

UNIVERSITY OF MINNESOTA



## The Whole Village Project

Village Reports for Leguruki, Kingori, Malula  
Samaria, and Njoro in Arumeru District

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# TABLE OF CONTENTS

Acknowledgements .....	2
Table of Contents.....	2
Acronyms .....	5
<b>1 Introduction .....</b>	<b>6</b>
<b>2 Methodology.....</b>	<b>6</b>
<b>3 Key Findings.....</b>	<b>8</b>
<b>3.1 District Strengths.....</b>	<b>Error! Bookmark not defined.</b>
<b>3.2 District Gaps .....</b>	<b>Error! Bookmark not defined.</b>
<b>3.3 Opportunities.....</b>	<b>Error! Bookmark not defined.</b>
<b>4 Results and Discussion .....</b>	<b>11</b>
<b>4.1 Household Livelihood and Assets.....</b>	<b>11</b>
Figure 1. Main Occupation of Household Head .....	<b>Error! Bookmark not defined.</b>
Table 1. Village Recommended Activities to Improve Local Livelihoods .....	133
Figure 2. Asset Ownership .....	<b>Error! Bookmark not defined.</b>
<b>4.2 Unexpected Loss .....</b>	<b>14</b>
Figure 3. Impact of Unexpected Loss .....	<b>Error! Bookmark not defined.</b>
<b>4.3 Village Institutions and Civic Engagement.....</b>	<b>15</b>
Table 2. Institutional Resources by Village .....	16
Table 3. Civic Participation by Village by Percentage of Respondents.....	<b>Error! Bookmark not defined.</b>
<b>4.4 Education.....</b>	<b>188</b>
4.4.1 Household-Head Education .....	18
4.4.2 Primary School Completion .....	18
Figure 4. Percent Adults with No Education versus Completed Primary School.....	199
Figure 5. Adult Primary School Completion Rates, Disaggregated by Sex.....	19
4.4.3 Access to Primary Education.....	20
Table 4. Primary School Environment .....	20
Table 5. Percent of Students Attending Primary School Hungry.....	21
4.4.4 Access to Secondary Education.....	21
Table 6. Secondary School Environment.....	22
<b>4.5 Health.....</b>	<b>22</b>
4.5.1 Access to Health Services.....	22
Table 7. Top Ranked Health Issues for Men, Women, and Children .....	23
4.5.2 Malaria and Other Illnesses .....	233
Figure 6. Households with Mosquito Nets, Treated and Untreated .....	244
4.5.3 Under-Five Health Status.....	244
Figure 7. Primary Caretaker of Children Under-Five .....	255
Table 8. Percent Children Under-5 Who Have Ever Had a Disease .....	255
Figure 8. Percent Children Under-5 Vaccinated .....	266
4.5.4 Environmental Health.....	266
Figure 9. Primary Sources of Drinking Water.....	277
4.5.5 HIV/AIDS .....	277
Table 9. Sample Size of KAP Survey, by Sex .....	28
Figure 10. Village HIV/AIDS Knowledge Scores, Disaggregated by Sex.....	<b>Error! Bookmark not defined.</b>
Figure 11. Percent Eligible Adults with No versus High HIV Prevention Knowledge .....	30
Figure 12. Eligible Adults with No HIV Prevention Knowledge, Disaggregated by Sex.....	30
<b>4.6 Nutrition and Food Security .....</b>	<b>30</b>
4.6.1 Household Nutrition .....	30
Figure 13. Average Number of Different Foods Consumed in the Last 7 Days.....	31
4.6.2 Infant and Young Child Feeding.....	31
4.6.3 Under-Five Nutrition .....	31
Figure 14. Percent Children Under-5 Eating Food Item in Last 24 Hours .....	32
Figure 15. Percent Children Under-5 Malnourished .....	33

4.6.4	Food Security .....	33
	Table 10. Percent of Households that Experienced a Food Insecurity in Last 4 Weeks .....	33
4.6.5	Kitchen Gardens.....	333
<b>4.7</b>	<b>Agriculture.....</b>	<b>334</b>
	Table 11. Percent Households Cultivating by Number of Crops Cultivated.....	345
	Table 12. Qualitative Data on District Agricultural Environment .....	35
<b>4.8</b>	<b>Livestock.....</b>	<b>35</b>
	Table 13. Mean Number of Livestock Owned per Household by Village.....	36
<b>5.</b>	<b>Conclusions.....</b>	<b>36</b>
<b>5.1</b>	<b>Recommendations .....</b>	<b>36</b>
<b>5.2</b>	<b>Next Steps.....</b>	<b>37</b>
<b>5.3</b>	<b>How You Can Help .....</b>	<b>37</b>
Appendix A – Survey Instruments .....		<b>38</b>
Appendix B – Table of Selected Indicators by Village .....		<b>40</b>

## ACRONYMS

COSTECH	Tanzania Commission for Science and Technology
FGD	Focus Group Discussion
HH	Household(s)
IYCF	Infant and Young Child Feeding
KAP	Knowledge, Attitude and Practices
NGO	Non-Governmental Organization
NIMR	National Institute of Medical Research
SFTZ	Savannas Forever Tanzania
STD	Sexually Transmitted Disease
TAWIRI	Tanzanian Wildlife Research Institute
TDHS	Tanzania Demographic and Health Survey
TFR	Total Fertility Rate
THIS	Tanzania HIV Indicator Survey
TSH	Tanzania Shillings
UMN	University of Minnesota
USAID	U.S. Agency for International Development
WHO	World Health Organization
WVP	Whole Village Project

# 1 INTRODUCTION

The purpose of this report is to present district officials and local leaders with multi-sectoral data across several villages in this district. We hope these data may be useful in seeing the strengths and weaknesses of different sectors and the variation across villages. These data may be useful in prioritizing future development projects. The villages represented here were selected by our donors for their project purposes and therefore they cannot be seen as representatives of the district. The data however, illustrate the diversity of economic and social development activities occurring across villages in the district.

The Whole Village Project (WVP) is collecting and analyzing comprehensive data at village level over an extended period of time. A collaborative project between Savannas Forever Tanzania (SFTZ), a Tanzanian NGO, and the University of Minnesota, USA, the Whole Village Project has a **vision** to work with people in rural Tanzanian villages to acquire and use knowledge for improving long-term health and well-being while sustaining natural resources. To achieve this goal, quantitative and qualitative data are systematically collected in villages across northern Tanzania by the Savannas Forever team in partnership with staff from the National Institutes of Medical Research (NIMR) and the Tanzanian Wildlife Research Institute (TAWIRI). The data are sent to the University of Minnesota for analysis and then returned to Tanzania. The SFTZ team returns to each village to present the data to villagers for their own use and decision-making. WVP intends to return to each village every two to three years in order to assess the sustainability of development projects over time and identify best practices.

In this report, we present a summary of data collected across five villages: Leguruki, Kingori, Malula, Samaria, and Njoro villages, Arumeru District in September 2009, August 2010, and November 2010.

# 2 METHODOLOGY

The Whole Village Project's survey tools and methodology has been reviewed and approved by multiple Tanzanian research authorities (COSTECH, NIMR and TAWIRI) and the University of Minnesota institutional review board for the ethical conduct of human subjects research. Further, permissions are sought by the respective regional, district and village leadership before beginning data collection.

Village selection is based on the funding agency priorities and permission of government leaders. After permissions are received the Savannas Forever Tanzania (SFTZ) staff arrange dates for data collection with district officials and village leaders. A Tanzanian survey team of 6-7 personnel work in each village for 5-6 days. The team begins with a sensitization session with leaders and community members to introduce the

project and staff. Village leaders provide a roster list of heads of households and the research team uses a computer generated randomization program to select 60-75 households from this list. A standardized quantitative survey is conducted in each selected household.

Data collection tools include both quantitative and qualitative instruments. All interviews and focus groups are conducted in Kiswahili whenever possible. If respondents are not fluent in Kiswahili, a bi-lingual villager is identified by the leadership to translate from the local language to Kiswahili. The core household survey asks questions about livelihood, earnings, educational status of all household members, assets, health and natural resource use. From the household members, two brief individual level surveys are conducted: (1) a HIV/AIDS knowledge, attitude and practice (KAP) survey and (2) an anthropometric assessment of children under-five and nutrition questions. For the KAP survey, up to 4 adults (15 years or older) within the household are asked to complete the survey. All interviews are conducted in a private space where no one else may listen. All children in the household under-five are weighed and measured and the primary caretaker is asked to answer the accompanying survey.

In order to obtain more contextual data about each village, a number of focus group and key informant interview tools are used. Focus groups are conducted with men and women, village leaders, and a special group of agriculturalists and livestock holders. Village leaders invite villagers to participate and try to obtain diversity of representation by sub-village, age and gender. The research team also conducts an institutional assessment of village organizations with a mixed group of 10-15 villagers to identify the different NGOs, religious organizations, and government services working in the village and their respective strengths, weaknesses and contributions to the community. In addition, key informant interviews are conducted with school headmasters and clinic officers. A detailed list of survey instruments and focus group guides can be found in Appendix A.

### **3 KEY FINDINGS**

The research captured a broad range of information from five villages in Arumeru District: Leguruki, Kingori, Malula, Samaria, and Njoro. Overarching district strengths, gaps, and opportunities were pulled from the abundance of data collected and analyzed and are presented below. Detailed results and discussion are presented in Section 4.

#### **3.1 District Strengths**

There are a number of common strengths observed between the five villages. In particular, there are high rates of child vaccinations for BCG, DPT and polio, widespread latrine usage, high access to protected water sources, relatively diverse food consumption, a moderately high HIV knowledge score, and high access to primary education.

Infant and young child vaccination rates for BCG, DPT and polio were over 94% in all five of the villages. However, vaccination rates for measles dropped to an average of 84%; given the virulence of this disease, clinic officers and health committee members should identify strategies to meet the gaps in measles vaccination. Although approximately 87% of infants and children took Vitamin A supplements, again the community should strive for 100% coverage given the low Vitamin A intake in local diets and the significant impact that Vitamin A deficiency has on child development.

Among the villages surveyed, there were a high percentage of households with latrines. Access to latrines and appropriate waste disposal reduce opportunities for communicable disease transmission and water borne diseases. Over 90% of respondents in Kingori, Leguruki, Samaria, Malula, and Njoro have a pit latrine, which is higher than the average of most other districts.

Over 80% of respondents in four of the five villages surveyed (Njoro being the exception with 23%) have access to protected water sources, meaning public taps, standpipes, and protected wells. This level of access to protected water is significantly higher than that of other districts surveyed. In Njoro, the water status of 75% of respondents is unknown.

The weekly average of different types of foods consumed by villagers in the five villages surveyed ranges between 7.6 types in Malula and 9.6 types in Kingori. The higher this number the more likely a sufficient diet is being consumed by villagers. This is reflected in the relatively high diversity of foods being consumed including grains, vegetables, legumes, fruits, and meat.



General AIDS knowledge is slightly higher than average among the five villages surveyed in Arumeru District. The average AIDS knowledge scores ranged from 4.1 to 4.8 among males and 3.6 to 4.4 among females (on a scale of 6). The scores for both males and females are slightly above that of most districts. The high AIDS knowledge scores in Arumeru district are to some degree the result of the low percentage of respondents with no HIV prevention knowledge (0-2 points). Respondents reporting no HIV/AIDS prevention knowledge were low. Again, although there is a strength here, all five communities should strive to increase HIV knowledge in order to better protect themselves and their families.

Each of the five villages surveyed reported having two or more primary schools, with the exception of Njoro which has one. Though there seems to be an abundance of schools, access to education cannot be assumed to be universal. Additional factors contribute to access to education including teacher availability and school fees. Among the five villages, classroom to student ratios and teacher to student ratios are high.

### **3.2 District Gaps**

Mosquito net ownership is significantly lacking in four of the five villages surveyed, the exception being Malula with 90% net ownership. In Njoro, 63% of households own at least one net, 64% in Leguruiki, and 77% in Kingori and Samaria. Percentages of those that had recently had their nets dipped in insecticide treatment were even lower: 23% in Kingori, 33% in Leguruiki, 48% in Njoro, 64% in Malula, and 67% in Samaria. Given the high rates of malaria in the area, increasing bed net coverage to 100% and regular dipping of nets should be encouraged.

The level of one's education is often a predictor of other quality of life factors such economic productivity, food security, and overall health. In the five villages surveyed, the quality of schools is a concern. Quality factors include a low teacher to student ratio, poor student exam results, and the limited food available at school. A meal of porridge is provided at seven of the 11 primary schools. Children are the future. However, if they are not able to access quality education their chances for improved quality of life as adults are greatly reduced.

Access to quality health services is also limited in the district. Dispensaries are found in four of the five villages, the exception being Njoro. Most respondents in this district felt the treatment at local dispensaries was extremely limited. According to men's and women's focus group discussions, malaria is the number one problem followed by urinary tract infections, typhoid, and high blood pressure. For children, the main issues in addition to malaria are diarrhea, pneumonia, tuberculosis, and malnutrition. In addition, maternal and child health services are extremely limited.

Any level of acute malnourishment among children under-five must be considered a gap. Nearly 10% of children under-five in Kingori and 13% in Samaria are underweight for their age. Leguruki, Samaria, and Njoro report stunting in approximately 27% of children under-five. In all five villages, the main source of food for children under-five is ugali, which itself cannot meet a child's nutrition needs. There was also a significant lack of green vegetables and fruit in the diet of children and the limited intake of the nutrients these foods offer affect child development.

Farming, as the main source of income, is vulnerable to the problem of soil erosion which is harmful to the sustainability and reliability of farming. Though there is little use of inorganic fertilizers, with the exception of Njoro where use of organic and inorganic fertilizers is high, there is extensive intercropping and terracing practiced to control erosion. Leguruki, Samaria, and Njoro indicated that they had not received visits from agricultural extension officers in the past year.

Newcastle Disease is the number one cause of chicken mortality in Tanzania. Vaccination rates against Newcastle Disease are low in Arumeru District. The highest rate of the five villages, 56% of households owning chickens in Kingori vaccinate those chickens against Newcastle Disease. The lowest rate is 24% in Njoro. These rates are low given the severe consequences of infection with Newcastle Disease. Household surveys revealed that 23% to 31% of chickens had been lost to disease in the past year in these villages.

### **3.3 Opportunities**

Three secondary schools exist in two villages among the five villages surveyed. Education committees, such as those in existence in Leguruki and Kingori, have an opportunity to work with district leaders to identify opportunities for developing solutions and improving the quality of schools in the district overall. The formation of education committees in the remaining three villages could produce improvements in the education available in Arumeru district. As education creates a foundation for overall family health and economic opportunities, prioritizing education is critical for the future development of this district.

Farmers in Leguruki, Samaria, and Njoro reported that did not receive a visit by an agricultural extension worker in the past year. Kingori and Malula both received visits from an agricultural extension worker. These agricultural extension workers typically train a small group of local farmers in agricultural best practices and established model farms (growing maize, sunflowers, etc.) as demonstration plots. The trained farmers are expected to transfer knowledge and skills learned to their own farms. Given that the most common complaints of farmers was lack of knowledge of improved farming techniques and other measures, there appears to be an opportunity to further spread agricultural knowledge from model

farmers to others and improve the productivity of farming. The district should monitor the impact of the work done by agricultural extension workers.

Increasing livestock vaccination rates will reduce the rate of cattle and goats lost to disease, which is still relatively high. In addition, although many households have heard of Newcastle disease, only a small proportion of chickens are vaccinated. Therefore, villages have an opportunity to reallocate resources to increase livestock vaccination rates, which is effective in reducing livestock lost to diseases.

Households with kitchen gardens tend to have less serious food insecurity problems, though this pattern was not demonstrated in Njoro. Specifically, villages with higher coverage of kitchen gardens tend to have a lower percentage of households that went to bed hungry, ate limited variety of food, and fewer underweight children. However, kitchen garden training remains very limited in the villages surveyed in Arumeru district. Village leaders have the opportunity to convey knowledge about kitchen gardens as a means to alleviate food insecurity.

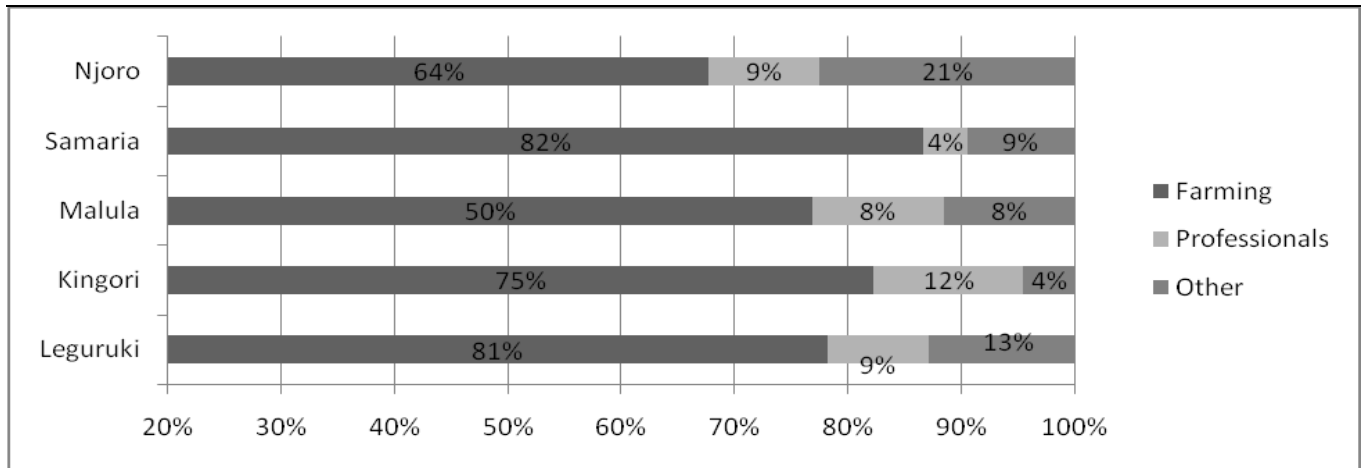
District leadership also has an opportunity to further protect the children in the district from vaccine-preventable disease. A high percentage of children under-five in Arumeru District are vaccinated against tuberculosis (BCG), DPT, polio, and measles, as recommended by the World Health Organization (WHO). However, vaccination coverage is not universal. Given the already high level of vaccination, the district has an opportunity to reach universal coverage against vaccine-preventable disease given the proper allocation of resources.

## **4 RESULTS AND DISCUSSION**

### **4.1 Household Livelihood and Assets**

Over 75% of household heads surveyed in Leguruki, Kingori, and Samaria report farming as their main occupation (see Figure 1). The remaining primary occupations of household heads include professionals and small business owners. Malula, with the lowest percentage of farming household heads of the villages surveyed, reported 28% of respondents as students as well as 8% with no occupation. Although not listed as a main occupation, a number of households own livestock in the form of cattle, goats and sheep, and chickens.

**Figure 1. Main Occupation of Household Head**



More households are headed by a man than a woman in all villages surveyed. The highest percentages of households headed by women are the villages of 27% in Samaria and 21% in Leguruki. The lowest percentage of households headed by women, significantly lower than the other four villages surveyed, was 7% in Kingori. Approximately three-quarters of female headed households are headed by single women who are widows; the remainder are primarily women in polygamous marriages.

Income, in the form of cash or goods, is most commonly generated through agricultural production. Village leaders in Kingori, Leguruki, Samaria, Malula, and Njoro listed crop production and sales to be the primary sources of income. Livestock, small businesses, alcohol sales, bee keeping and honey production, brick making, firewood sales are additional income generators in the five villages.

Focus group discussions (FGDs) facilitated with men and women investigated activities that could improve the livelihoods of village members. The highest ranked recommendation by participant type by village is listed in Table 1.

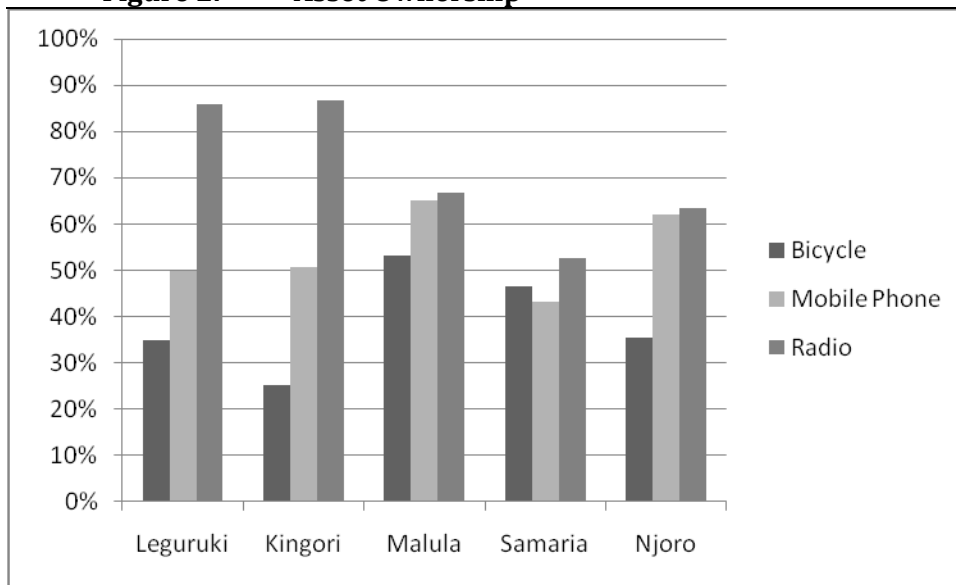
**Table 1. Village Recommended Activities to Improve Local Livelihoods**

<b>Village</b>	<b>Men</b>	<b>Women</b>
<b>Leguruki</b>	Microfinance Distribution of agricultural inputs Sewing machines	Poultry keeping Dairy cattle keeping Dairy goat keeping
<b>Kingori</b>	Chicken keeping Dairy cattle keeping Microfinance	Chicken keeping for eggs Dairy cattle keeping Microfinance
<b>Malula</b>	Dairy cattle/goat keeping Indigenous chicken keeping Advanced maize and sunflower	Borehole Microfinance Poultry
<b>Samaria</b>	Chicken keeping Hybrid goat keeping Borehole	Local chicken keeping Microfinance Sewing machines
<b>Njoro</b>	Poultry production Microfinance Vegetable farming	Dairy cattle keeping Dairy goat keeping Microfinance

The recommended activities did not vary significantly between gender focus groups. Other recommendations included alternative income generating activities such as bee keeping and making batik.

Asset ownership, a proxy indicator of a household's socioeconomic status, was polled (Figure 2). When households were asked about ownership of durable goods such as mobile phones, radios or bicycles, the most common item owned in all five of the villages was a radio. Leguruki (86%) and Kingori (87%) reported the highest radio ownership rates. After radio ownership, mobile phones were the next most commonly owned commodity in Leguruki (50%), Kingori (51%), Malula (65%), and Njoro (62%). In Samaria, however, bicycle ownership (47%) was slightly higher than that of a mobile phone (43%). Bicycle ownership was greatest in Malula (53%) and lowest in Kingori (25%).

**Figure 2. Asset Ownership**



The WVP has also created a “wealth index” based on 30 household assets including items such as roof type and radio ownership but excluding livestock. The varying scores across the five villages are as follows: 6.2 for Leguruki, 4.8 for Kingori, 5.1 for Malula, 3.8 for Samaria, and 6.1 for Njoro. Across the 45 villages surveyed by WVP to date, these villages fall into the middle third of villages for overall number of assets.

The vast majority of houses surveyed in Arumeru District were built with natural materials, with walls made of mud and baked bricks and floors made of earth or clay. Of the houses surveyed in Arumeru District, the vast majority were built with corrugated metal roofs (over 90% in all five villages) while the remaining were constructed with natural materials, such as mud/straw/poles and grass/palm thatch.

## 4.2 Unexpected Loss of Income or Assets

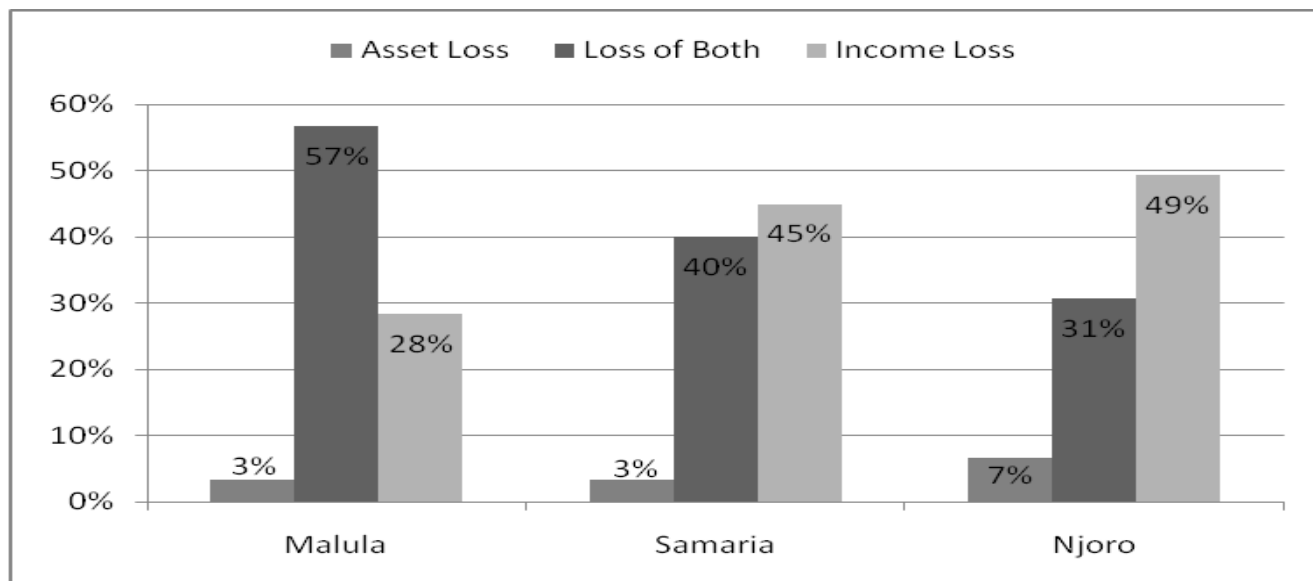
In a given year, a household may experience unanticipated crises such as the death of a family member, the loss of a job or the loss of crops or livestock. Some families or households are able to cope with these losses better than others.

When we asked households in Leguruki, Kingori, Malula, Samaria and Njoro about unanticipated income or asset losses it became apparent that the villages as a whole were coping with significant economic losses this year due to poor crop production and the high price of foods.

93% of households in Samaria 88% of households in Malula, and 95% of households in Njoro reported unexpected loss in the past year. These data were not recorded for Leguruki and Kingori.

The most reported unexpected losses in Malula, Samaria, and Njoro were substantial loss of crops due to weather, namely drought in Samaria and Malula.

**Figure 3. Impact of Unexpected Loss**



As demonstrated in Figure 3, unexpected losses result in a significant setback to stability within both households and the villages themselves. 31% of respondents in Njoro, 40% in Samaria, and 57% in Malula reported both income and asset loss. Income loss was significantly higher than asset loss in all three villages.

### 4.3 Village Institutions and Civic Engagement

Table 2 presents a picture of the institutional analysis conducted in the villages surveyed in Arumeru District. Village institutions and services are categorized according to the following types: village-run, village committee or group, and operated by third party. The sector column indicates the type of service or resource that the institution provides. The sector of an institution provides a general description of services provided; however, such descriptions are not exhaustive nor do organizations necessarily provide the same services to different villages.

The tally of total institutions in each village is listed in the last row of Table 2, and sub-totals by type of institution is listed within the table immediately following each sub-section. Although these tallies do not give a picture of the types of services available in each village, they do indicate the relative level of activity by type of service providers.

**Table 2. Institutional Resources by Village**

Institution	Leguruki	Kingori	Samaria	Malula	Njoro	Sector
<b>Village-Run</b>						
Community Health Worker	-	-	-	-	-	Health
Education	x	x	x	x	X	Education
Health Service	x	x	x	x	X	Health
Religious Institution (church, mosque, etc.)	x	x	x	x	X	Aid/Development, Food/Hunger, Human Development, Social Welfare
Veterinary Services	x	x	-	x	-	Health, Wildlife/Conservation
Village Council/ Government	x	x	x	x	X	Politics/Government
Village Market	x	x	-	-	-	Business Development
Community/Publicly Owned Water	x	x	-	-	-	Water
<b>Sub-total Village-Run</b>	<b>7</b>	<b>7</b>	<b>4</b>	<b>5</b>	<b>4</b>	
<b>Village Committee/Group</b>						
Education Committee	x	x	-	-	-	Farming/Agriculture
Environment and Natural Resources Committee	x	-	-	-	-	Energy/Environment, Farming/Agriculture
Farmers Coop/ Agriculture Association	x	x	-	-	-	Farming/Agriculture
Security Committee	-	x	x	-	-	Legal/Law Enforcement
Water Committee	x	x	-	-	-	Water/Civil Service
Community Development/ Planning/ Financial Committee	-	x	x	-	-	Financial/Socioeconomic
<b>Sub-total Village Committee/Group</b>	<b>4</b>	<b>5</b>	<b>2</b>	<b>0</b>	<b>0</b>	
<b>Third-Party Operated</b>						
ADDO	-	x	-	-	-	Aid/Development, Social Welfare
ADP	x	x	x	x	-	Aid/Development
BRAC	-	-	-	-	X	Aid/Development
DADP/JICA	-	-	x	-	-	Education/Agriculture
EF	-	-	x	-	-	Education/Conservation
JPTL	x	-	-	-	-	Agriculture/Farming
PADEP	x	x	-	-	-	Farming/Agriculture
PRIDE	-	-	-	x	-	Legal/Law Enforcement
SACCOS	x	x	x	-	X	Financial/Socioeconomic
SEDA	-	-	-	x	-	Financial/Socioeconomic
SIC	x	x	-	x	-	Education
TAP	-	x	-	-	-	Farming/Agriculture
TASAF	-	-	-	x	-	Social Welfare
TEMBO	x	x	-	-	-	Education, Financial/Socioeconomic
<b>Sub-total Third Party</b>	<b>6</b>	<b>7</b>	<b>4</b>	<b>5</b>	<b>2</b>	
<b>Total</b>	<b>17</b>	<b>19</b>	<b>10</b>	<b>10</b>	<b>6</b>	

Kingori has nearly twice as many institutions as Samaria and Malula and well over twice as many institutions as Njoro. Neither Malula nor Njoro have any village committees while Kingori has five. Across



the five villages, a large focus of many of the village run organizations and committees are on farming and agriculture, health issues and improving access to credit. In focus groups, villagers were asked to provide an assessment in the form of a percentage of some of the major institutions in their village. Leguruki and Samaria are generally favorable about their village run institutions and committees with the exception of health services (Leguruki) and the farmers association (Leguruki). Malula is highly favorable of their education and religious institutions but highly unfavorable in regards to their health services and village government. Njoro is highly critical of their local institutions and committees; although villagers in focus groups acknowledged that the village government, schools and dispensaries each were making some positive contributions, they also named an equal number of weaknesses.

Kingori reported the largest presence of third-party operated institutions (NGOs, multi-lateral institutions and private businesses), seven in total, followed by Leguruki and Malula. Services were focused in the area of farming and agriculture, development, and education. In general, scores for third-party institutions working in these three communities varied widely from highly favorable to critical. Most of the criticism in all cases was because NGOs had only reached a few people, had not fulfilled all the services that were expected, did not provide follow-up, or did not include villagers in the decision making process.

Household level civic engagement was measured by the household survey respondent's membership in a village government or committee, participation in village assemblies, and asking a village leader for assistance. Approximately 1 in 13 respondents in Leguruki and Njoro and 1 in 20 in Kingori are members of either a village government or a village committee, which requires the highest level of personal investment of time and resources (see Table 3).

**Table 3. Civic Participation by Village by Percentage of Respondents**

	Leguruki	Kingori	Malula	Samaria	Njoro
Village government or committee member	14%	5%	N/A	N/A	12%
Participated in village assembly (last 12 mo)	44%	45%	N/A	N/A	19%
Asked village leader for assistance (last 12 mo)	12%	9%	N/A	N/A	70%

Overall civic participation in village assemblies held in the past 12 months was relatively low the villages surveyed. Despite lack of participation in village assemblies, many households felt comfortable asking village leaders for assistance.

## 4.4 Education

### 4.4.1 Household-Head Education

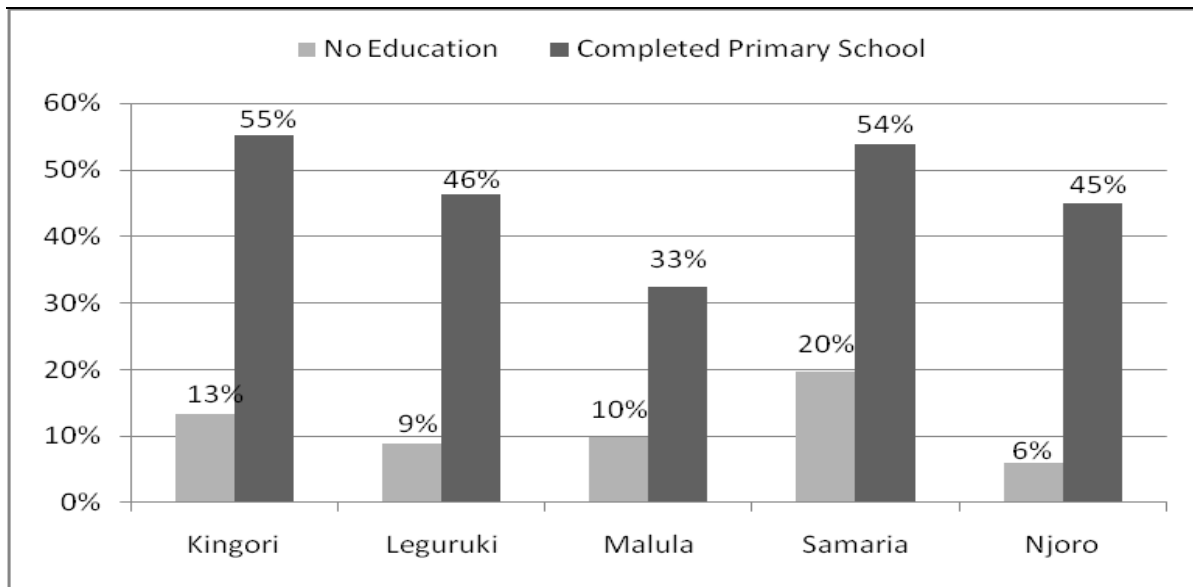
Among household heads in Kingori, Leguruki, Malula and Samaria proportions of primary school completions are modest with 40-50% primary school completion rates. Rates in Njoro, however, were significantly lower with only 15% of household heads reporting having completed primary school. 41% of household heads in Njoro attended primary school but did not complete through Standard 7. In Malula 36% of respondents and in Kingori 20% of respondents had no education compared with 8% in Malula and 9% in Njoro. Malula had six household heads that attended secondary school (12%), though none had completed their secondary education. Leguruki and Njoro each had one respondent who completed secondary school. Other types of education, such as adult or vocational education, were low.

Education rates vary among household heads, oftentimes with significant differences between males and females. In Samaria, for example, 20% of female household heads completed primary school while 63% of their male counterparts had completed the same level of education. Primary school completion rates in Njoro, however, show a different picture with 46% of female household heads having completed primary school and 8% having continued on, but not completing, secondary school. Of their male counterparts, 39% completed primary school and 16% continued on to, but did not complete, secondary school. In Leguruki, 54% of male household heads completing primary school while the rate for female household heads was significantly lower at 6%.

### 4.4.2 Primary School Completion

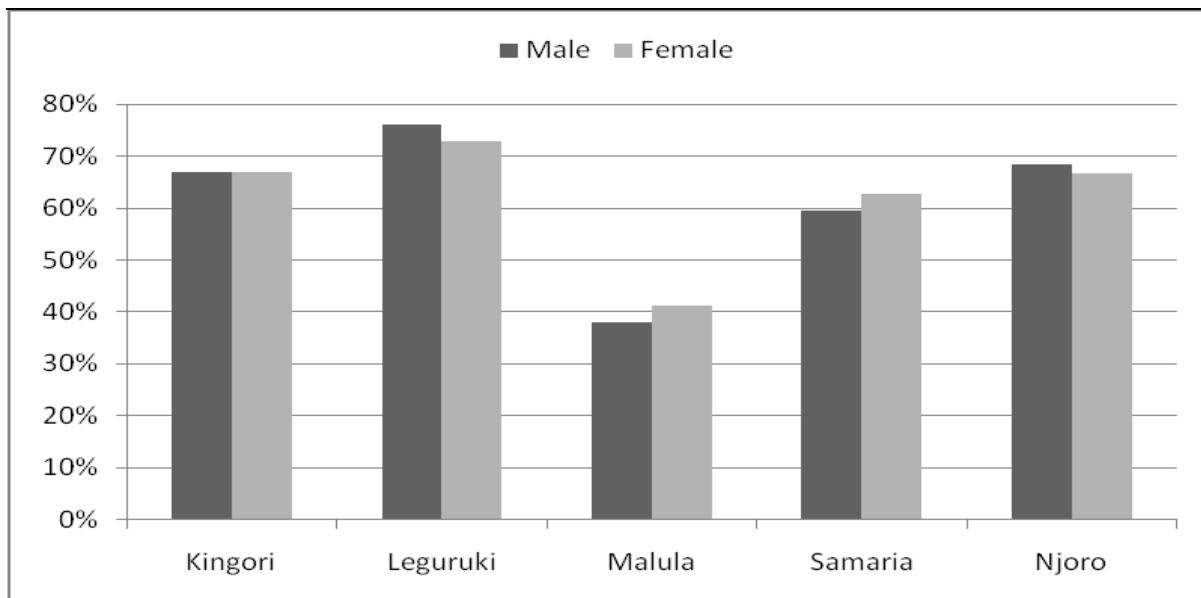
We also assessed the primary school completion rate for all adults (age 15 and over) and saw slightly higher rates of primary school completion as compared to household heads (see Figure 4).

**Figure 4. Percent Adults Completed Primary School versus No Education**



An average, 12% of the adults in the five villages surveyed in Arumeru District have no education. Samaria (20%) has the highest percentage of adults with no education while Njoro (6%) has the lowest rate of adults with no education. As shown in Figure 5, primary school completion rates between women and men do not present a statistically significant difference. Leguruki has the highest completion rates of the five villages though male completion rates are slightly higher than female rates.

**Figure 5. Adult Primary School Completion Rates, Disaggregated by Sex**



In Njoro, 24% of women went to but did not complete secondary school. Leguruki has the highest percentages of adults with at least some secondary education; three males and two females completed secondary school.

#### 4.4.3 Access to Primary Education

All five villages surveyed in Arumeru District have at least two or more primary schools, with the exception of Njoro which has one primary school. In regards to secondary schools, Leguruki has one, Njoro has two, and one is currently under construction in Kingori. Malula and Samaria report having no secondary school in their villages. Access to primary education is not only measured by presence of a primary school, but also by resources – teachers, classrooms, textbooks – available at that primary school. Data presented in Table 4 were compiled from questionnaires completed during interviews with school headmasters.

**Table 4. Primary School Environment**

Village/ School	Students Enrolled			Teacher to Student Ratio			Classroom to Student Ratio			Textbook to Student Ratio			% Teachers completed Form IV	
	1.	2.	3.	1.	2.	3.	1.	2.	3.	1.	2.	3.	1.	2.
Leguruki 1. Leguruki Primary 2. Noseiya Primary 3. Mbaaseny Primary	446	532	225	1:49	1:66	1:45	1:55	1:76	1:56	1:3	1:10	1:6	Average: 81%	
Kingori 1. Kibenga Primary 2. Kwatulele Primary 3. Nuru Primary	178	622	277	1:59	1:38	1:46	1:59	1:44	1:39	1:7	NA	NA	Average: 56%	
Malula 1. Malula Primary 2. Mikuuni Primary	590	294		1:37	1:37		1:47	1:32		1:3	1:3		100%	63%
Samaria 1. Samaria Primary 2. Savana Primary	537	329		1:60	1:24		1:67	1:66		1:5	1:5		78%	100%
Njoro Primary	560			1:23			1:64			1:15			100%	

A shortage of classrooms/studying facilities, teachers and staff/student housing, and teaching resources are noted by school headmasters and male and female focus group discussion participants as the greatest weaknesses of the primary schools in their villages. As supported by the data presented in Table 4, in general, the primary schools in the villages surveyed in Arumeru District have poor teacher-to-student ratios (Noseiya Primary in Leguruki, teacher-student ratio is 1:66), classroom-to-student ratios (Savana Primary in Samaria, 66 students need to use one classroom), and textbook-to-student ratios. In the institutional focus group in Samaria, parents remarked they were unhappy with the absence of teacher housing and the lack of water services. It is not surprising that the quality of teachers are in question when significant proportions of teachers have not completed Form IV themselves; they are likely under-trained and lack sufficient education themselves to be teaching.

Another measure of access is regular school attendance. Attendance rates averaged among the primary schools in each of the villages are as follows: Leguruki (88%), Kingori (91%), Malula (94%), Samaria (88%), and Njoro (88%). Attendance is nearly equal between boys and girls in these cases, sometimes with female attendance rates slightly higher than that for males.

Access to a quality primary school education is further affected by the physical condition of the learning child. Children who attend school hungry are less likely to be able to learn. All of the primary schools in the villages surveyed have a vast majority of students coming to school hungry (see Table 5). The three primary schools in Leguruki and Kibenga Primary in Kingori are reported as serving porridge to students. The two primary schools in Malula serve meals though the type of food offered was not recorded in the survey. A challenge noted by a headmaster in Leguruki is the need for improved teacher housing. Teachers struggle to reach school in the early mornings and must be reimbursed for traveling costs. An achievement also in Leguruki at Noseiya Primary was that a staff toilet had been constructed, some student textbooks had been purchased, and parents had constructed several desks.

**Table 5. Percent of Students Attending Primary School Hungry**

Village/ School	% Students Attending School Without Eating Food or Having Tea Only			School Meals Provided		
	1.	2.	3.			
Leguruki 1. Leguruki Primary 2. Noseiya Primary 3. Mbaaseny Primary	1. N/A	2. 90%	3. 94%	1,2,3: Porridge		
Kingori 1. Kibenga Primary 2. Kwatulele Primary 3. Nuru Primary	1. 100%	2. 70%	3. 80%	1. Porridge	2. No	3. No
Malula 1. Malula Primary 2. Mikuuni Primary	1,2: 100%			1,2: Yes		
Samaria 1. Samaria Primary 2. Savana Primary	1. 60%	2. 95%		1,2: No		
Njoro Primary	85%			Lunch offered at a fee		

#### 4.4.4 Access to Secondary Education

The three currently operating secondary schools among the five villages surveyed in Arumeru District face many of the same difficulties as primary schools in terms of limited resources. In Leguruki, 100% of the teachers have completed Form IV and 85% are fluent in English. 69% are computer literate, and teacher-student ratios are 1:19. Student examination results are high (90% in 2007, 85% in 2008). Challenges for

the Leguruki Secondary School are lack of food and tardy payment in school fees. However, achievements for the school include high examination pass rates, sound cooperation between teachers and students, and funds were received from TANAPA, the Tanzanian National Parks Association to repair school buildings. Between the two secondary schools in Njoro, one government and one private, significant gaps exist in the quality of education as well as school environment (Table 6). Indicators show the quality of education is higher at privately-run, Catholic, Precious Blood Secondary School than government-run Poli Secondary School. Teacher computer literacy rates at Precious Blood (100%) are five times that at Poli Secondary (20%). Also, specialized curriculum in life skills and computers are offered at Precious Blood while none are offered at Poli Secondary. With nearly equal enrollment numbers, Poli reported five teachers while Precious Blood reported 15. Resource needs reported by headmasters depicts a vastly different reality for the two schools. The headmaster at Poli Secondary reported a need for textbooks, reference books, and additional teachers while his colleague at Precious Blood reported a need for computers, laboratory equipment, and textbooks. Focus groups reported poor community-school relations with Precious Blood as no students from Njoro attended the school.

**Table 6. Secondary School Environment**

<b>School</b>	<b>School Type</b>	<b>Student Enrollment</b>	<b>Teacher: Student Ratio</b>	<b>Classroom: Student Ratio</b>	<b>Meal Provided</b>
Leguruki Secondary	Government	250	1:19	1:35	Breakfast
Poli Secondary	Government	260	1:52	1:43	Lunch
Precious Blood Secondary	Private: Catholic, Boarding	208	1:14	1:21	Breakfast, Lunch, Dinner

## 4.5 Health

### 4.5.1 Access to Health Services

Access to health services is central to the delivery of prevention and care services and health outcomes. Here we consider service availability and service quality as a measure of “access.” Service availability can include distance or time required to reach the facility (or trained health providers), hours of operation, appropriate personnel on-staff, and necessary equipment to run laboratory tests; service quality may address proper staff training and appropriate treatment (and availability of commodities) according to established guidelines.

Qualitative information on the problems facing villages in Arumeru District was collected through focus group discussions with men and women. In four of the five villages assessed, Leguruki being the exception, respondents ranked malaria as the number one health issue facing men, women, and children (see Table 7).

Other issues for adults included urinary tract infections, typhoid, high blood pressure, and pneumonia. For children, diarrhea, pneumonia, tuberculosis, and malnutrition were also mentioned by parents as diseases of primary concern.

**Table 7. Top Ranked Health Issues for Men, Women, and Children**

Village	Men's Health	Women's Health	Children's Health
Leguruiki	1. Bladder Infections 2. Arthritis 3. Swelling of Feet	1. Female Circumcision 2. Pneumonia 3. Malnutrition	1. Malaria 2. Malnutrition 3. Pneumonia
Kingori	1. Malaria 2. Pneumonia 3. Urinary Tract Infections	1. Malaria 2. Pneumonia 3. Typhoid	1. Malaria 2. Pneumonia 3. Amoeba
Malula	1. Malaria 2. Gout 3. Urinary Tract Blockage	1. Malaria 2. High Blood Pressure 3. Reproductive Diseases	1. Malaria 2. Influenza 3. Tuberculosis
Samaria	1. Malaria 2. Typhoid 3. Dental issues	1. Malaria 2. Typhoid 3. Blood Pressure	1. Malaria 2. Coughing 3. Diarrhea
Njoro	1. Malaria 2. High Blood Pressure 3. Rheumatism	1. Malaria 2. Typhoid 3. High Blood Pressure	1. Malaria 2. Pneumonia 3. Diarrhea

In the villages surveyed in Arumeru District, Leguruiki, Kingori, and Samaria were fortunate to have a government dispensary although some services and drugs or equipment are lacking. Malula reported one private dispensary; doctors and nurses from the ward offices visit the village once per month and provide maternal and under-five care. Samaria reported in addition to a dispensary a worker's house has been constructed. Njoro is recorded as having no medical facilities. The dispensaries in Leguruiki and Kingori are each staffed by one assistant medical officer and each have a refrigerator. The only mention of maternal/child health and family planning services was by the Health Officer in Samaria who reported these services available at Katiti Hospital, a significant distance from the village. In focus groups, villagers complained of a lack of public education on health citing the fact that some villagers still sleep with their livestock. Insufficient medicine, too few staff, lack of laboratory equipment and need for women's medical assistants were also expressed.

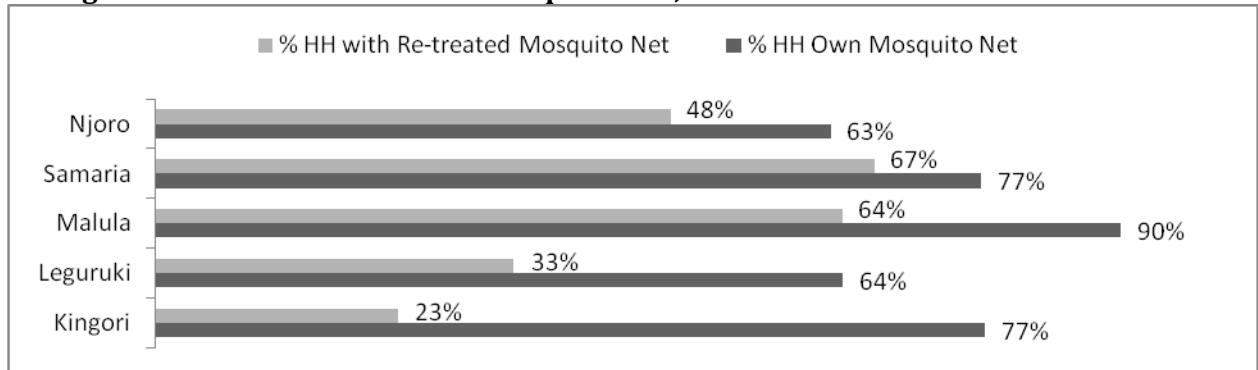
Household surveys indicate that the majority of households in this district seek treatment for all household members, including ill children under-five, from an established health facility.

#### 4.5.2 Malaria and Other Illnesses

Given the prevalence of malaria, all households are asked if they own at least one mosquito net and if it has been re-treated with insecticide since its purchase. Figure 6 presents data by village on percentage of households owning a mosquito net and those who have re-treated it. A wide range of ownership rates

exists across the five villages with Malula (90%) having the highest rate of net ownership followed by Samaria and Kingori (both 77%). Net treatment was highest in Samaria (67%) and lowest in Kingori (23%). If consistent mosquito net use is practiced by household members, they should begin to see their malaria rates decrease as well.

**Figure 6. Households with Mosquito Nets, Re- Treated and Untreated since Purchase**



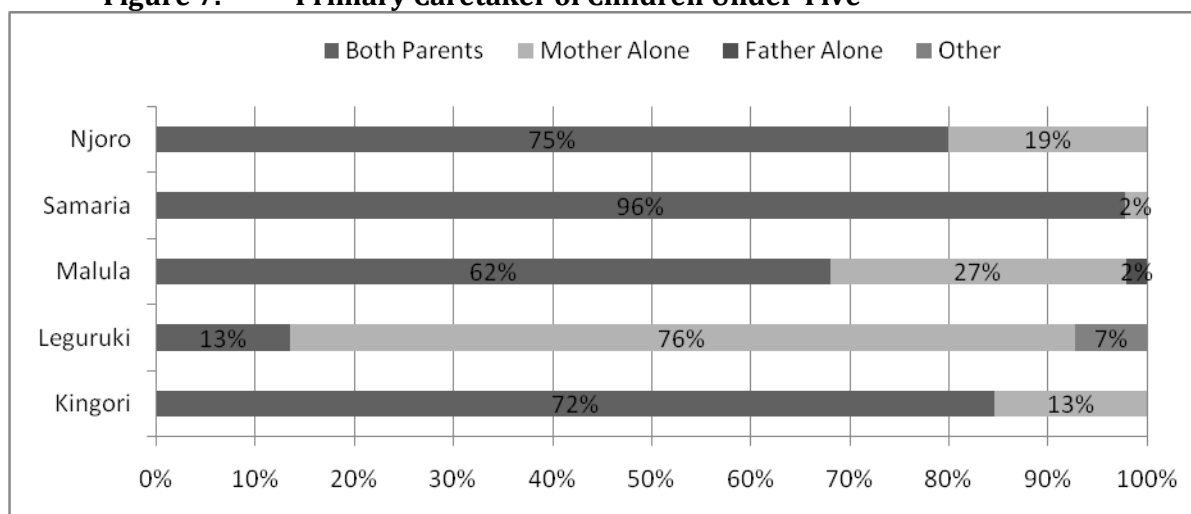
#### 4.5.3 Under-Five Health Status

The health status of children under-five is critical to their future physical, mental and emotional quality of life as well as expected mortality. In order to assess the quality of children’s health at this age we inquire about primary caretakers, exclusive breastfeeding as an infant, primary food eaten, vaccines, and experience with disease. In addition, the field team weighs and measures the height of children to determine how close they are to a normal growth curve and if they are over or undernourished.

The morbidity and mortality of children under-five years can be correlated to the presence or absence of biological parents, especially the biological mother. The vast majority of mothers of children under-5 are alive and living in the household, the highest rate is 100% in Njoro and the lowest 91% in Kingori. For fathers in Malula, 81% are alive and in the household while 11% are alive and outside the household. Four fathers in Malula had died. Also, one father in Kingori, two fathers in Leguruki, and two fathers in Samaria had died. In roughly 10% of households in the villages surveyed in Arumeru District, the father is alive but lives outside the household. This figure is lower than villages surveyed in other districts. Figure 7 indicates that childcare is mostly shared between the mother and father. Leguruki has an unusually high percentage of mother-only caretakers (76%). With that said, it is rare for the father to be the primary caretaker of the children; the father was the primary caretaker in only one household surveyed in Arumeru District. The father as a primary caretaker was also in Malula.



**Figure 7. Primary Caretaker of Children Under-Five**



In households surveyed where the primary caretaker is someone other than the mother and/or father, the primary caretaker tends to be a grandparent.

Of the villages surveyed, approximately 9% of children are considered frequently sick. Two households in Samaria and one child in Kingori and Leguruki have lost a child less than five years old in the last 2 years.

**Table 8. Percent Children Under-5 Who Have Had a Disease in the Past 3 Months\*<sup>1</sup>**

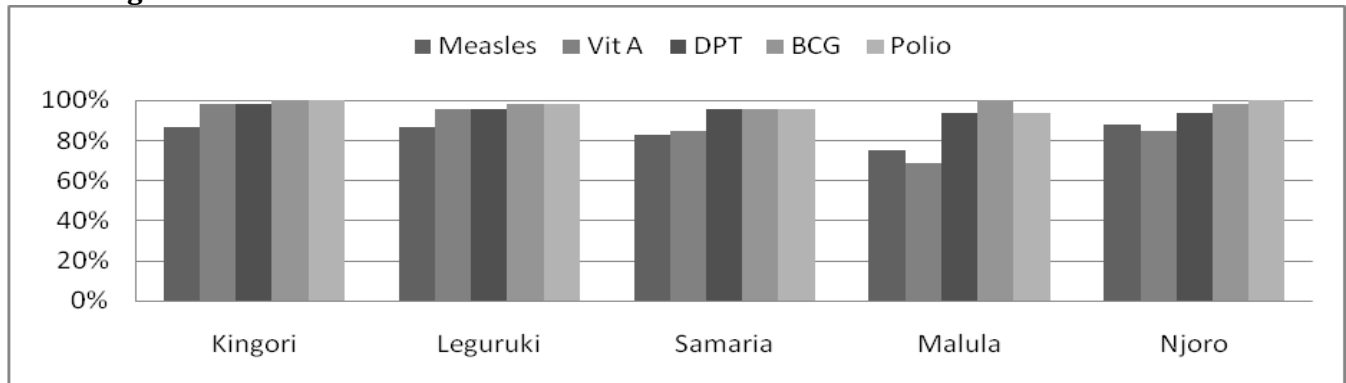
Village	Fever	Diarrhea	Cough/Flu	Malaria	Measles
Kingori	85%*	72%*	97%*	N/A	2%*
Leguruki	85%*	59%*	87%*	N/A	0%*
Malula	47%	10%	65%	20%	6%
Samaria	33%	9%	59%	11%	0%
Njoro	38%	19%	44%	40%	0%

Table 8 gives a picture of the disease burden for children under-five in these villages. In Kingori and Leguruki, the most commonly reported illness was a fever followed closely by a cough or flu. In Malula, Samaria, and Njoro, cough or flu was the most commonly reported illness followed by fever and malaria. The incidence of pneumonia, worms, and measles in children under-five is very low in Malula, Samaria, and Njoro. Samaria, Malula, and Njoro had on average about 7% of children under-five suffering from a long-term illness.

<sup>1</sup> \*The villages of Kingori and Leguruki were administered an early survey version that did not qualify a timeframe for child illness. In the later survey, parents or guardians were asked if an under-five child had been sick in the “past 3 months”.

According to the World Health Organization (WHO) guidelines, children are considered fully vaccinated when they have received a vaccination against tuberculosis (BCG), three doses each of the DPT and polio vaccines, and a measles vaccination by the age of 12 months. Figure 8 shows the percentage of children under-five who have been vaccinated by village; data were also collected on percentage of children under-five who had received a vitamin A supplement.

**Figure 8. Percent Children Under-5 Vaccinated**



Over 90% of children under-five in the villages surveyed in Arumeru district have received a DPT, BCG, or polio vaccine. Among all recommended vaccines, measles vaccination rates (75%-88%) are the lowest within each village surveyed. Malula has the lowest rates for measles vaccinations and Vitamin A supplements, as well as the lowest vaccination rates among the five villages. The data shown in Figure 8 do not take into account the age at vaccination or number of doses, so a determination of whether or not children are fully vaccinated is not possible.

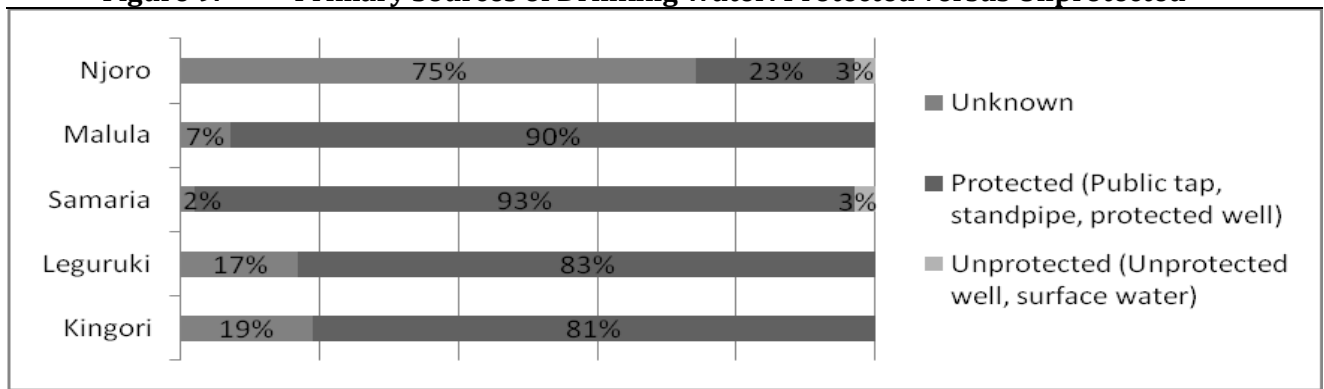
#### 4.5.5 Environmental Health

Many infectious diseases, especially diarrheal diseases, can be a result of poor hygiene and contaminated water and food sources. All five of the villages have relatively high rates of 91% to 96% latrine coverage which is very positive.

Qualitative data indicates the primary modes of refuse disposal in Arumeru District villages are to bury and burn refuse on a household compound.

The majority of households have access to protected drinking water in the villages surveyed in Arumeru district. Of respondents with protected water sources, Malula (97%) ranked the highest while Njoro has the highest number of households without access (13%). As shown in Figure 9, sources of protected drinking water were generally public taps, standpipes, or protected wells. In Samaria and Njoro, surface water (unprotected) represents approximately 3% of water sources.

**Figure 9. Primary Sources of Drinking Water: Protected versus Unprotected**



Given that the majority of households are drinking unprotected water, treating the water through boiling, a filter, bleach tablets or other means is important to protect the health of all family members. Households using some form of water purification are greatest in Leguruki (67%) and lowest in Malula (23%).

The average amount of time households from each village spend collecting water varies significantly. The total water collection time encompasses the time it takes a household member to get to the water source, collect the water, and return home. In addition to significant time required to collect water, access to drinking water is further limited by long distances. Residents of Samaria followed by Malula have the farthest distance to travel to access drinking water and the longest time to travel; Njoro residents have the shortest distance and thus spend less time collecting water.

Cooking fuel type and primary cooking location affect respiratory health, primarily of women and children. In addition, accidents around fires lead to more burns for women and children. The vast majority of surveyed households cook with wood, the highest percentage is 100% in Leguruki and the lowest is 90% in Malula. In Malula, 3% of households rely on Kerosene.

#### 4.5.5 HIV/AIDS

In addition to the household survey, up to four adults were interviewed in each household on their Knowledge, Attitude and Practice (KAP) regarding HIV/AIDS. This section focuses exclusively on correct knowledge of HIV prevention data as collected through these KAP surveys. A more detailed report that includes additional data and analysis on HIV/AIDS knowledge, attitudes, and practices is available from Savannas Forever Tanzania (refer to Acknowledgements section for contact information).

This discussion on HIV knowledge examines the differences in knowledge level between men and women. As shown in Table 9, a higher percentage of women than men participated in the survey with 74% women in Malula, 62% in Samaria, and 58% in Leguruki. Eligibility was defined as anyone 15 years or older living

in the household. The main reason for this variance in response rate is that men were less likely to be present when the KAP survey was conducted.

**Table. 9. Sample Size of KAP Survey, by Sex**

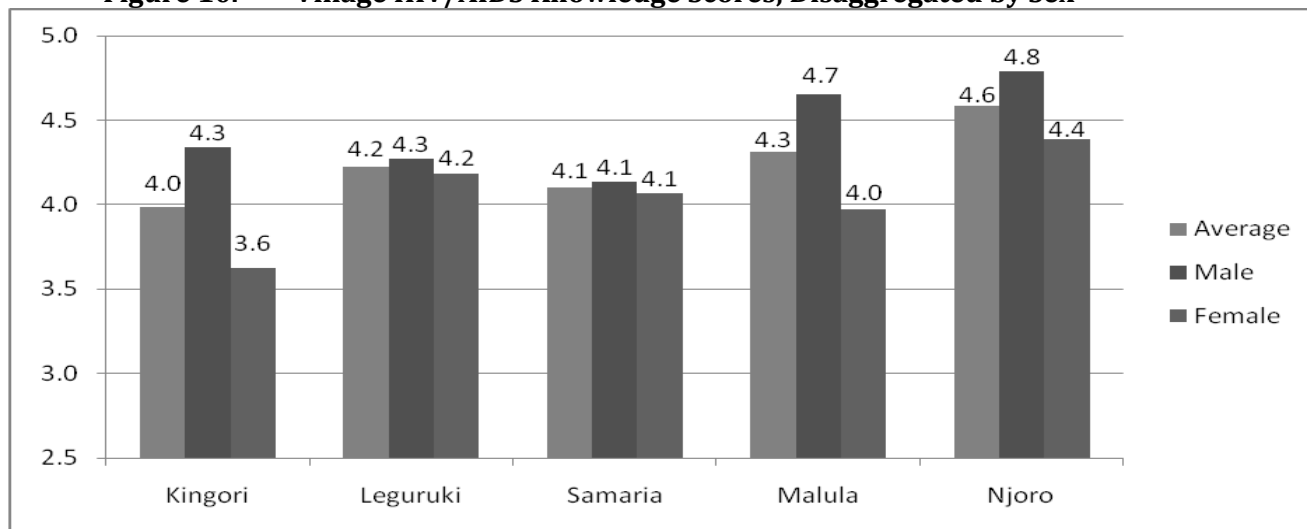
	Sample size		
	Male (%)	Female (%)	Total (n)
Kingori	44%	56%	134
Leguruki	42%	58%	158
Samaria	38%	62%	97
Malula	26%	74%	89
Njoro	43%	57%	132

To assess an individual’s correct knowledge of HIV/AIDS, the KAP survey asks six questions:

1. Can people reduce their chances of getting the HIV/AIDS virus by having just one sex partner who has no other partners?
2. Can people get the HIV/AIDS virus from mosquito bites?
3. Can people reduce their chances of getting HIV/AIDS by using a condom every time they have sex?
4. Can people get the HIV/AIDS virus by sharing food with a person who has HIV/AIDS?
5. Is it possible for a healthy looking person to have HIV/AIDS?
6. Can HIV/AIDS be transmitted from mother to child?

Correct responses to the six questions are added together to compute a composite HIV/AIDS knowledge score, which can range from 0 (no correct answers) to 6 (all correct answers). Village and sex differences in average HIV/AIDS knowledge scores are summarized in Figure 10.

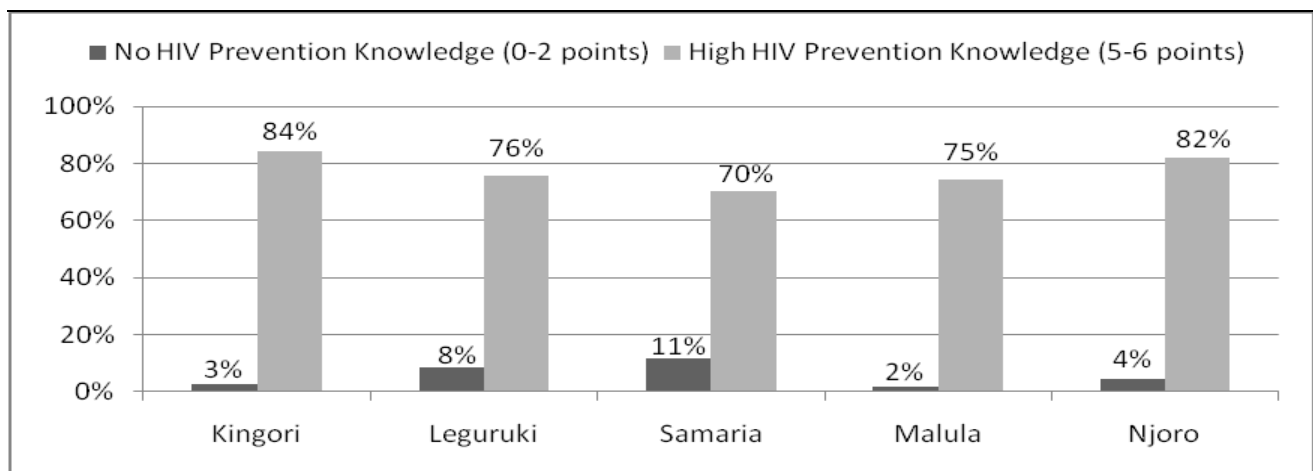
**Figure 10. Village HIV/AIDS Knowledge Scores, Disaggregated by Sex**



Kingori has a slightly lower average HIV/AIDS knowledge score (average 4.0) than Samaria (4.1), Leguruki (4.2), Malula (4.3), and Njoro (4.6) although this difference is not statistically significant. The men’s and women’s scores are close in each of the villages, all less than one point in difference. Men’s scores are slightly higher in each of the villages, with the greatest difference in Malula (Male 4.7, Female 4.0).

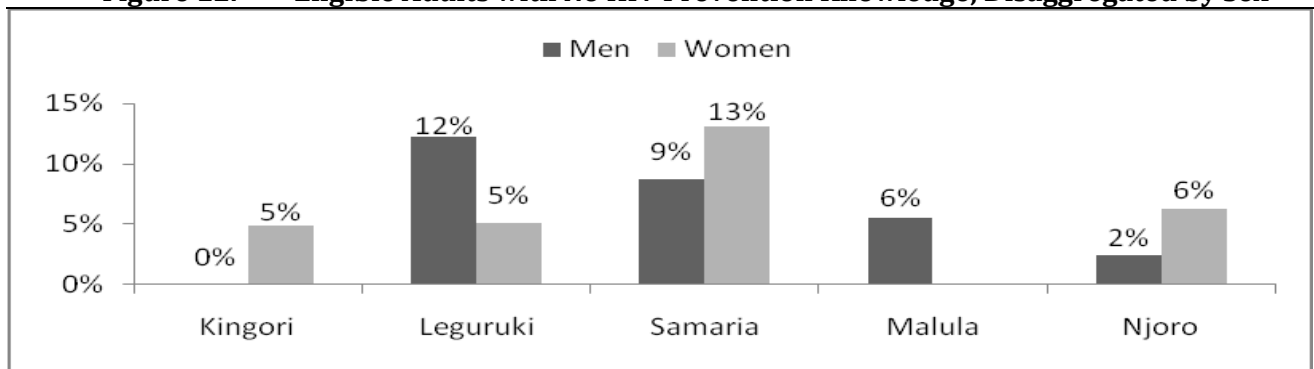
The skip pattern of the KAP questionnaire means that individuals who say they have not heard of HIV/AIDS do not answer any of the six questions, and individuals who say they do not know of any ways to prevent HIV infection do not answer the first four questions, which concern prevention. Since the responses that trigger these skip patterns imply lack of knowledge, skipped questions earn zero points. Therefore, those who say they have not heard of HIV/AIDS get a score of zero, while those who have heard of HIV/AIDS but report no knowledge of prevention measures receive a score between 0 and 2 based on their answers to questions numbers 5 and 6. As shown in Figure 11, high versus low HIV prevention knowledge is relatively similar among the five villages surveyed. The largest percentage of adults with high HIV knowledge and its prevention is in Kingori (84%) followed by Njoro (82%). Survey results from Leguruki (76%), Samaria (70%), and Malula (75%) show relatively close numbers of eligible adults scoring 5-6 points on the HIV knowledge assessment. The greatest percentages of adults with no HIV prevention knowledge are in Samaria where just over 1 in 10 adults (11%) know no correct method of preventing HIV.

**Figure 11. Percent Eligible Adults with No versus High HIV Prevention Knowledge**



As shown in Figure 13, there are very low percentages of men and women in the villages with no knowledge of HIV prevention methods. Percentages of men in Leguruki (12%) and women in Samaria (13%) are the highest rates of adults with no knowledge of HIV prevention methods among the five villages.

**Figure 12. Eligible Adults with No HIV Prevention Knowledge, Disaggregated by Sex**



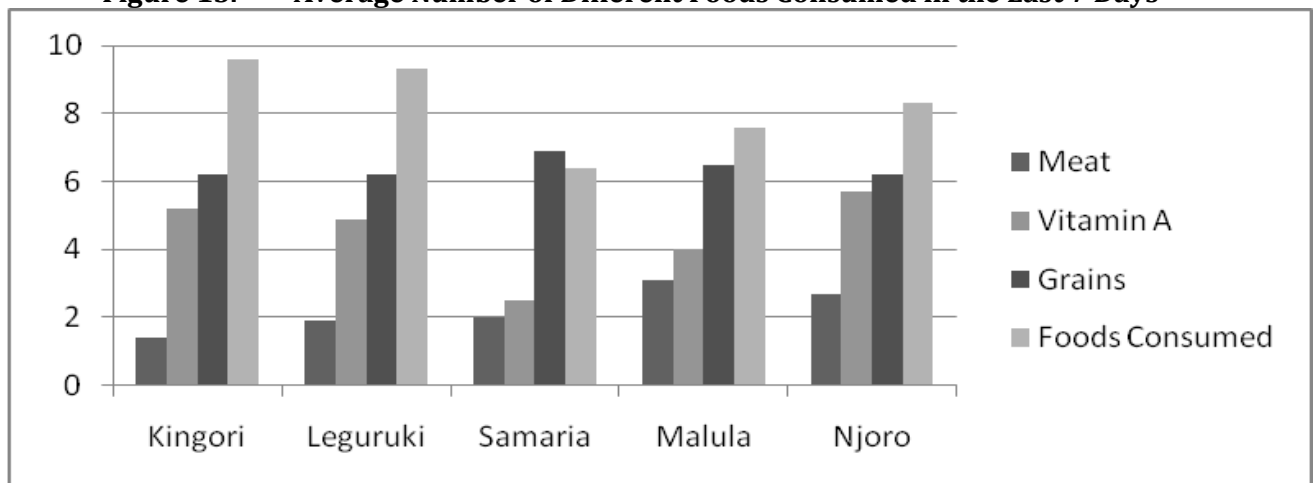
After the 16<sup>th</sup> village, we began asking men and women if they have ever been tested for HIV. Because the question was not asked, we do not have response rates in Kingori and Leguruki. In Samaria and Njoro, twice as many females (66%) as males (33%) had been tested for HIV. In Malula, the difference was even greater with 74% of females reported having been tested compared to 26% of males.

## 4.6 Nutrition and Food Security

### 4.6.1 Household Nutrition

Diversity of daily diets and consistent intake of recommended vitamins and nutrients is limited, though relatively high in comparison to other surveyed districts. On average, households ate a variety of 6.4 (Samaria) to 9.6 (Kingori) types of different foods in a week with a range from 2 to 12. Households ate relatively similar amounts of grains in each of the five villages, though Samaria (2.5) has a lower average number of times households ate foods with vitamin A than the other villages. Otherwise, the five villages appear to have similar diets when comparing consumption of meat protein, grains, and legumes as shown in Figure 13.

**Figure 13. Average Number of Different Foods Consumed in the Last 7 Days**



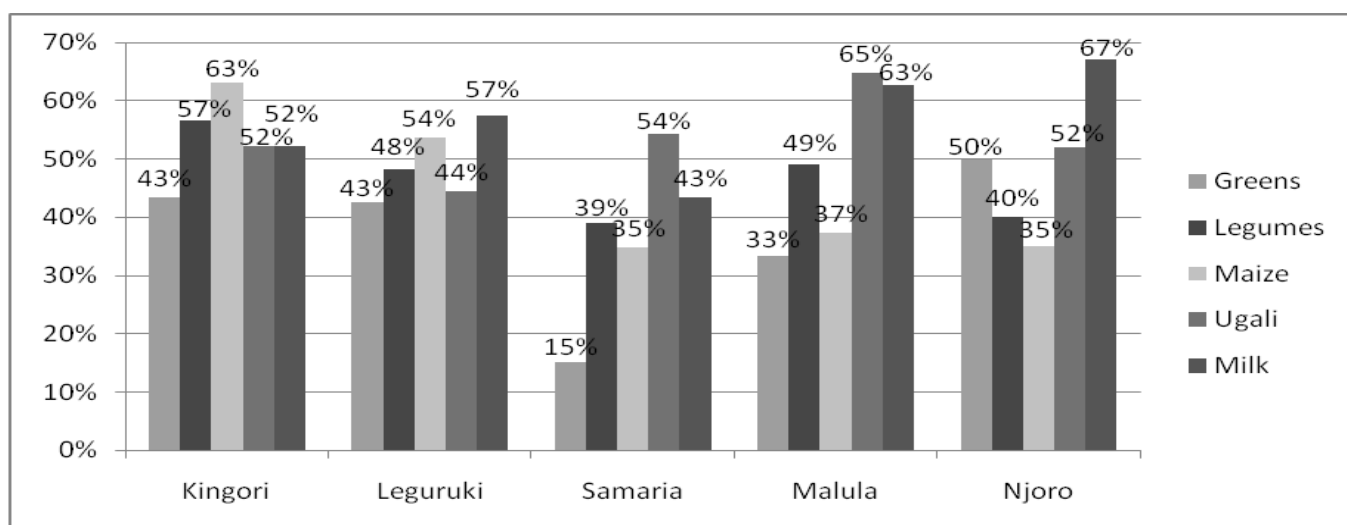
#### 4.6.2 Infant and Young Child Feeding

Optimal infant and young child (age 6-23 months) feeding practices (IYCF) include: early initiation of breastfeeding, exclusive breastfeeding during the first 6 months, continued breastfeeding for up to two years and beyond, timely introduction of complementary feeding at 6 months, frequency of feeding solid/semisolid foods, and the diversity of food groups fed to children 6-23 months. Although the majority of babies and children were breastfed, only 11% of babies in Malula, 16% in Samaria, and 17% of babies in Kingori were exclusively breastfed during their first 6 months of life. Among children that had been weaned at the time of the survey, the most common age of weaning was 19-22 months.

#### 4.6.3 Under-Five Nutrition

The most commonly eaten foods by children under-five in the last 24 hours in households surveyed are listed in Figure 14. Percentages labeled in Figure 14 indicate the most commonly eaten food by children under-five in that village.

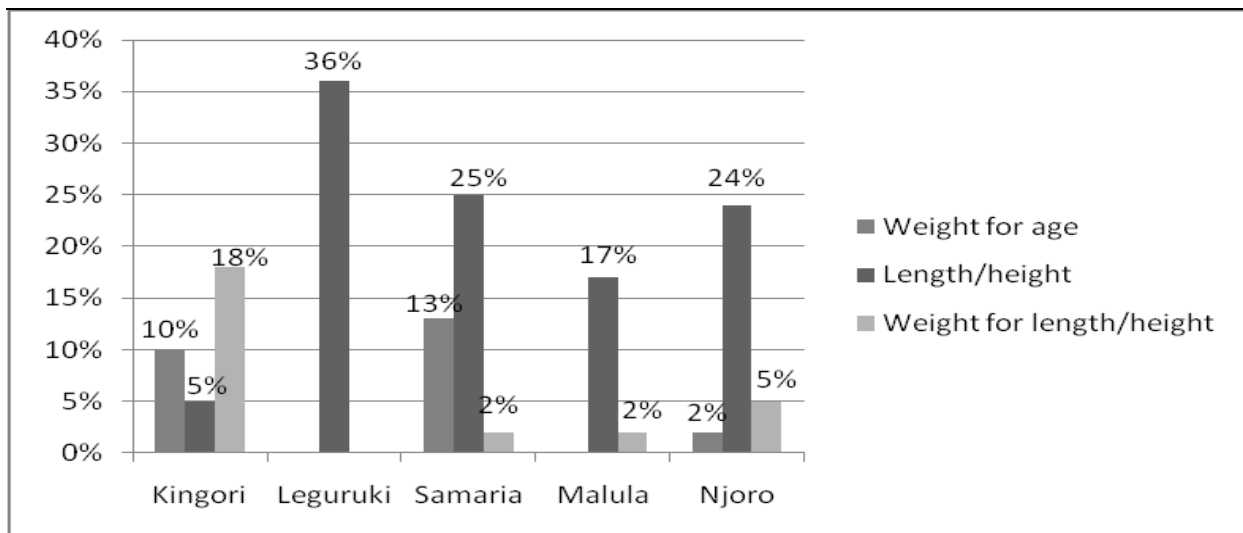
**Figure 14. Percent Children Under-5 Eating Food Item in Last 24 Hours**



On average, milk and ugali were the most commonly consumed foods by children under-five in the last 24 hours. Legume and maize consumption in the last 24 hours were not far behind. Consumption patterns did not seem to vary drastically among the five surveyed villages. Samaria had the lowest consumption of greens and legumes though it reported significant consumption of oranges and other carbohydrates. Tomato consumption among the five villages was highest in Kingori (33%) and lowest in Leguruki (7%). Fruit consumption varied with oranges and bananas as the most frequently eaten fruit. In general, consumption patterns shown in Figure 14 indicate that children in Arumeru District have limited variety in their daily diet.

The World Health Organization (WHO) established a standardized set of measures for expected child weight and height measurements given a child’s age producing what is called a z-score statistic. The three under-5 anthropometric measures include: length/height for age z-score (measures stunting), weight for length/height z-score (measures under nutrition and wasting), and weight for age z-score (measures if weight is appropriate for age). The z-score is displayed across standard deviations (SD). Any SD that is -2 or below is considered to be moderately to severely below the norm. According to the data collected in the survey of children under-five (see Figure 15), 10% of children in Kingori and 13% in Samaria are underweight for their age. Stunting occurs with greatest frequency in Leguruki (36%) followed by Samaria (25%), and Njoro (24%). Although these are high figures, according to UNICEF it is not unusual for up to 40% of children under-five in Tanzania to be well below their expected height for age. It does point to a problem of under nutrition however.

**Figure 15. Percent Children Under-5 Malnourished and Stunted**



#### 4.6.4 Food Security

A series of nine questions are used to create a Household Food Insecurity Score (USAID, 2009). Sample questions include, have you gone a day and night without food in the past month; or have you had to eat a limited number of foods in the previous week or reduced how much you eat? The higher the food insecurity score, the greater the average food insecurity experienced. Of the five villages surveyed in Arumeru District, households in Leguruki were the most food secure with a mean index score of 2.49 compared to 3.03 in Samaria and 3.47 in Njoro (see Table 10).



**Table 10. Percent of Households that Experienced a Food Insecurity in Last 4 Weeks**

	<b>Kingori</b>	<b>Leguruki</b>	<b>Samaria</b>	<b>Malula</b>	<b>Njoro</b>
<b>Worried not enough food</b>	38%	38%	25%	32%	43%
<b>Ate fewer meals</b>	32%	37%	27%	35%	47%
<b>No food</b>	19%	15%	12%	12%	21%
<b>Went to sleep hungry</b>	11%	12%	13%	13%	20%
<b>One day and night without food</b>	4%	8%	7%	8%	7%
<b>Average food insecurity index</b>	<b>2.70</b>	<b>2.49</b>	<b>3.03</b>	<b>2.62</b>	<b>3.47</b>

#### 4.6.5 Kitchen Gardens

Kitchen gardens are one means that households can use to protect themselves from periods of food insecurity when there is high crop or livestock loss. Questions regarding kitchen garden training were added after the initial surveys were conducted and therefore not included in the data for Kingori and Leguruki. Very few households surveyed in Samaria and Malula received training on kitchen gardens, only three people in Samaria and 5 in Malula. In Njoro, however, 20% of those surveyed received kitchen garden training. These numbers correlate to low numbers of households from our sample currently growing kitchen gardens in Samaria (0 people) and Malula (8 people). In Njoro, however, 15 respondents are recorded as growing kitchen gardens (21%). Though it does not tie into the correlation between kitchen garden training and kitchen garden growing, 31% of respondents in Kingori and 37% in Leguruki are currently growing a kitchen garden. The fact that there are more kitchen gardens in Kingori and Leguruki is consistent with the greater food security experienced in those villages in comparison to Samaria. The results in Njoro are unusual with high numbers of kitchen gardens being grown and high food insecurity. The information provided by the kitchen garden survey questions does not provide enough information to fully understand the curious interplay between food security and kitchen gardens in Njoro.

## 4.7 **Agriculture**

Farmers in Arumeru District are predominantly small-scale, subsistence farmers with a portion going towards cash crop production. Residents of Kingori, Leguruki, and Samaria own the most acreage followed by Malula and then Njoro. In terms of total acres rented and owned, the average acreage is greatest in Samaria (7 acres) and lowest in Kingori (2.9 acres). The average land under cultivation per household presents yet another picture with households cultivating one acre in Njoro, two acres in Kingori, three acres in Leguruki and Samaria, and four acres in Malula. According to villagers participating in an agricultural focus group, 99-100% of households own land without title in Kingori, Leguruki, Samaria, and Njoro. In Malula, 80% of villagers own land without title while the remaining 20% rent land.

Most households in Malula, Samaria, and Njoro grow a diversity of crops with a large variation between the three villages as shown in Table 11. Crop data is not available for the villages of Kingori and Leguruki. Of the three villages for which crop data is available, Njoro reports the largest percentages of farmers growing maize (71%), green vegetables (28%), coffee (19%), beans (51%), bananas (76%), and papaya (31%). Of the crops listed, sunflowers are the only crop for which Samaria and Malula have higher percentages of farmers cultivating than Njoro. It is interesting to note the large variance among percentages of households cultivating bananas in Njoro (76%) as compared to Samaria (0%) and Malula (0%). Other crops that are grown include: oranges, mangoes, avocados, green gram, and groundnuts.

Although similar crops are grown and sold among the surveyed villages, variations exist in the prices of certain crops. For example, a kilogram of coffee sold for 1000 TSH in Leguruki and Kingori compared to 2000 TSH in Njoro. Crop price variance is frequently the result of market access, though it does not appear to be a major factor for these villages. Kingori, Leguruki, and Malula each report a market either in or within 3 kilometers of the village while Samaria and Njoro report a distance of approximately 5 kilometers to the nearest market. Information is not available on market distance for the village of Njoro.

**Table 11. Percent Households Cultivating Various Crops by Village\***

Village	Maize (Sacks)	Sunflowers (Cans)	Green Vegetables (Sacks)	Coffee (Sacks)	Beans (Cans)	Bananas (Bunches)	Papaya (Sacks)
Samaria	13.33%	28.33%	15.00%	0.00%	45.00%	0.00%	1.67%
Malula	6.67%	10.00%	1.67%	1.67%	6.67%	0.00%	0.00%
Njoro	70.67%	2.67%	28.00%	18.67%	50.67%	76.00%	30.67%

\*Crop data not available for Kingori and Leguruki

Focus group discussions (FGDs) were facilitated with top farmers (typically 4-6 farmers per village), as defined by village leaders, and agricultural extension officers (if applicable) to further assess the agricultural environment in each village. Qualitative data collected and analyzed from these FGDs are presented in Table 12.

**Table 12. Qualitative Data on District Agricultural Environment**

Village	% HH that Irrigate Plot	% HH using Fertilizer		% HH with Soil Erosion as Serious Problem
		Inorganic	Organic	
Kingori	--	20%	20%	10%
Leguruki	0%	10%	90%	10%
Samaria	0%	5%	90%	2%
Malula	0%	10%	40%	20%
Njoro	10%	95%	100%	35%

Farmers among the five villages surveyed indicated that they used intercropping, terracing, the growing of reeds and sisal, and the digging of water channels to control soil erosion. Kingori and Malula reported having received visits from agricultural extension workers in the previous year while Leguruki, Samaria, and Njoro had not. In Kingori, farmers reported high cost and lack of skill as the reason for low use of organic fertilizers. In Leguruki and Malula, high cost was the reason for low use of inorganic fertilizers. Soil destruction and sufficiently fertile soil were cited as the reasons for low use of inorganic fertilizers in Samaria.

#### 4.8 Livestock

Overall, households in the five villages surveyed in Arumeru District own more chickens than goats, sheep, or cattle (Table 13). Households in Malula own more livestock (e.g., cows, goats and chickens) than households in any of the other four villages. In Malula, farmers own between two to three times as many goats and sheep as farmers in the other four villages.

**Table 13. Mean Number of Livestock Owned per Household by Village**

Village	Cattle	Goats/sheep	Chickens
Kingori	2.7	3	8.2
Leguruki	2.6	3.4	8.5
Samaria	2.5	5.3	5.1
Malula	4.7	9	8.7
Njoro	1.8	2.8	5.7

Vaccination of livestock varied among the five villages surveyed. In the agricultural focus groups, farmers in Kingori indicated that 75% of their cows had been vaccinated against Sleeping Sickness, East Coast Fever, and Rinderpest but none of their goats or sheep had been vaccinated. Villagers in Leguruki reported 25% of their cows but none of their sheep or goats had been vaccinated in the past year. In Samaria, no cattle, goats or sheep had been vaccinated in the past year. Malula reported 90% of cattle had been vaccinated

(Foot and Mouth Disease, CBPP, and Anthrax were of greatest concern) and 60% of goats and sheep. Malula also had the advantage of a visit from an agricultural extension worker in the past year. Njoro reported 100% of their cattle had received vaccinations (Anthrax) though none of their goats and sheep. Percentages of cattle lost to disease or drought were relatively low on the household level in Kingori (19%), Leguruki (21%), and Njoro (15%). Cattle lost to disease and drought was somewhat higher in Malula (31%) and Samaria (50%).

Losses of chickens due to disease were fairly consistent in Kingori (31%), Leguruki (30%), Samaria (26%), Malula (23%), and Njoro (27%). Newcastle Disease is the number one cause of chicken mortality in Tanzania yet despite this, chicken-owning households vaccinating against this disease was limited: 56% in Kingori, 49% in Leguruki, 28% in Samaria, 42% in Malula, and 24% in Njoro.

## **5 CONCLUSIONS**

### **5.1 Recommendations**

The five villages surveyed in Arumeru District share many commonalities in their profiles overall. As district and village leaders review these results, it would be meaningful for them to consider how best to increase access to government services in villages in each of the five villages as well as encourage wider participation by relevant NGOs. Specific recommendations we leave to district and village leaders and other local government authorities who understand the local context and can better apply these results. Our general recommendations include the following:

- District leaders share these results with other appropriate leaders and use these data to inform the design of future interventions at the village and district level.
- Build on existing strengths within these villages such child vaccination rates for BCG, DPT and polio and widespread latrine ownership. Villages should be encouraged to strive for 100% coverage in each of these areas.
- Significant infrastructure support is needed for schools and clinics in order to improve the quality of services they are able to deliver.
- Improving health outcomes and food security in the five villages is tied to the limited access of protected drinking water for most villagers; this should be a primary target for improved quality of life for all villagers.
- Women's education rates are low and this in turn may be affecting the lower nutrition intake and cases of malnutrition identified in the villages. Increasing women's literacy skills and in particular, their knowledge of nutrition, water quality, and HIV/AIDS could improve health outcomes for the whole family.

- There is a need to expand access to agricultural services, the coverage of extension workers to rural villages and access to vaccinations for livestock. In addition, community level training on the value of kitchen gardens and Newcastle disease vaccinations could also significantly improve food security.

## 5.2 Next Steps

The data and analysis presented in this report will be compiled with similar data gathered and analyzed from other districts participating in the Whole Village Project (WVP). WVP will eventually conduct a big picture analysis of all compiled data to achieve its long-term project objectives, which are to:

- Identify interdisciplinary strategies that improve public health, nutrition, education, conservation and food security to help alleviate poverty and sustain natural resources, villages and wildlife in rural Tanzania;
- Establish a long-term monitoring and evaluation system to measure the effectiveness of foreign assistance programs and aid over 10-20 years in purposefully selected rural villages using validated survey methodologies;
- Provide data in a meaningful way for village self-empowerment and capacity building that leads to greater civic engagement and community capacity; and to
- Create a model for translational research and application in multiple settings.

WVP intends to return to each village surveyed in Arumeru District in 2-3 years to re-assess the current status of each village. In the immediate future, the Savannas Forever Tanzania (SFTZ) team will return to each village to present the data collected and to discuss the results and conclusions of this report. Data and reports will also be shared with government officials and policy makers in Tanzania, and non-governmental and local government partners working on the ground in the villages surveyed.

## 5.3 How You Can Help

The purpose of this report is to provide data to district and local leaders in order to inform your decision-making for future social and economic development activities. Please communicate with the Whole Village Project staff and leaders to discuss the usefulness of these data, whether or not there are other indicators that would be useful to you, and if we have missed anything in our assessment and analysis of your village and/or district.

## **APPENDIX A – SURVEY INSTRUMENTS**

### Household level

- Household survey
- Food security, nutrition and jatropha

### Individual surveys:

- HIV/AIDS knowledge, attitude and practice
- Under-five child anthropometric measures and health

### Focus group and key informant interview questionnaires:

- Village Resources
- Agriculture & livestock focus group
- Village leadership
- Village institutional analysis
- Women's focus group
- Men's focus group
- Headmaster questionnaire
- Health Officer questionnaire

## APPENDIX B – SELECT INDICATORS BY VILLAGE IN ARUMERU DISTRICT

		Leguruki	Kingori	Malula	Samaria	Njoro
<b>THE HOUSEHOLD AND HOUSING</b>						
	Number of households surveyed	77	75	60	60	76
	Average household size	5.2	4.9	5.3	5.1	4
	% households in polygamous marriage (more than 1 wife)	5.1%	6.7%	6.7%	5.1%	4.0%
	% of households headed by women	20.5%	7%	19.6%	26.8%	14.9%
	% of HHs headed by single women (never married, divorced, widowed)	12.8%	5.3%	10%	73%	69%
	% of households with corrugated metal roof	97.4%	96.0%	91.7%	93.3%	94.7%
	% of households using a toilet	98.7%	96.0%	93.3%	91.7%	97.3%
	Avg time (minutes) required to collect water	25.5	31.2	166.5	302.9	19.6
	% households use firewood as primary energy source for cooking	100%	95%	90%	98.30%	98.50%
<b>EDUCATION</b>						
	% of all adults without education	9%	13%	10%	20%	6%
	% of household heads completed primary school	65%	59%	43%	52%	16%
	% of adult men completed primary school	75%	71%	38%	61%	69%
	% of adult women completed primary school	77%	79%	41%	63%	67%
	Average primary school teacher to student ratio	1:66; 1:45; 1:49	1:59; 1:44; 1:46	1:37	1:60	24:560
	Average primary school textbook to student ratio	10:1; 6:1; 3:1	1:7	1:3	1:5	1:15
	Average secondary school teacher to student ratio	1:19	N/A	1:37	1:24	5:260; 15:208
	Average # of years teachers stay at primary school	7; 2; 5	4; 10; 3	5 years	5 years	10 years
	Average # of years teachers stay at secondary school	2	N/A	N/A	1 year	5 years; N/A
	Ratio of female to male gross enrollment rates (primary school)	.91; .99; 1.0	.89; 1.15; .88	306:284	295:242	234:326
	Ratio of female to male gross enrollment rates (secondary school)	1.5	N/A	131:161	163:166	120:140; 208:0
<b>HEALTH</b>						
	% of households with at least one mosquito net	64%	77%	90%	76.7%	62.7%
	% of households with access to protected drinking water	96%	95%	97%	95%	81%
	% of households that take measures to make the water safe	67%	60%	23.3%	31.7%	41.3%
	# of hospital/dispensary/clinic in the village	1	1	Private	1	--
<b>CHILDREN UNDER 5</b>						
	% of infants exclusively breast fed through 6 months of age	30%	17%	11%	16%	30%
	% infants introduced to complementary feeding before 6 months	15%	23%	89%	84%	70%
	% of children whose birth mother is still alive and inside the HH	93%	91%	94%	96%	100%

		Leguruki	Kingori	Malula	Samaria	Njoro
	% of children moderately to severely underweight	0%	10%	0%	13%	2%
	% of children who are vaccinated for BCG	98%	100%	100%	96%	98%
	% of children who are vaccinated for polio	98%	100%	94%	96%	100%
	% of children who are vaccinated for DPT	96%	98%	94%	96%	94%
	% of children who are vaccinated for measles	87%	87%	75%	83%	87.5%
	% of children received Vitamin A supplement	96%	98%	69%	85%	85%
	% children with fever reported in past 3 months	85%	85%	47%	33%	38%
<b>AIDS KNOWLEDGE</b>						
	Avg AIDS knowledge score (0 to 6 points); men	4.3	4.3	4.7	4.1	4.8
	Avg AIDS knowledge score (0 to 6 points); women	4.2	3.6	4.0	4.1	4.4
	% of adults who know that a person can protect themselves from HIV	76%	84%	75%	70%	82%
<b>FOOD SECURITY AND NUTRITION</b>						
	% of households worried about food in the past 4 weeks	38%	38%	32%	25%	43%
	% of households ate limited variety of food in the past 4 weeks	53%	66%	78%	82%	80%
	% of HHs went one day and night with no food in the past 4 weeks	8%	4%	8%	7%	5%
	% of households that are currently growing kitchen garden	54%	31%	8.30%	0%	21.60%
	Avg # of days/times HHs ate meat protein in past week	1.8	1.3	3.1	2	1.2
	Avg # of days/times HHs ate legumes in past week	3.2	3.2	2.3	3.6	3.4
	Avg # of days/times in last week HH ate foods with Vitamin A	9.1	10.1	4	2.5	5.9
	# of different types of food eaten in last week OR NUTRITION DIET DIVERSITY SCORE	6.1	6.4	7.6	6.4	8.3
	Food Security Index (Scale 0 to 9 with low indicating higher food security)	--	--	3.6	3.2	1.4
<b>ECONOMIC ACTIVITY, AGRICULTURE AND INCOME</b>						
	Average acres cultivated per household	2.9	2.5	3.6	3.2	1.4
	Average # of cattle owned per household	2.1	1.8	2.7	1.1	1.3
	Average # of goats/sheep owned per household	1.6	1.1	7	4.2	1.3
	Average # of chickens owned per household	7.6	6.3	8	4.3	4.2
	% of HHs whose chicken are vaccinated for Newcastle disease	46%	5%	42%	28%	24%
	% of cattle lost to disease in the past 12 months	20%	18%	20%	19%	16%
	% of chickens lost to disease in the past 12 months	0.4%	0.4%	22%	26%	19%
	% of goats/sheep lost to disease in the past 12 months	0%	0%	18%	14%	86%
	% of household heads with the main occupation of farming	81%	75%	50%	82%	63%



		<b>Leguruki</b>	<b>Kingori</b>	<b>Malula</b>	<b>Samaria</b>	<b>Njoro</b>
	% of HH heads with the main occupation of livestock keeping	1%	1%	0%	2%	0%
	% households with bicycle	35%	25%	53%	47%	31%
	% households with radio	86%	87%	67%	52%	63%
	% households with cell phone	50%	51%	65%	43%	60%
<b>CIVIC ENGAGEMENT AND INSTITUTIONS</b>						
	% of HHs that participated in village assembly in past 12 mo	44%	44%	--	--	11%
	% of HHs in village gov't or committee in past 12 mo	14%	5%	--	--	19%
	% of HHs that asked village leaders for assistance in past 12 mo	12%	9%	--	--	70%
	Distance to closest major weekly market	0 (in village)	3km	3 km	6 km	5 km
	# of village committees/groups	6	7	2	0	0
	# of NGOs	5	8	5	8	2
	# of credit, banking services or VICOBA	1	1	2	3	1