Approaches and strategies for good agricultural practices (GAP) that is more pertinent - quite cultural, natural and sustainable to the environment, food and income security should be pursued.

j) The survey found that the effect of drought was more to the rain fed rice than it was to the irrigated rice. This calls for the government to put more efforts and increase investment in rice irrigation by developing new areas, building new irrigation infrastructures and maintenance of the existing schemes. However, these schemes should be community owned, developed and managed for sustainability. Alternatively the Government can find partnership with private sectors that are willing to invest in irrigation and farmers encouraged to form water users associations, renting irrigation plots from any developer and pay for the cost of water use.

k) Studies on establishment of Crop Insurance Programmes for farmers affected by the persistent disasters such as droughts, floods, market failure etc and possible climate change effect mitigation and resilience measures should be urgently conducted.

l) Negotiate with Micro-Finance Institutions to provide guaranteed micro-credit services to vulnerable families involved in petty trade activities for survival. It was found out that 12 percent of the respondents had started small scale (petty) businesses, 7 percent sold handcrafts, 3 percent were employed in seaweed, and 5 percent were selling unskilled labour for their livelihoods

m) Individual farmers could be categorized according to their operational capacities, for instance in terms of land size cultivated and support be varied accordingly. Different farmer categories have different farmer needs. Government may pilot the program in a few areas through extending support to farmers-organized groups. Raising sufficient marketable quantities and addressing production constraints such as access to financial services in the long-run will require farmers to gradually form production and marketing groups and associations.

n) Strengthen the entrepreneurship capacities of rice farmers as part of the programme so that they view rice farming as any other business. The training modules may include such topics like crop enterprise selection and analysis, bulking, marketing, saving and credit management, cash-flow, costs and expenditure analyses.

o) Expedite special and targeted public assistance programs including providing relief food, food for work and cash for food schemes to prevent deterioration of the nutritional statuses of excluded groups specifically those considered extremely vulnerable like female headed households, extremely low income families with orphans, children, landless, people living with disabilities and elderly persons, pregnant and lactating mothers, people living with HIV/AIDS particularly those using anti-retroviral drugs.

p) Review the rice trade policies. In the short-run, Government may intervene by controlling the market price of rice. A range of policy options exist. Some of them include: reducing or lifting the import tax (per unit tariff) on rice, raising the rice import quota to increase the quantity of rice imported and rice availability, subsidization of rice imports and fixing the market price of rice till the next rice harvest in 2017 with a view of slowing down the domestic rice price inflation and hence, making it affordable for the poor people.

***Appendix 1*:** Questionnaire for rapid assessment of food crops performance in the 2016 long rains (masika) season in Zanzibar

Main objective:

The overall objective of the assessment was to provide an update on the food crops performance for the Masika 2015/2016 and inform on the food situation in the country.

Specific Objectives

d) To establish the condition of field performance for rice and other major food crops for Masika season 2015/16.

e) To establish the proportion of major crops severely affected by the untimely and poor distribution of Masika seasonal rains in 2015/1216

f) To identify alternative coping strategies adapted by farmers following the crop failure in this Masika season 2015/2016.

A: Household particulars

1. Name of interviewee.....
2. Relation to head of household…….....
3. Age (years).....
4. Sex..... Male ☐ Female ☐
5. District.....
6. Shehia.....
7. Name of the rice production block/valley/area.....
8. Mobile number….....
9. Ecology of the rice farm (tick √ appropriate answer):

a) Rain fed lowland rice ☐

b) Rain fed upland rice ☐

c) irrigated rice ☐

10. Number of people in the household

Age	**Female**	**Male**	**Total**
Less than 10 years			

10 to 19 years			
20 years and above			

B: Rainfall intensity and distribution in 2016 long rain season (farmers' opinions)

11. Explain the dates of onset and termination of long rains in your area

2016 long rain season				**Normal seasons**			
Rains started		**Rains ended**		**Rains started**		**Rains ended**	
Month		Month		Month		Month	
Week		Week		Week		Week	

12. How was the rainfall intensity in 2016 long rains season (tick √ appropriate answer)

Normal	**More than normal**	**Less than normal**

13. What was the rainfall distribution in relation to the stages of your crops in the field (tick √ appropriate answer)

Good	**Average**	**Bad**	**Very bad**

C: Weather effects and the crops condition in 2016 long rains season (farmer's opinion)

14. Which one of the weather conditions affected your crops in 2016 long rains season (tick √ appropriate answer)

Floods	**Drought**	**Both**	**None**

15. If you were affected by floods or drought in your crop production activities, what was the effect? (tick √ appropriate answer)

Crop	The effect caused by floods			Effect caused by drought		
	Delay in planting	Damage of crop stand already in the field	Other effects	Delay in planting	Damage of crop stand already in the field	Other effects
Rice						
cassava						
Bananas						
Sweet potatoes						
Yams						
Cocoyams						
Cowpeas						

16. Explain the crops conditions in your field in the 2016 long rains season

Crop	Crop condition (tick √ appropriate)			If the condition was bad explain why was that situation
	Good	Average	Bad	
Rice				
cassava				
Bananas				
Sweet potatoes				
Yams				
Cocoyams				
Cowpeas				

17. What was the magnitude of floods and drought effects to your crop in 2016 long rains season?

Crop	Acres planted	Acres affected by floods	Acres affected by drought	Total area affected
Rice				
cassava				
Bananas				
Sweet potatoes				

Yams				
Cocoyams				
Cowpeas				

18. What were the other effects apart from floods and drought?

crop	**Type of effect**	**Total area affected**
Rice		
cassava		
Bananas		
Sweet potatoes		
Yams		
Cocoyams		
Cowpeas		

19. If the lack of rains will persist for longer from now, what are your opinions about your crops which are still in the field/not yet matured?

.....

.....

.....

.....

D: Food situation/food availability in the 2016 long rains season

20. Compare the acreage and quantities harvested between 2016 season and the previous year (2015)

	2015 season	**2016 season**

crop	Acres planted	Quantity harvested	Acres planted	Quantity harvested	Quantity retained for hh consumption	Quantity sold
Rice						
cassava						
Bananas						
Sweet potatoes						
Yams						
Cocoyams						
Cowpeas						

21. For how long your food balance (in the store and in the field) will sustain your household?

Less than 1 month	**1 month**	**3 months**	**6 months**	**1 year**	**More than 1 year**

E: Availability and use of agricultural inputs in the 2016 long rains seasons

22. Indicate the use of the following inputs in for your crops in 2016 season

Crop	**Use of seeds**		**Use of fertilizers**			
	Acres planted with improved seeds	**Acres planted with local seeds**	**Acres applied with fertilizers**	**TSP (kg)**	**Urea (kg)**	**Organic fertilizer (tons)**
Rice						
cassava						

Bananas						
Sweet potatoes						
Yams						
Cocoyams						
Cowpeas						

23. Did you get tractor mechanization services in 2016 season? Ye ☐ N ☐

24. If the answer in 20 "Yes", was it in right time? Y ☐ N ☐

F: Number of meals in the household

25. Compare the number of meals per day your household is currently taking and the number of meals per day in the normal agricultural seasons (tick √ appropriate answer)

Number of meals in 2016 season				**Number of meals in the normal seasons**				**If there is difference explain the reason**
1	2	3	3+	1	2	3	3+	

G: Sources of income and food purchasing power and

26. What are you main sources of income? Mention at least five sources in order of preference

a) ……..

b) .....

c) .....

d) .....

e) .....

H: Coping strategies

27. If the crop harvest is poor and you suffer shortage of food in your household, what are alternative means used to get food?

Coping strategy	**Tick √ appropriate**
a) Seeking labourer works	

b) Selling some of livestock	
c) Selling of assets and valuables	
d) Renting food for long period	
e) Purchasing food on credit	
f) Seeking assistance from relatives	
g) Others (mention)…….....	

Name of interviewer
…….....

Title …….....

Date of interview …….....

Mobile number of interviewer.....

***Appendix 2*: List of farmers/respondents in the crop performance survey**

S.No.	NAME OF THE FARMER	AGE	SEX	DISTRICT	SHEHIA	RICE BLOCK
1	Asha Haji Pandu	53	F	Central	Kiboje Mkwajuni	Kisima Mchanga
2	Asia Kassim Hassan	53	F	Central	Kiboje M. Shauri	Kisima Mchanga
3	Farida Abdalla Khamis	36	F	Central	Koani	Koani
4	Jalia Rajabu King'wasa	60	F	Central	Miwani	Miwani
5	Kazija Haji Haji	68	F	Central	Mchangani	Mchangani
6	Mafunda Said	50	F	Central	Koani	Koani
7	Mkesha Ali Sudi	36	F	Central	Koani	Koani
8	Mwajuma Mtumweni Choumu	38	F	Central	Cheju	Cheju Mkanyageni
9	Mwanajuma Omar Thani	60	F	Central	Cheju Gambini	Cheju Mkanyagen
10	Panya Pili Jaku	50	F	Central	Cheju	Cheju Wacheni
11	Pili Juma Haji	52	F	Central	Kiboje Mkwajuni	Kisima Mchanga
12	Sikuzani Othman Mdede	55	F	Central	Miwani	Miwani
13	Taifa Fadhili Khamis	53	F	Central	Cheju Kisomanga	Bonde Kisomanga
14	Tunza Ali Shaali	55	F	Central	Koani	Koani
15	Abdi Silima Vuai	52	M	Central	Mchangani	Mchangani
16	Abeid Said Kaupenda	64	M	Central	Miwani	Miwani
17	Ali Ame Ali	74	M	Central	Ndijani M/Punda	Chetu Bora Leo
18	Ali Mussa Omar	44	M	Central	Ndijani Mseweni	Cheju Utume
19	Ali Twalib Makame	53	M	Central	Kiboje Mkwajuni	Kisima Mchanga
20	Ali Uzia Ali	33	M	Central	Koani	Koani
21	Ame Makamae Makame	50	M	Central	Mchangani	Mchangani
22	Amuri Muhamedi Chumu	66	M	Central	Mchangani	Mchangani
23	Bashiru Mansuri Juma	57	M	Central	Miwani	Miwani
24	Daudi Mohammad Yussuf	52	M	Central	Ndijani	Utume
25	Dominic Phenix	52	M	Central	Koani	Koani
26	Hafidh Ali Khelef	54	M	Central	Koani	Koani
27	Haji Jaku Mosi	56	M	Central	Tunduni	Mchangani
28	Haji Muhidini Haji	70	M	Central	Mchangani	Mchangani
29	Haji Yussufu Haji	54	M	Central	Mchangani	Mchangani
30	Hamad Sultan Mselem	45	M	Central	Ndijani Mseweni	Tumesoma Mwanzo
31	Hamrani Naimu Membari	34	M	Central	Mchangani	Mchangani
32	Hassan Ali Haji	56	M	Central	Ndijani M/Punda	Cheju Fao
33	Idrisa Hassan Rajabu	52	M	Central	Ndijani Mseweni	Cheju Tassaf
34	Issa Khamis Silima	63	M	Central	Kiboje M. Shauri	Kisima Mchanga

35	Juma Yussufu Juma	46	M	Central	Mchangani	Mchangani
36	Kasim Suleiman Mpunga	53	M	Central	Cheju Chuchumile	Cheju Kibeteni
37	Kasimu Khatib Shindano	72	M	Central	Ndijani Nyambiza	Cheju
38	Kheri Ali Mrisho	30	M	Central	Kiboje Mkwajuni	Kisima Mchanga
39	Mabruki Jaku Vuai	65	M	Central	Mchangani	Mchangani
40	Mohd Mussa Mohd	47	M	Central	Kiboje Mkwajuni	Kisima Mchanga
41	Mossi Pili Shauri	45	M	Central	U/Ukuu Kaebona	Cheju FAO
42	Mrisho Rashid Kondo	65	M	Central	Koani	Koani
43	Muhamadi Ame Haji	49	M	Central	Mchangani	Mchangani
44	Muombwa Abdi Miraji	52	M	Central	Cheju Chuchumile	Cheju Washirika
45	Mwinshaha Fakih Ali	55	M	Central	Ndijani Mseweni	Cheju Utume
46	Mzee Ali Mzee	57	M	Central	Mchangani	Mchangani
47	Omar Abdallah Mussa	54	M	Central	Ndijani Mseweni	Cheju Tassaf
48	Omar Khamis Juma	30	M	Central	Jendele	Cheju Lengo Letu
49	Ramadhani Bakari Muombwa	50	M	Central	Cheju	Fao
50	Saidi Masudi Kahalam	56	M	Central	Mchangani	Mchangani
51	Shaban Ramadhan Makame	52	M	Central	Ndijani Mseweni	Cheju Tumesoma
52	Suleiman Ame Makame	56	M	Central	Jendele	Cheju Muungano
53	Tatu Saidi Kupenda	55	M	Central	Miwani	Miwani
54	Yahya Yussuf Ibrahim	63	M	Central	Ndijani Mseweni	Cheju
55	Rahma Mgeni Faki	42	F	Chake Chake	Vitongoji	Mfubaha
56	Hasina Hossein Juma	45	F	Chake Chake	Vitongoji	Mfubaha
57	Fatma Saleh Hamad	50	F	Chake Chake	Vitongoji	Mfubaha
58	Zulekha Mussa Ali	46	F	Chake Chake	Vitongoji	Mfubaha
59	Mfunda Moh'd Juma	65	F	Chake Chake	Vitongoji	Mfubaha
60	Time Rashid Ali	40	F	Chake Chake	Vitongoji	Mfubaha
61	Fadhila Khamis Kombo	20	F	Chake Chake	Vitongoji	Mfubaha
62	Raha Abdalla Talib	60	F	Chake Chake	Chonga	Mabieni
63	Idde Moh'd Haji	58	F	Chake Chake	Chonga	Mabieni
64	Satira Hussein Haji	50	F	Chake Chake	Chonga	Mabieni
65	Fatma Hamad Othman	50	F	Chake Chake	Chonga	Mabieni
66	Siti Fundi Hussein	33	F	Chake Chake	Chonga	Mabieni
67	Asha Fundi Hussein	35	F	Chake Chake	Chonga	Mabieni
68	Khadija Abas Moh'd	30	F	Chake Chake	Chonga	Mabieni
69	Bishara Moh'd Ali	70	F	Chake Chake	Chonga	Mabieni
70	Mauwa Moh'd Haji	37	F	Chake Chake	Chonga	Mabieni
71	Bahati Feruzi Soud	40	F	Chake Chake	Chonga	Mabieni

72	Maryam Moh'd Haji	44	F	Chake Chake	Chonga	Mabieni
73	Chai Shehe Iddi	70	F	Chake Chake	Chonga	Mabieni
74	Time Iddi Hatib	35	F	Chake Chake	Tibirinzi	Tibirinzi
75	Wahida masoud Ali	49	F	Chake Chake	Tibirinzi	Tibirinzi
76	Zainab Abdala Salim	50	F	Chake Chake	Tibirinzi	Tibirinzi
77	Huda Ali Said	49	F	Chake Chake	Tibirinzi	Tibirinzi
78	Fatma Juma Suleiman	55	F	Chake Chake	Tibirinzi	Tibirinzi
79	Mafunda Juma Ali	45	F	Chake Chake	Tibirinzi	Tibirinzi
80	Mkongwe Ai Said	70	F	Chake Chake	Tibirinzi	Tibirinzi
81	Fatma Adi Ali	50	F	Chake Chake	Tibirinzi	Tibirinzi
82	Jokha Ali Khalfan	54	F	Chake Chake	Tibirinzi	Tibirinzi
83	Asha Sueiman Juma	60	F	Chake Chake	Tibirinzi	Tibirinzi
84	Nachia Sultan Nassor	60	F	Chake Chake	Tibirinzi	Tibirinzi
85	Mambo Abasi Mambo	49	M	Chake Chake	Vitongoji	Mfubaha
86	Khamis Kombo Hamadi	65	M	Chake Chake	Vitongoji	Mfubaha
87	Alawi Mussa Ali	60	M	Chake Chake	Vitongoji	Mfubaha
88	Said Sudi Khamis	34	M	Chake Chake	Vitongoji	Mfubaha
89	Muhammad Khamis Mrisho	70	M	Chake Chake	Vitongoji	Mfubaha
90	Khamis Sudi Khamis	40	M	Chake Chake	Vitongoji	Mfubaha
91	Soud Khamis Mrisho	60	M	Chake Chake	Vitongoji	Mfubaha
92	Juma Omar Hamad	70	M	Chake Chake	Vitongoji	Mfubaha
93	Hamad Omar Hamad	55	M	Chake Chake	Vitongoji	Mfubaha
94	Moh'd Faraji Moh'd	45	M	Chake Chake	Vitongoji	Mfubaha
95	Abeid Rashid Abeid	75	M	Chake Chake	Vitongoji	Mfubaha
96	Moh'd Juma Mbwana	75	M	Chake Chake	Chonga	Mabieni
97	Abdalla Assa Ali	25	M	Chake Chake	Chonga	Mabieni
98	Mgwali Machano Mgwali	26	M	Chake Chake	Chonga	Mabieni
99	Moh'd Kheri Rashid	33	M	Chake Chake	Chonga	Mabieni
100	Ramadhan Fundi Hassan	50	M	Chake Chake	Chonga	Mabieni
101	Shehe Feruzi Sudi	36	M	Chake Chake	Chonga	Mabieni
102	Mabruki Abdalla Salim	51	M	Chake Chake	Tibirinzi	Tibirinzi
103	Salim Said Ali	72	M	Chake Chake	Tibirinzi	Tibirinzi
104	Khamis Iddi Khamis	42	M	Chake Chake	Tibirinzi	Tibirinzi
105	Moh'd Ali Khalfan	41	M	Chake Chake	Tibirinzi	Tibirinzi
106	Saim Abdala Saim	70	M	Chake Chake	Tibirinzi	Tibirinzi
107	Khalefu Suleiman Khalfan	65	M	Chake Chake	Tibirinzi	Tibirinzi
108	Khalfan Abdalla Salim	60	M	Chake Chake	Tibirinzi	Tibirinzi

109	Masoud Salum Khalfan	45	M	Chake Chake	Tibirinzi	Tibirinzi
110	Fatma Bakari Hamadi	45	F	Micheweni	Kifundi	Laaraki
111	Siti Haji Hamadi	45	F	Micheweni	Konde	Laaraki
112	Salama Salimu Mussa	30	F	Micheweni	Konde	Laaraki
113	Amina Kombo Ibrahim	45	F	Micheweni	Kifundi	Laaraki
114	Fatma Hamiss Omar	35	F	Micheweni	Kifundi	Laaraki
115	Mariyamu Kombo Faki	40	F	Micheweni	Kifundi	Laaraki
116	Raya Ali Shaame	50	F	Micheweni	Kifundi	Laaraki
117	Siti Khamis Ali	25	F	Micheweni	Konde	Laaraki
118	Mariam Khalid Ali	46	F	Micheweni	Kifundi	Laaraki
119	Mariam Ali Khamis	27	F	Micheweni	Kifundi	Laaraki
120	Salma Nassor	28	F	Micheweni	Konde	Laaraki
121	Asha Haji Abdalla	50	F	Micheweni	Kifundi	Laaraki
122	Hidaya Ali Juma	35	F	Micheweni	Kifundi	Laaraki
123	Mafunda Khamis Kombo	60	F	Micheweni	Kifundi	Laaraki
124	Bikame Ali Bakari	90	F	Micheweni	Mitemani	Koowe
125	Mboje Shoka Faki	56	F	Micheweni	Koowe	Koowe
126	Siti Nassor Juma	60	F	Micheweni	Mitemani	Koowe
127	Subira Hamad Muarab	70	F	Micheweni	Mapofu	Koowe
128	Mfunda Othman Hamad	40	F	Micheweni	Mapofu	Koowe
129	Amina Ali Kombo	65	F	Micheweni	Mtemani	Koowe
130	Hidaya Shehe Nassor	50	F	Micheweni	Mjini Wingwi	Koowe
131	Mwanahamis Issa Shehe	25	F	Micheweni	Mjini Wingwi	Koowe
132	Stahmili Othman Kai	40	F	Micheweni	Mjini Wingwi	Koowe
133	Tumu Ali Dadi	35	F	Micheweni	Njuguni	Koowe
134	Chumu Juma Juma	44	F	Micheweni	Mjini Wingwi	Koowe
135	Kaije Abdalla Issa	55	F	Micheweni	Michungani	Koowe
136	Hadiya Ismail Ali	60	F	Micheweni	Mapofu	Koowe
137	Mwanaidi Omar Haji	31	F	Micheweni	Kinowe	Kinyakuzi
138	Siti Ali Khamis	70	F	Micheweni	Kinowe	Kinyakuzi
139	Mchanga Khatib Nassir	60	F	Micheweni	Kinowe	Kinyakuzi
140	Sharifa Kombo Khamis	45	F	Micheweni	Kinowe	Kinyakuzi
141	Abla Omar Abdala	85	M	Micheweni	Kinowe	Laaraki
142	Ali Muhamed Nasour	50	M	Micheweni	Konde	Laaraki
143	Ali Seifu Seleyum	64	M	Micheweni	Konde	Laaraki
144	Nasoro Ali Khalid	45	M	Micheweni	Konde	Laaraki
145	Salum Abeidi Saidi	42	M	Micheweni	Konde	Laaraki

146	Assa Dadi	65	M	Micheweni	Michungwani	Koowe
147	Said Yusuf Hamad	30	M	Micheweni	Mapofu	Koowe
148	Ali Bakari Ali	55	M	Micheweni	Mapofu	Koowe
149	Othman Ali Khamis	48	M	Micheweni	Mapofu	Koowe
150	Said Khamis Hamad	68	M	Micheweni	Mapofu	Koowe
151	Ali Abdalla Issa	75	M	Micheweni	Mjanaza	Koowe
152	Khamis Omar	55	M	Micheweni	Kinowe	Kinyakuzi
153	Hamad Suleiman Hamad	37	M	Micheweni	Kinowe	Kinyakuzi
154	Omari Hamadi	50	M	Micheweni	Kinowe	Kinyakuzi
155	Shaibu Shehe Muhamed	54	M	Micheweni	Kinowe	Kinyakuzi
156	Khamis Juma Khamis	50	M	Micheweni	Kinowe	Kinyakuzi
157	Hamis Ali	39	M	Micheweni	Kinowe	Kinyakuzi
158	Semeni Hassan Shamte	65	F	Mkoani	Chambani	JKU
159	Time Salum Ahmed	28	F	Mkoani	Makombeni	Darajani
160	Maua Khalfan	60	F	Mkoani	Makombeni	Darajani
161	Mwakombo Mohamed Abrahman	50	F	Mkoani	Makombeni	Darajani
162	Maimuna Kassim Mohd	50	F	Mkoani	Makombeni	Darajani
163	Kudura Hamad Othman	50	F	Mkoani	Makombeni	Darajani
164	Baina HajiKhamis	50	F	Mkoani	Makombeni	Darajani
165	Fatma Mussa Makame	42	F	Mkoani	Makombeni	Darajani
166	Mboja Mjengo Mjawiri	70	F	Mkoani	Makombeni	Darajani
167	Mafunda Haji Khamis	60	F	Mkoani	Makombeni	Darajani
168	Hakiba Juma Chaani	60	F	Mkoani	Makombeni	Darajani
169	Asha Haji Haji	42	F	Mkoani	Makombeni	Darajani
170	Amina Ali Shaali	60	F	Mkoani	Makombeni	Darajani
171	Fatma Mwadini Simai	70	F	Mkoani	Chambani	JKU
172	Mafunda Juma Khamis	41	F	Mkoani	Chambani	JKU
173	Mayufe Muhammed Ali	34	F	Mkoani	Chambani	JKU
174	Saida Khamis Amour	45	F	Mkoani	Chambani	JKU
175	Sidhanii Mohd Mbwana	40	F	Mkoani	Chambani	JKU
176	Fadhila Amini Mohd	30	F	Mkoani	Chambani	JKU
177	Amina Akida Makame	30	F	Mkoani	Chambani	JKU
178	Amina Kombo Juma	30	F	Mkoani	Chambani	JKU
179	Batuli Omar Hamad	25	F	Mkoani	Chambani	JKU
180	Mwanahamis Iddi Haji	50	F	Mkoani	Chambani	JKU
181	Asha Othman Haji	35	F	Mkoani	Chambani	JKU
182	Moza Amour Ali	65	F	Mkoani	Wambaa	Mkadini

183	Hadia Haji Makame	60	F	Mkoani	Wambaa	Mkadini
184	Mtumwa Omar Haji	32	F	Mkoani	Wambaa	Mkadini
185	Hadia Ali juma	31	F	Mkoani	Wambaa	Mkadini
186	Salma Khamis Ndaika	45	F	Mkoani	Wambaa	Mkadini
187	Moza Amour Njoro	40	F	Mkoani	Wambaa	Mkadini
188	Riziki Moh'd Ali	60	F	Mkoani	Wambaa	Mkadini
189	Saumu Moh'd Ali	50	F	Mkoani	Wambaa	Mkadini
190	Nuru Ali Mbarouk	47	F	Mkoani	Wambaa	Mkadini
191	Amia Moh'd Abdalla	41	F	Mkoani	Wambaa	Mkadini
192	Safia Rajab Simba	38	F	Mkoani	Wambaa	Mkadini
193	Rufea Ayoub Shaib	38	F	Mkoani	Wambaa	Mkadini
194	Khalfan Said Ali	50	M	Mkoani	Makombeni	Darajani
195	Omar Abdalla Mussa	50	M	Mkoani	Makombeni	Darajani
196	Juma Said Ali	50	M	Mkoani	Makombeni	Darajani
197	Amini Othman Sharif	60	M	Mkoani	Makombeni	Darajani
198	Mzee Khamis Saleh	43	M	Mkoani	Chambani	JKU
199	Saleh Bakar Omar	60	M	Mkoani	Chambani	JKU
200	Mkubwa Omar Sadiki	70	M	Mkoani	Chambani	JKU
201	Moh'd Said Moh'd	42	M	Mkoani	Wambaa	Mkadini
202	Khamis Abushir Hussela	39	M	Mkoani	Wambaa	Mkadini
203	Khamis Said Nassor	60	M	Mkoani	Wambaa	Mkadini
204	Mikidadi Juma Rajab	35	M	Mkoani	Wambaa	Mkadini
205	Amina Makame Ali	70	F	North A	Kikobweni	Kibokwa
206	Bahati Suleiman Haji	47	F	North A	Chaani Kubwa	Kibokwa
207	Khatibu Ameir Khatibu	60	F	North A	Gamba	Kibokwa
208	Mayasa Abdallah Juma	44	F	North A	Bandamaji	Ziwani
209	Mchanga Salum Kombo	45	F	North A	Mkokotoni	Mto Wa Maji
210	Mtuluku Usi Ramadhani	50	F	North A	Kinyasini	Kwa Yakubu
211	Mtumwa Hassan Simai	45	F	North A	Chaani	Kibokwa
212	Mwanakombo Hatibu Sharif	50	F	North A	Kivunge	Kibokwa
213	Sabrina Shaabani Ramadhani	50	F	North A	Bandamaji	Manyema
214	Shaani hassan Bakar	56	F	North A	Chaani Kubwa	Kibokwa
215	Ali Abdallah Ali	52	M	North A	Kinyasini	Kibokwa
216	Ame Khamis Ali	60	M	North A	Chaani Kubwa	Kibokwa
217	Denge Juma Denge	50	M	North A	Kikobweni	Kibokwa
218	Haji Kundi Khamis	40	M	North A	Bandamaji	Bondeni
219	Juma Khamis Mahmoud	50	M	North A	Kinyasini	Seed Block

220	Khamis Sharif Khamis	50	M	North A	Bandamaji	Ziwani
221	Mngwali Haji Faki	36	M	North A	Mkokotoni	Mto Wa Maji
222	Mwadini Pandu Mwadini	56	M	North A	Mcheza Shauri	Kibokwa
223	Pili Mkame Pili	52	M	North A	Kikobweni	Kibokwa
224	Shadhil Shauri Haji	58	M	North A	Mcheza Shauri	Kibokwa
225	Usi Fadhili Machano	50	M	North A	Chaani Masingini	Mbuzini C
226	Yahya Hamza Haji	57	M	North A	Pita Na Zako	Kibokwa
227	Yasin Khamis Haji	60	M	North A	Kidombo	Kibokwa
228	Yusuf Fadhil Muhsin	45	M	North A	Chaani Kubwa	Kibokwa
229	Bishara Juma Khamisi	48	F	North B	Matetema	Makame Ng'ombe
230	Fatma Mzee Mcha	55	F	North B	Upenja	Bwana Kasema
231	Hadia Ali Makame	50	F	North B	Kwagube	Mihoroni
232	Hazina Dugh Juma	71	F	North B	Upenja	Mkamia Maji
233	Kazija Mcha Mkanga	42	F	North B	Pangeni	Kwamzungu
234	Khadija Khamis Vuai	60	F	North B	Pangeni	Machengwe
235	Mema Saleh Hamad	43	F	North B	Pangeni	Kwa Mzungu
236	Miza Ali Omar	70	F	North B	Upenja	Chokwe
237	Miza Juma Khamis	50	F	North B	Donge Mchangani	Jangwani
238	Mosi Kwaza khamis	56	F	North B	Pangeni	Mpirani
239	Mrisho Khamis Haji	60	F	North B	Zingwezingwe	Kibambasa
240	Mwanapili Suleiman Ame	62	F	North B	Mafufuni	Jangwani
241	Panguwa Mcha Haji	30	F	North B	Upenja	Bwana Kasema
242	Pili Zila Makame	38	F	North B	Bandamaji	Matetema
243	Riziki Mossi Kombo	45	F	North B	Donge Mchangani	Jangwani
244	Subira Pandu Kombo	51	F	North B	Mahonda	Jogawari
245	Tatu Mbuga Moh'd	47	F	North B	Upenja	Nyanganyani
246	Unjukani Mganga Fum	39	F	North B	Pangeni	Chejio Umande
247	Wanu Foum Khamis	45	F	North B	Pangeni	Chajio Umande
248	Abubakar Omar Machano	42	M	North B	Donge Pwani	Jangwani
249	Ali Bora Mteza	50	M	North B	Upenja	Nguli
250	Ali Moh'd Omar	50	M	North B	Donge Pwani	Jangwani
251	Ame Kiroja Sleiman	73	M	North B	Kilombero	Mipirani
252	Ame Moh'd Juma	56	M	North B	Donge Vijibweni	Jangwani
253	Ame Mtumwa Ame	49	M	North B	Mafufuni	Jangwani
254	Ameir Abasi Ameir	64	M	North B	Donge Vijibweni	Jangwani
255	Amour Hamadi Juma	65	M	North B	Matetema	Mihoroni
256	Chande Khamis Chande	60	M	North B	Pangeni	Machengwe

257	Choum Moh'd Mwevura	47	M	North B	Donge Majenzi	Jangwani
258	Fumu Khamis Fum	68	M	North B	Pangeni	Asante Jumbe
259	Haji Abdallah Pandu	56	M	North B	Upenja	Mkamia Maji
260	Haji Ali Makame	36	M	North B	Fujoni	Kitongani
261	Hamadi Saleh Hamadi	54	M	North B	Mkadini	Naimu
262	Hilali Abdalla Machano	44	M	North B	Donge Vijibweni	Jangwani
263	Iddi Himidi Iddi	51	M	North B	Matetema	Makame Ng'ombe
264	Issa Silima Muhamad	39	M	North B	Kilombero	Mtumbakuni
265	Juma Atawa Ame	48	M	North B	Makoba	Jangwani
266	Juma Ziadi Ussi	61	M	North B	Makoba	Jangwani
267	Khamis Mtwana Mwalimu	58	M	North B	Makoba	Jangwani
268	Mahadhi Mjumbe Haji	50	M	North B	Mafufuni	Jangwani
269	Majaliwa Issa Ali	45	M	North B	Kilombero	Mtumbakuni
270	Maryam Khamis Saleh	65	M	North B	Kwagube	Kibombani
271	Mossi Said Abdalla	49	M	North B	Zingwezingwe	Kibambasa
272	Muhsini Ame Nyasa	40	M	North B	Donge Vijibweni	Jangwani
273	Muslihi Maulidi Fidia	71	M	North B	Mafufuni	Jangwani
274	Omar Makame Juma	51	M	North B	Makoba	Jangwani
275	Omari Juma Machano	74	M	North B	Mafufuni	Jangwani
276	Ramadhani Ali Sheha	78	M	North B	Misufini	Jangwani
277	Salum Seif Ameir	65	M	North B	Donge Vijibweni	Jangwani
278	Shida Hamad Ame	56	M	North B	Makoba	Jangwani
279	Simai Miraji Juma	35	M	North B	Pangeni	Mnyonge
280	Vuai Hassan Mussa	30	M	North B	Upenja	Chanjaani
281	Asha Hassan Ameir	63	F	South	Mtende	Mganga
282	Futari Rashid Mussa	61	F	South	Mtende	Mtende
283	Msim Omar Shehe	50	F	South	Muyuni C	Muyuni
284	Mwanabaraka Shaka Ali	60	F	South	Muyuni B	Muyuni
285	Mwanajuma Abdalla Ali	28	F	South	Muyuni B	Muyuni
286	Mwanapili Juma Hassan	35	F	South	Muyuni C	Muyuni
287	Kinole Issa Kinole	75	M	South	Mtende	Mtende Mganga
288	Maulid Khamis Kombo	47	M	South	Mtende	Jangwa
289	Pandu Issa Pandu	49	M	South	Muyuni A	Muyuni
290	Sharia Juma Mzee	68	M	South	Muyuni B	Muyuni
291	Tatu Mohammed Seif	56	F	West	Bumbwi Sudi	Bumbwi Sudi
292	Mwajuma Said Waziri	60	F	West	Bumbwi Sudi	Bumbwi Sudi
293	Aviwa Ali Songoro	43	F	West	Kizimbani	Bumbwi Maekani

294	Mosi Masika Juma	45	F	West	Kizimbani	Madimbwini
295	Mpaji Haji Makungu	40	F	West	Kizimbani	Maekani
296	Mwanaidi Waziri Salum	60	F	West	Kizimbani	Magogoni
297	Shinuna Ali Juma	70	F	West	Kizimbani	Bumbwi
298	Kheri Said Kunguru	35	M	West	Bumbwi Sudi	Bumbwi Sudi
299	Jabir Khamis Vuai	56	M	West	Bumbwi Sudi	Bumbwi Sudi
300	Adam Khamis Othman	57	M	West	Bumbwi Sudi	Bumbwi Sudi
301	ramadhan Taribu Nyanza	50	M	West	Bumbwi Sudi	Bumbwi Sudi
302	Malik anas Juma	58	M	West	Bumbwi Sudi	Bumbwi Sudi
303	Mboge Abdi Simai	58	M	West	Bumbwi Sudi	Bumbwi Sudi
304	Hamadi Hilali Yusuf	64	M	West	Kizimbani	Kizimbani
305	Juma Khamis Vuai	74	M	West	Kizimbani	Bumbwi
306	Mrisho Khamis Omar	35	M	West	Kizimbani	Kizimbani
307	Saida Khamis Faki	60	F	Wete	Kiungoni	Tovuni
308	Mtumwa Hamad Bakar	50	F	Wete	Kiungoni	Tovuni
309	Mariam Maalim Sharif	45	F	Wete	Kiungoni	Tovuni
310	Zuhura Salim Hamadi	50	F	Wete	Kiungoni	Tovuni
311	Time Salim Hamadi	40	F	Wete	Kiungoni	Tovuni
312	Rehema Bakar Ali	30	F	Wete	Kiungoni	Tovuni
313	Chumu Ali Hamad	50	F	Wete	Kiungoni	Tovuni
314	Salima Hamad Juma	42	F	Wete	Kiungoni	Tovuni
315	Mchanga Rashid Ali	40	F	Wete	Kiungoni	Tovuni
316	Fatma Omar Said	50	F	Wete	Bopwe	Mangwena
317	Rehema Hamad Masoud	58	F	Wete	Bopwe	Mangwena
318	Mwajuma Makame Ali	45	F	Wete	Bopwe	Mangwena
319	Maulid Mbarouk Hamad	42	F	Wete	Bopwe	Mangwena
320	Ziada Abeid Juma	42	F	Wete	Bopwe	Mangwena
321	Mwanakhamis Shaame Mwadini	40	F	Wete	Bopwe	Mangwena
322	Abushia Khamis Haji	45	F	Wete	Bopwe	Mangwena
323	Maryam Abeid Juma	55	F	Wete	Bopwe	Mangwena
324	Asha Shaib Mabrouk	46	F	Wete	Bopwe	Mangwena
325	Siti Ali Salim	35	F	Wete	Pandani	Msaani
326	Halima Sleiman Salum	52	F	Wete	Pandani	Msaani
327	Salama Abdallah Suweid	67	F	Wete	Pandani	Msaani
328	Mayasa Abdalla Moh'd	52	F	Wete	Pandani	Msaani
329	Mgeni Said Juma	56	F	Wete	Pandani	Msaani
330	Sharifa Khamis Nassor	52	F	Wete	Pandani	Msaani

331	Raya Said Hamad	55	F	Wete	Pandani	Msaani
332	Maskat Amour Rashid	52	F	Wete	Pandani	Msaani
333	Maryam Omar Ali	42	F	Wete	Pandani	Msaani
334	Bimu Rashid Ali	57	F	Wete	Pandani	Msaani
335	Ashura Ali Hamad	45	F	Wete	Pandani	Msaani
336	Sada Juma Faki	54	F	Wete	Kambini	Kiongoni
337	Fatma Sleiman Said	40	F	Wete	Kambini	Kiongoni
338	Kame Juma Saleh	35	F	Wete	Kambini	Kiongoni
339	Siti Omar Bakar	35	F	Wete	Kambini	Kiongoni
340	Zuhura Ali Said	28	F	Wete	Kambini	Kiongoni
341	Kijuma Khamis Hamad	28	F	Wete	Kambini	Kiongoni
342	Sada Hamad Shehe	55	F	Wete	Kambini	Kiongoni
343	Amina Sleiman Juma	55	F	Wete	Kambini	Kiongoni
344	Zawadi Ali Kombo	42	F	Wete	Kambini	Kiongoni
345	Asha Faki Bakari	35	F	Wete	Kambini	Kiongoni
346	Chum Juma Khamis	50	F	Wete	Kangagani	Chwale
347	Zawadi Ali Hassan	45	F	Wete	Kangagani	Chwale
348	Sada Salim Mussa	49	F	Wete	Kangagani	Chwale
349	Wahida Hassan Bakari	41	F	Wete	Kangagani	Chwale
350	Fatma Haji Shamata	48	F	Wete	Kangagani	Chwale
351	Time Ali Afadhali	56	F	Wete	Kangagani	Chwale
352	Rehema Hamad Kombo	50	F	Wete	Kangagani	Chwale
353	Maida Ali Makame	40	F	Wete	Mt . Kusini	Mavuika
354	Zubeida Salum Moh'd	35	F	Wete	Mt . Kusini	Mavuika
355	Mariam Rashid Ali	40	F	Wete	Mt . Kusini	Mavuika
356	Raya Hassan Ali	35	F	Wete	Mt . Kusini	Mavuika
357	Rashid Ali Hamad	41	M	Wete	Kiungoni	Tovuni
358	Saleh Hamad Bakari	65	M	Wete	Kiungoni	Tovuni
359	Said Hamad Ali	50	M	Wete	Kiungoni	Tovuni
360	Masoud Ali Hamad	42	M	Wete	Kiungoni	Tovuni
361	Mngindo Kombo Faki	35	M	Wete	Kiungoni	Tovuni
362	Muhidin Kombo Hassan	55	M	Wete	Bopwe	Mangwena
363	Said Shaame Mwadin	56	M	Wete	Bopwe	Mangwena
364	Mikidad Salum Nganzi	40	M	Wete	Bopwe	Mangwena
365	Kassim Rayani Khamis	28	M	Wete	Bopwe	Mangwena
366	Issa Hamad Ali Omar	55	M	Wete	Bopwe	Mangwena
367	Salum Hamad Juma	60	M	Wete	Pandani	Msaani

368	Abdalla Seif Khamis	44	M	Wete	Pandani	Msaani
369	Seif Nassor Masoud	62	M	Wete	Pandani	Msaani
370	Said Sleiman Ali	56	M	Wete	Kambini	Kiongoni
371	Moh'd Salim Juma	55	M	Wete	Kambini	Kiongoni
372	Yahya Mjaka Makame	18	M	Wete	Kambini	Kiongoni
373	Haji Said Hamad	20	M	Wete	Kambini	Kiongoni
374	Ali Mkadam Ramadhan	50	M	Wete	Kangagani	Chwale
375	Said Salim Faki	45	M	Wete	Kangagani	Chwale
376	Juma Ali Haji	45	M	Wete	Kangagani	Chwale
377	Hussein Omar Rajab	65	M	Wete	Kangagani	Chwale
378	Issa Ali Salim	70	M	Wete	Kangagani	Chwale
379	Ali Khamis Suleiman	56	M	Wete	Kangagani	Chwale
380	Ali Juma Ali	75	M	Wete	Kangagani	Chwale
381	Juma Moh'd Ali	52	M	Wete	Mt . Kusini	Mavuika
382	Juma Said Rashid	52	M	Wete	Mt . Kusini	Mavuika
383	Ali Sali Rashid	45	M	Wete	Mt . Kusini	Mavuika
384	Khatib Said Khatib	50	M	Wete	Mt . Kusini	Mavuika
385	Hamad Omar Hassan	70	M	Wete	Mt . Kusini	Mavuika
386	Jamal Husein Uledi	41	M	Wete	Mt . Kusini	Mavuika
387	Sudi Mansuri Moh'd	35	M	Wete	Mt . Kusini	Mavuika
388	Omar Maulid Othman	33	M	Wete	Mt . Kusini	Mavuika
389	Ali Juma Ai	53	M	Wete	Mt . Kusini	Mavuika
390	Mselem Abdalla Muridan	60	M	Wete	Mt . Kusini	Mavuika