



**TUUNGANE**  
creating a healthy future for people and nature

**CHANGES IN HOUSEHOLD  
WELL-BEING AND RESILIENCE  
2011-2016**

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while paving the way for transformations in development.



Hess Environmental Economic Analysis specializes in conducting developing-country household surveys using computer-aided personal interviewing and

doing the statistical analysis and write up of the results.



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## Abbreviations & acronyms

|        |   |
|--------|---|
| BMU    | Beach management unit   |
| COCOBA | Community conservation banks (village savings and loans associations) |
| CMC    | Century month code  |
| DHS    | Demographic Health Survey   |
| FCS    | Food consumption score  |
| MEMP   | Mahale Ecosystem Management Project                                   |
| PRB    | Population Reference Bureau   |
| TANAPA | Tanzania National Parks Authority                                     |
| TFR    | Total fertility rate  |
| TNC    | The Nature Conservancy  |
| WASH   | Water, sanitation and hygiene   |
| WFP    | World Food Programme  |
| WHO    | World Health Organisation   |

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“Little by little, a little becomes a lot.”

— Tanzania proverb

## Executive Summary

The Tuungane project focuses on healthier families, healthier fisheries, and healthier forests. In August 2016, we measured changes since a baseline survey five years before and found progress in families, fisheries, and forests.

Overall, families said they were better off in 2016 than five years before. In 2011, the majority of households (60%) said they had difficulty meeting their daily needs. In 2016, this dropped to a bit more than one third of households (39%).

The total population in the villages increased 4.4% per year (mostly from births). At this rate, the number of households will double every 16 years. This is a slight decrease from the 14-year doubling time in 2011.

A drop in child mortality is among the more important changes we found. Saving children's lives matters for both people and nature. As people become more confident that their current children will live, they have fewer births which makes mothers and children healthier and reduces the pressure on local forests and fisheries. People said project activities that helped reduce child mortality included information outreach on pregnancy and childbirth, rehabilitated health clinics, more trained birth attendants, and a boat to transport pregnant women and sick children to the regional hospital when health problems are beyond the capacities of local clinics.

Among families, there was an increase in the number of married women using contraception from 17% to 25%. Most of the increase in contraception came from women who wanted to space their births better. As one woman explained: *'Tuungane educated us that if we space having children, then mothers become healthier and family income increases. If a woman gives birth every year, it affects her ability to participate in development activities'*.

While unmet need for family planning was reduced by the project, it is still at 51%, suggesting demand for family planning at the village clinics is likely to continue growing in the coming years.

So far the total number of children women want has not changed and remains high at 7.4. While the economic benefits of having a smaller family and the reduced pressure on natural resources were recognised by most people, a majority still wanted a large family. Most project activities, however, were only 3.5 years old at the time of the 2016 survey. Given more time, we expect the desire for large families will diminish as people become more confident that their current children will live.

For families, a key strategy for the project is using 'Model Households' to act as peer educators for other households. The Model Household strategy was 18 months old at the time of the 2016 survey, and 10% of those interviewed said they were Model Households. Model Households had better indicators than non-Model Households for attitudes towards conservation, family planning awareness, community participation, hygiene practices, and sustainable resource use. As we had hoped, Model Households are modelling behaviours that improve a family's long-term well-being and environmental sustainability.

Common illnesses including intestinal worms, typhoid, diarrhoea, eye infections, ear infections, skin infections, and pneumonia all decreased. People said that the project's focus on ensuring village health clinics are adequately staffed and supplied and the training of community health workers contributed to better overall health in the villages.

More than half the women interviewed had visited a project health clinic in the last 12 months, and when asked to rate the clinic, respondents said the clinics were clean or very clean (83%), they were treated with respect (80%), and they were satisfied or very satisfied with the service (76%).

We found high use of mosquito nets in both the 2011 and 2016 surveys, and use among children under five increased, yet 83% of households still suffered from malaria in the 12 months before the survey. Malaria remains a major health issue. Cholera affected 9% of households in the previous 12 months but has the potential to spread rapidly. Half of households had no soap, sand or ash available at the handwashing place, and 1 out of 3 households drink water from an unimproved source without prior treatment for at least part of the year.

Only about a quarter of the people interviewed had heard of climate change, but 55% had experienced changes in weather patterns since they were young, with a decrease in rainfall being the most commonly mentioned change.

Fisheries are the economic engine of this area and provide more cash income to the villages than any other source. Fishing is seasonal, however, and most people are farmers who fish rather than fishers who farm.

Since 2011, fishers have become less pessimistic. Those reporting an increase in fish catch compared to five years ago rose from 8% to 33%, and when asked if there will be sufficient fish in the future, in 2011 54% said no. In 2016, only 39% said no. People said the project's Beach Management Units that manage local fisheries helped improve fisheries by '*making sure that fishermen are following good fishing rules and regulations*'.

Yet the number of families with someone who fished declined from 37% in 2011 to 24% in 2016. People said the ban on mosquito-net fishing caused some people to stop fishing with these cheap but highly destructive nets. Side by side with this reduction was an expansion of farmland. Median landholding increased from 3 to 4 acres. Most land (old and new) was purchased (32%), inherited (25%), given by the village (17%), or rented (14%). Only 2% of the new land came from clearing bush or forest land.

In forests, we found a decline in the use of charcoal (from 37% to 24%). People said village forests were now better protected and wood harvests better regulated, and more people in 2016 thought there was sufficient forest close to their village to meet day-to-day needs (from 35% to 44%). The number of people who understood that deforestation causes siltation in local streams and rivers also increased from 50% to 68%.

A few things in the project area did not change. Less than 1% of household heads had completed secondary school and only 56% had completed primary school. More than half the population (52%) is still under the age of 15. Support for nature conservation remains high: almost everyone favours the continued protection of the large number of chimpanzees that live in the area (88%).

Overall, the indicators suggest that the well-being of local families improved from 2011 to 2016. In fisheries and forests we found encouraging signs as well. Thus, the project appears to have made a positive difference for both people and nature in its first 3.5 years, yet much still remains to be done.

# 1 Introduction

## 1.1 Background of the study

This document details the results of a household follow-on survey and outcome assessment for the Tuungane ('let's unite' in Kiswahili) project, which is working near Mahale Mountains National Park in Uvinza District of Tanzania's Kigoma Region. The survey was implemented in August 2016. Tuungane is a project that simultaneously addresses population, health and environmental issues. This type of project is known globally as a 'PHE project'.

In many places, health and environmental problems are addressed separately. Yet in rural areas, these problems are inter-related, and changing one can change the other. Globally, there is a growing interest in such projects, and there are now dozens of PHE projects ongoing worldwide [1].

A PHE project usually integrates family planning, basic health care, and environment management into a single set of project activities. For example, fisheries management training may also include trainings on hand washing and discussions on the healthy spacing of pregnancies. The PHE hypothesis is that by integrating population, health and environment activities, PHE projects can achieve greater overall benefits to both people and nature than single-sector projects.

The Tuungane project is a partnership of the District governments, Pathfinder International (a reproductive health international NGO), and The Nature Conservancy (an international conservation NGO). The project's funding to date came primarily from private individuals and foundations in the United States.

The project's ultimate objectives are healthier families, healthier forest, and healthier fisheries. Its activities in the project villages include: improving access to reproductive and primary maternal and child healthcare; improving access to clean water and sanitation; strengthening local governance in project villages; promoting soil conservation agriculture; developing participatory land-use plans; defining and piloting new income-generating enterprises; establishing village savings and loan associations (COCOBAs); establishing Beach Management Units; and protecting community-defined fish breeding and nursery areas.

The Tuungane project began funding project activities in late 2012, although some elements of the project were initiated in the EU-funded predecessor project Mahale Ecosystem Management Project (MEMP) such as village land-use plans and COCOBAs and other activities were only started in earnest from 2014 (e.g., Model Households and work on governance, sustainable fishing, and livelihoods). A baseline household survey was conducted in 2011 covering elements of household well-being that were expected to be influenced by the project.

The current study was co-funded and organised by The Nature Conservancy (TNC), Pathfinder International, and the Population Reference Bureau (PRB) and aimed to measure the outcomes of the project for household well-being and resilience. PRB's involvement forms part of its work in the USAID Evidence Project, which aims to generate and synthesize evidence to strengthen and contribute to the scaling up of high-quality family planning and reproductive health services. PRB's collaboration with

the Tuungane project has the specific goal of increasing evidence on the added value of family planning within PHE projects. Focal points of this were the pathways through which family planning impacts resilience to climate change effects.

To assess project outcomes and the abovementioned pathways, a mixed-methods strategy was used (quantitative and qualitative).

## 1.2 Project area

In the far west of Tanzania along the shores of Lake Tanganyika lies the Greater Mahale Ecosystem. The 1,613 km<sup>2</sup> Mahale Mountains National Park anchors the ecosystem and is the traditional homeland of the Tongwe and Holoholo tribes. Lake Tanganyika is the world's second largest lake by volume and holds nearly a fifth of the Earth's available freshwater. This 'inland ocean' forms the western boundary of the Greater Mahale Ecosystem, a 4.8-million-acre forested landscape. The area is marked by rich biodiversity, including 250 endemic species of fish and more than 90% of Tanzania's endangered chimpanzees.

Farming is the dominant livelihood strategy in the area, with cassava, maize and beans as staple crops. However, an important economic activity is fishing for the highly profitable sardine-like pelagic fish called *dagaa*.

A diversity of ethnic groups live in the area but largely share the lingua franca of Kiswahili.

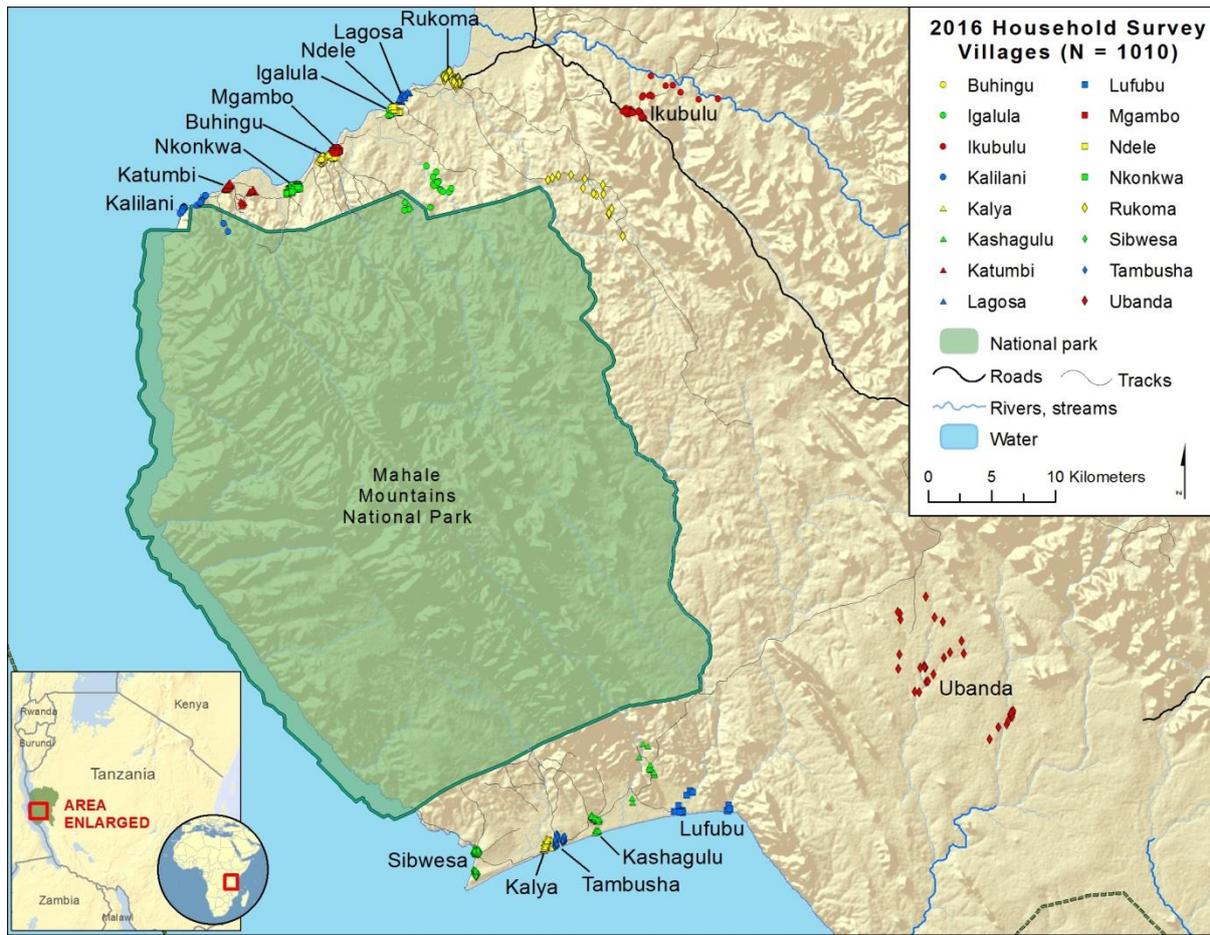


Figure 1 Survey village and interview locations

## 2 Survey methods

This report documents a repeat cross-sectional survey of 10 villages near Mahale Mountain National Park in Tanzania, and presents the analysis of the changes found between the July 2011 baseline survey and the August 2016 follow-on survey. The results of this analysis formed the input for the study's qualitative element: in November and December 2016, village feedback sessions were held in the survey villages, and focus group discussions with village elders, women, youth and fishers were conducted in the villages. The quantitative results were presented for corroboration, and the discussions helped with the interpretation on how the different elements of the Tuungane project changed households' well-being and resilience to climate change effects. The main document integrates results from both the quantitative and qualitative assessments, while a stand-alone report of the qualitative assessment can be found in the appendices.

The 2016 survey design was based on guidance provided by Tanzania's Medical Research Coordination Committee [2] and *Guidelines of Ethics for Health Research in Tanzania* published by the Tanzania National Health Research Forum [3]. Because of the health questions in the survey, Tanzania's National Institute for Medical Research reviewed the survey protocol and granted a clearance certificate for the survey on 11 July 2016.

## 2.1 Sampling

The sample frame of the 2016 survey comprised all households in the same villages that were included in the 2011 baseline survey. In 2011, the following ten villages were selected: Buhingu, Igalula, Kalilani, Kalya, Kashagulu, Katumbi, Lubalisi, Nkonkwa, Sibwesa, and Rukoma. The project villages were originally selected based on their proximity to Mahale Mountains National Park and their willingness to partner with the project. Administrative village restructuring meant that there are now 17 villages where there were 10 in 2011. Sixteen of these cover the same area as the original sample frame,<sup>1</sup> and these comprise the 2016 survey villages. These villages are where project activities have been focused for the last few years.<sup>2</sup>

**Table 1 Old and new village structure**

| <i>Ward</i>                         | <i>Old Villages<br/>2011</i> | <i>New Villages<br/>2016</i> |
|-------------------------------------|------------------------------|------------------------------|
| Igalula<br>(North of National Park) | Igalula                      | Igalula                      |
|                                     |                              | Ndele                        |
|                                     |                              | Lagosa                       |
|                                     | Rukoma                       | Rukoma                       |
|                                     | Lubalisi                     | Lubalisi                     |
|                                     |                              | Ikubulu                      |
| Buhingu<br>(North of National Park) | Buhingu                      | Buhingu                      |
|                                     |                              | Mgambo                       |
|                                     | Nkonkwa                      | Nkonkwa                      |
|                                     |                              | Katumbi                      |
|                                     | Kalilani                     | Kalilani                     |
| Kalya<br>(South of National Park)   | Kalya                        | Kalya                        |
|                                     |                              | Tambusha                     |
|                                     | Kashagulu                    | Kashagulu                    |
|                                     |                              | Ubanda                       |
|                                     |                              | Lufubu                       |
|                                     | Sibwesa                      | Sibwesa                      |

The 2011 baseline survey included 476 randomly selected households in the 10 villages. To calculate the sample size for the 2016 survey, we looked at baseline prevalence rates for a range of variables and decided on a follow-up cross-sectional survey of 1,000 randomly selected households. With an alpha of 5%, and a power of 80%, a 5% change would be detectable for variables with a baseline prevalence rate of 9%, and an 8% change for variables with a 40% baseline prevalence rate. The minimal detectable effect size will be larger for the variables in the reproductive health and fisher sections, especially the latter, as not all households in baseline and follow-on had respondents who met the criteria for these sections, and thus the number of respondents is lower.

Sampling in the 2016 survey followed the same procedures as in 2011. A sample frame for the survey was drawn up by collecting population data on villages and sub-villages. This process was completed

<sup>1</sup> Lubalisi was included in the 2011 survey, and respondents in the sub-village Ikubulu were interviewed. After village restructuring in December 2014, Ikubulu became a separate village. For comparability reasons, only Ikubulu was included in the 2016 survey.

<sup>2</sup> The health activities of the project have expanded beyond these villages, and at the time of the 2016 survey were being implemented in 24 villages.

in several stages. First, for each village, information was collected on the number of households in the village as a whole and in each sub-village. Second, to limit the geographic spread that the survey team would have to cover, two sub-villages were selected from each village, depending on the characteristics of the sub-villages. In villages that included both coastal and inland sub-villages, one of each was selected. The village sample was divided over the selected sub-villages proportional to the combined population size of all coastal and inland sub-villages. When a village had only coastal or inland sub-villages, the sample was proportional to the population size of the selected sub-villages. When possible, sub-villages included in 2011 were selected again in 2016 to aid comparability.

For each sub-village, a list of all households was prepared by a survey team member and local leaders. The random sample of households was drawn from these lists using a random number generator application from Muse Guy Productions.

Sub-village sample lists, including replacement households, were brought back to sub-village leaders to check all selected households were present and to draw maps of their locations to aid interview logistics. Sub-village guides, usually the sub-village leader, were hired to help locate the households and introduce the enumerators.

The village restructuring and the fact that not all sub-villages in a village were surveyed meant that both surveys do not cover the exact same geographic area. Due to the potential bias this may have introduced, all the main indicators were also analysed in a restricted sample which included only households from sub-villages that were surveyed in both years. Whenever a difference was found, this is reported in a note that accompanies the result. For one indicator, access to an improved water source, results from the restricted rather than the full sample are presented. The geographic location of the sub-village is the main determinant of households' source of water and showing results from the full sample would have misrepresented reality.

The 2016 sampling process also differed from that of the baseline in that it used proportional sampling to size, where village sample size was proportional to village population size. In 2011, 50 interviews were assigned to each village to allow village comparisons. The larger overall sample in 2016 meant that, even with proportional sampling, all but the smallest villages had sufficiently large samples to allow comparison.<sup>3</sup> In the analysis, the 2011 data were weighted to approximate a proportional sample (see Section 2.5 below). Table 2 shows the sample by village for 2011 and 2016.<sup>4</sup>

Note that village household data were not always reliable. Data acquired from village leaders on the number of village and sub-village households were often different from the sub-village household lists developed by the survey team. The team's numbers were almost always lower. Calculating average household size based on the population and household data provided by the village leaders results in quite unrealistic values for some villages.

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<sup>3</sup> In both 2011 and 2016, only large village differences were detectable.

<sup>4</sup> The appendices include a table showing the sample distribution using the 2016 village structure, including sub-village level samples.

**Table 2 Village households and sample numbers**

| <i>Villages 2011</i> | <i>Number of households</i> | <i>Interviewed households</i> | <i>Villages 2016</i>   | <i>Estimated number of households<sup>5</sup></i> | <i>Interviewed households</i> |
|----------------------|-----------------------------|-------------------------------|------------------------|---|-------------------------------|
| Igalula              | 1,117                       | 51                            | Igalula                | 1,151   | 127                           |
| Rukoma               | 901                         | 53                            | Rukoma                 | 1,364   | 145                           |
| Ikubulu              | 200                         | 49                            | Ikubulu                | 526   | 57                            |
| Buhingu              | 1,225                       | 55                            | Buhingu                | 1,296   | 142                           |
| Nkonkwa              | 402                         | 49                            | Nkonkwa                | 646   | 71                            |
| Katumbi              | 396                         | 50                            | Katumbi                | 555   | 60                            |
| Kalilani             | 400                         | 30                            | Kalilani               | 334   | 35                            |
| Kalya                | 1,102                       | 50                            | Kalya                  | 1,388   | 150                           |
| Kashagulu            | 1,356                       | 50                            | Kashagulu <sup>6</sup> | 1,531   | 135                           |
| Sibwesa              | 601                         | 50                            | Sibwesa                | 777   | 88                            |
| Total                | 7,700                       | 487                           |                        | 9,568   | 1,010                         |

## 2.2 Respondent selection

The questionnaire had three sections: a household section, a fisher questionnaire, and a section on reproductive health. The respondent for the household section had to be at least 18 and was ideally the household head. If the head was unavailable, another adult household member was selected if they were knowledgeable about the household and able to answer the survey questions. If no knowledgeable adult was available, the team enquired when they would be back. Depending on the survey team's planned presence in each village, a return visit was made when possible. If not, a replacement household was interviewed. The respondent of the fisher questionnaire was selected based on availability. If the respondent of the household section fished, that person was selected. The respondent had to be at least 18 and fish full or part time including fishing from the shore ('stick fishing'). The same selection process was used for the respondent of the reproductive health section. The respondent to this section had to be a woman between 18 and 49.<sup>7</sup> If a household's fisher or woman of reproductive age was not available at the time of the interview, an appointment was made if they were back while the survey team was still present in the village. If they were not back in time, the sections were skipped.

Before each interview, the selected households were read the free, prior, informed consent (FPIC) statement (see questionnaire in appendices) and asked if they wanted to participate. In 2016, nine interviews are recorded in the software as refusals after the FPIC statement was read. A considerable

<sup>5</sup> Sample division was based on population rather than household numbers. This shows the estimated household numbers obtained by dividing the village population numbers by the average household size as found in the survey (6.2 members).

<sup>6</sup> Only very unreliable population and household data were available for Kashagulu when deciding on the proportional sample size for the village. A population estimate of 4,000 was used which corresponds to the 135 assigned interviews, which later proved too low. The table shows the latest, more accurate estimate of households. Kashagulu is therefore slightly underrepresented in the results.

<sup>7</sup> The official reproductive age range is 15-49, but the project did not seek ethical permission to interview minors. In 2011, the 15-49 age range was used. For 2011-2016 reproductive health and family planning comparisons, respondents below 18 were excluded from the 2011 data.

number of replacements had to be made due to household unavailability. Rejection and availability together meant 23% of the total number of households were replacements.<sup>8</sup>

## 2.3 Counterfactual

In 2011, it was expected that project activities would be limited to six of the ten villages and the remaining four would act as comparisons in a subsequent impact analysis. In fact, the project worked in all ten villages except Kalilani.<sup>9</sup> The lack of control villages means this report will only focus on before-after differences. However, project activities were started at different times in different villages (Table 3). It may be possible to detect different effects based on time since implementation, but this lies outside the scope of this report and is suggested for further data analysis.

As can be seen from Table 3, some activities, such as designing village land-use plans and the savings and loans associations (called COCOBAs), were started by the predecessor MEMP project. Part of the hypothesized benefits will therefore already have been included in the 2011 baseline, and only changes since then can be picked up in this analysis. Besides the starting year of the specific activities, Table 3 also shows the project's three-phased village prioritization, with Buhingu, Nkonkwa, Katumbi, Sibwesa, Kalya and Kashagulu forming phase 1 and Rukoma, Lubalisi and Igalula forming phase 2, and Kalilani, together with other villages not included in the 2011 baseline, forming phase 3. There are no known other organizations working in the survey villages, so alternative explanations for the observed changes are limited.

**Table 3 Starting year of activities in the different villages**

| <i>Village (2011)</i> | <i>Freshwater/<br/>BMU</i> | <i>Community-<br/>Based<br/>Distribution</i> | <i>Health<br/>Facilities</i> | <i>Village<br/>Land Use<br/>Plans</i> | <i>COCOBA</i> | <i>Prioritization</i> |
|-----------------------|----------------------------|--|------------------------------|---------------------------------------|---------------|-----------------------|
| Igalula               | 2015                       | 2014   | 1981                         | 2007                                  | 2005          | 2015-16               |
| Rukoma                | 2015                       | 2014   | 1992                         | 2008                                  | 2006          | 2015-16               |
| Lubalisi              | NA                         | 2014   | 2015                         | 2008                                  | 2014          | 2015-16               |
| Buhingu               | 2013                       | 2013   | 1981                         | 2007                                  | 2004          | 2012-14               |
| Nkonkwa               | -                          | 2013   | 2002                         | 2011                                  | 2004          | 2012-14               |
| Katumbi               | 2013                       | 2013   | 2011                         | 2015                                  | 2004          | 2012-14               |
| Kalilani              | -                          | -  | -                            | -                                     | 2012          | 2016-17               |
| Kalya                 | 2013                       | 2013   | 1987                         | 2006                                  | 2005          | 2012-14               |
| Kashagulu             | 2013                       | 2013   | 1990s                        | 2008                                  | 2005          | 2012-14               |
| Sibwesa               | 2012                       | 2013   | 2006                         | 2007                                  | 2005          | 2012-14               |

## 2.4 Survey instrument and data quality management

The 2016 questionnaire was for the most part identical to the one used in 2011. The 2011 questionnaire was designed to measure the main elements of household well-being that the project expected to influence and followed the World Bank's multidimensional definition of poverty. The three World Bank dimensions of Opportunities, Empowerment and Security were sub-divided into a

<sup>8</sup> Based on roughly half the interviews, as records of replacement were lost by one of the supervisors.

<sup>9</sup> Kalilani has a dispute with TANAPA which claims it lies inside the Mahale Mountains National Park and wants to relocate the village.

number of focal areas, each with a number of indicators. These covered the household situation, living conditions, household assets, farming, livelihoods, credit, governance, community participation, health, medical care, and population and environment linkages. Separate sub-sections were included on fishing for those who self-identified as fishers and reproductive health for women between the ages of 18 to 49. Wherever possible, the health and reproductive health sections used the same questions as the 2010 Tanzania Demographic and Health Survey (DHS) to allow comparison to national and regional values.<sup>10</sup>

To incorporate the additional focal area of resilience to climate change and create information for the assessment of the pathways through which family planning impacts these, several questionnaire sections were added or expanded. This includes questions on hygiene, family planning, climate change, diet and food security, and social cohesion. The reproductive health section was also expanded to allow an evaluation of healthcare facilities and services. The farming section of the household questionnaire was enlarged to better assess current farming practices.

While the 2011 survey used paper questionnaires, in 2016, computer-aided personal interviewing (CAPI) was used with Samsung tablets and the World Bank's Survey Solutions software. Hyperlinks to the English and Kiswahili 2016 versions of the questionnaire can be found in the appendices.

In the field, every day after data collection, interviews were uploaded to the server and the data were checked for quality. Every evening, a file with comments and questions was sent back to the supervisors to discuss with the enumerators, and any needed corrections were made. Supervisors also went back to 10% of the interviewed households to confirm the household had been interviewed and to check data with a short check-up questionnaire of ten questions. If large differences were found, these were discussed with the enumerator.

## 2.5 Data weighting and sample structure

The analyses were run in SPSS 21 using the complex samples module to allow entering the sampling structure and 2011 weights. The full sampling structure with coastal and inland strata and sub-village clusters could not be entered because information about the number of households per sub-village was missing for the 2011 survey. This information was available for 2016, but entering different sampling structures in the analysis might have biased the comparison. Villages were entered as strata, and weights for 2011 were calculated by taking the inverse of the proportion of interviewed households to the total number of households in a village. As the 2016 sample village distribution was proportional to the size of the village population, equal weights were used for the 2016 observations. By not entering the full sample structure, standard errors are likely to be underestimated. Some caution is therefore appropriate in interpreting differences between 2011 and 2016 that are only just statistically significant. As the survey covered more than 5% of the population, a finite population correction had to be applied, for which the SPSS 'sampling without replacement' option was selected and the village household numbers entered as population size.<sup>11</sup>

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<sup>10</sup> See [4] for a detailed description of the design of the 2011 questionnaire.

<sup>11</sup> Although presentation of the data will follow the old 10 village structure to allow comparison with the 2011 data, household numbers entered here were for the actual villages (10 in 2011 and 16 in 2016). The combined data therefore had 26 strata.

Unless otherwise stated, presented results for 2011 are based on weighted data. The presentation of village-specific results is unweighted by definition, as weights are village based. Differences between unweighted and weighted results are an indication of village variation in the variable.

Although the fisher and reproductive health questionnaires have fewer respondents, the same village weights were applied.

## **2.6 Survey team**

The survey team comprised ten enumerators and two supervisors. Seven of the ten enumerators were from the survey area. The enumerators had at least finished form IV (O-levels), but most were attending or had completed post-secondary education. Most had also participated in previous CAPI surveys for the Tuungane project. One supervisor had participated in the 2011 baseline, and the other was a professionally trained supervisor who was familiar with the software and survey procedures. The team, including an 11<sup>th</sup> back-up enumerator, was familiarized with the questionnaire and software during a four-day training. Training was finalised in a two-day pre-test to test sampling procedure, respondent selection, new question understanding, survey programming, and supervisor check procedures (36 interviews on day 1 and 37 on day 2). Each enumerator did between three and nine interviews in the pre-test. With hindsight, training time was short considering the level of education and comprehension of English for most of the enumerator team.



**Figure 2 Enumerator training**

### **3 Results**

Due to the questions added in the 2016 survey, interview duration increased. In 2011, the average interview lasted 43 minutes. In 2016, the average interview took just over 60 minutes.<sup>12</sup> In 2016, the household section took 54 minutes, the fisher questionnaire 9 minutes, and the reproductive health section 10 minutes to complete, on average, but few households answered all three sections.

#### **3.1 Respondent and household characteristics**

As can be seen in Table 4, the characteristics of the respondents to the different sections of the questionnaire are roughly the same in the two surveys, and the weighting of the 2011 data changes little. The household section was mainly answered by the household head (roughly 60% of the interviews) and by his or her spouse (around 30%). Roughly half of these respondents were male, with slightly more males interviewed in 2011. The average age of the respondent at the time of the interview was 37 in 2011 and 39 in 2016.

Fishers were interviewed in 136 households (28% of the total) in 2011 and 181 households (18% of the total) in 2016. The fishing section was mainly answered by the head of the household or one of his/her children. Interviewed fishers were almost always men (98%), and their average age was 34 in 2011 and 37 in 2016.

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<sup>12</sup> Actual interview time in 2016, excluding introduction and waiting time between different respondents. The time reported in 2011 includes waiting time.

Women of reproductive age (defined for this study as between 18 and 49) were interviewed in 357 households (73% of the total) in 2011 and 767 households (76% of the total) in 2016.<sup>13</sup> The respondents to the reproductive health section were mainly the spouse of the household head (around 70%). In 2011, more 'other household members' were interviewed than in 2016. The average age of the female respondents was 30 in both surveys.

**Table 4 General respondent characteristics**

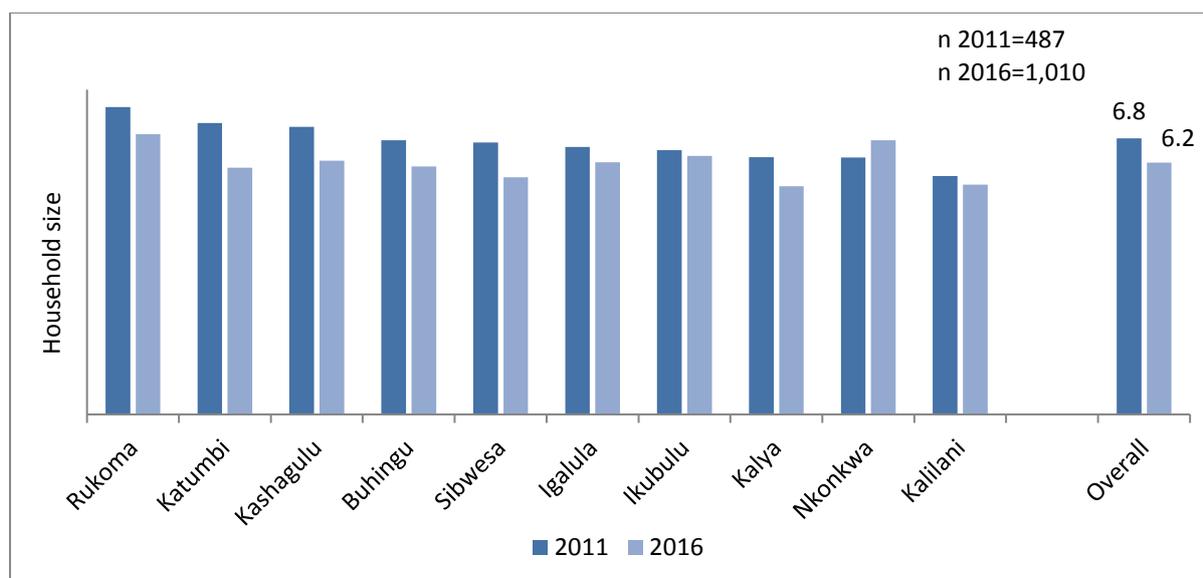
| <i>Questionnaire section</i> | <i>Household role (%)</i> |               |              |              | <i>Sex (%)</i> |               | <i>Mean age</i> | <i>n</i> |
|------------------------------|---------------------------|---------------|--------------|--------------|----------------|---------------|-----------------|----------|
|                              | <i>Head</i>               | <i>Spouse</i> | <i>Child</i> | <i>Other</i> | <i>Male</i>    | <i>Female</i> |                 |          |
| <b>2011 unweighted</b>       |                           |               |              |              |                |               |                 |          |
| Household section            | 58                        | 28            | 7            | 6            | 53             | 47            | 37              | 487      |
| Fisher section               | 73                        | 4             | 16           | 7            | 98             | 2             | 34              | 136      |
| Reproductive health section  | 8                         | 70            | 9            | 13           | -              | -             | 30              | 357      |
| <b>2011 weighted</b>         |                           |               |              |              |                |               |                 |          |
| Household section            | 57                        | 27            | 9            | 7            | 54             | 46            | 37              | 487      |
| Fisher section               | 73                        | 3             | 17           | 7            | 98             | 2             | 34              | 136      |
| Reproductive health section  | 8                         | 67            | 10           | 15           | -              | -             | 30              | 357      |
| <b>2016</b>                  |                           |               |              |              |                |               |                 |          |
| Household section            | 60                        | 31            | 6            | 3            | 49             | 51            | 39              | 1010     |
| Fisher section               | 86                        | -             | 13           | 1            | 98             | 2             | 37              | 181      |
| Reproductive health section  | 9                         | 74            | 10           | 7            | -              | 100           | 30              | 767      |

This study uses a common definition of what constitutes a household: a group of people who live and usually share their food together. Average household size in the 2016 survey was significantly lower than in 2011 (Figure 3).<sup>14</sup> Looking at the village-level results, this pattern is there for all villages but Nkonkwa. It is not clear what causes the difference in Nkonkwa. Household age composition is largely the same for both surveys (Figure 4).

Household size in both surveys was larger than the 2015 Tanzanian national rural average of 5.1 members [5], and the 2011 data lie close to the average household size of 6.6 found in a 2006 survey in the area [6]. Unfortunately, the national data are not broken down by region. Perhaps rural areas in the Kigoma Region have larger households.

<sup>13</sup> In 2011, women between 15 and 49 were interviewed – the official reproductive age. Seven 2011 interviews with women aged 15 to 17 were excluded from this analysis to avoid bias caused by the different age criteria.

<sup>14</sup> Statistical significance tested through a bivariate general linear model: Wald F=9.946; p=0.002.



**Figure 3 Average household size**

In both surveys, 17% of interviewed households had female heads of household (Table 5), which is considerably lower than the 2015 rural national average of 24% [5].

**Table 5 Average household size and female-headed households**

|                 | <i>Average household size</i> | <i>Female-headed households (%)</i> | <i>n</i> |
|-----------------|-------------------------------|-------------------------------------|----------|
| 2011 unweighted | 6.7                           | 16                                  | 487      |
| 2011 weighted   | 6.8                           | 17                                  | 487      |
| 2016            | 6.2                           | 17                                  | 1010     |

The age composition of the households in 2011 and 2016 was roughly the same (Figure 4). The population under 15 comprised 49% in 2011 and 52% in 2016.<sup>15</sup> Figure 5 shows the age composition by gender for 2016. The bulge for women of 50-54 is probably due to enumerators trying to reduce their work load as women up to age 49 had to be interviewed in the reproductive health section.

<sup>15</sup> Statistical significance tested through bivariate logistic regression after creating a binary variable (age 0-14=0; age 15 and higher=1): Wald F=4.836; df= 9,254; p=0.03.

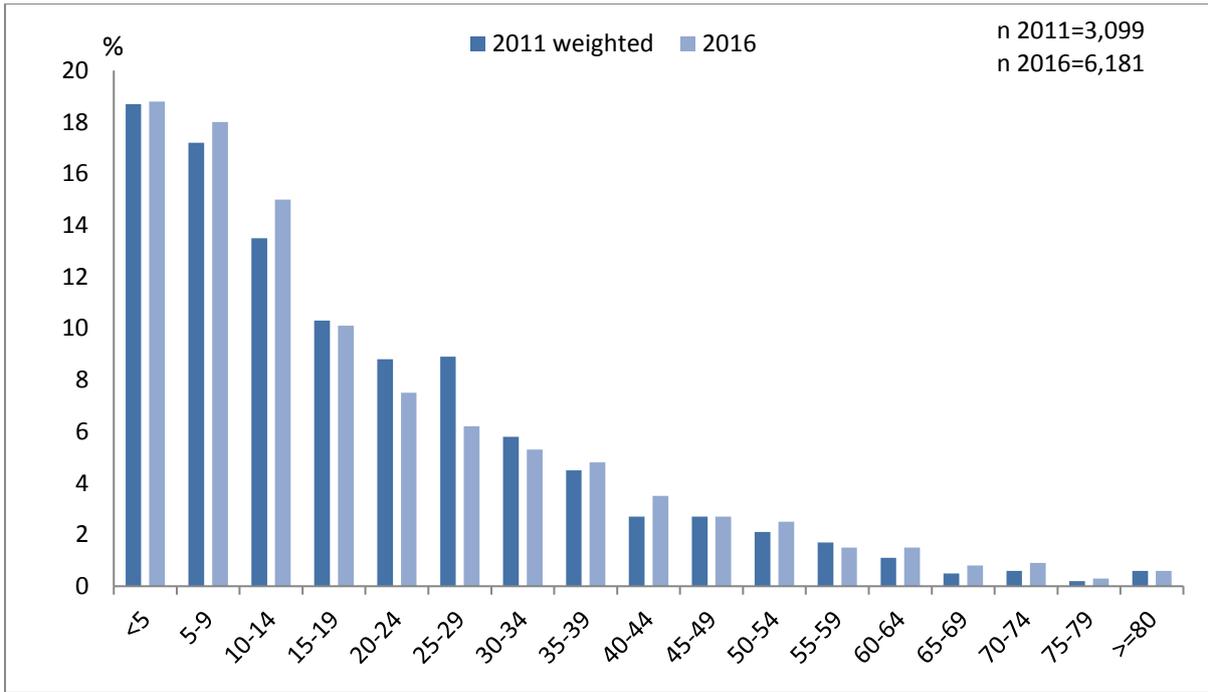


Figure 4 Household age composition

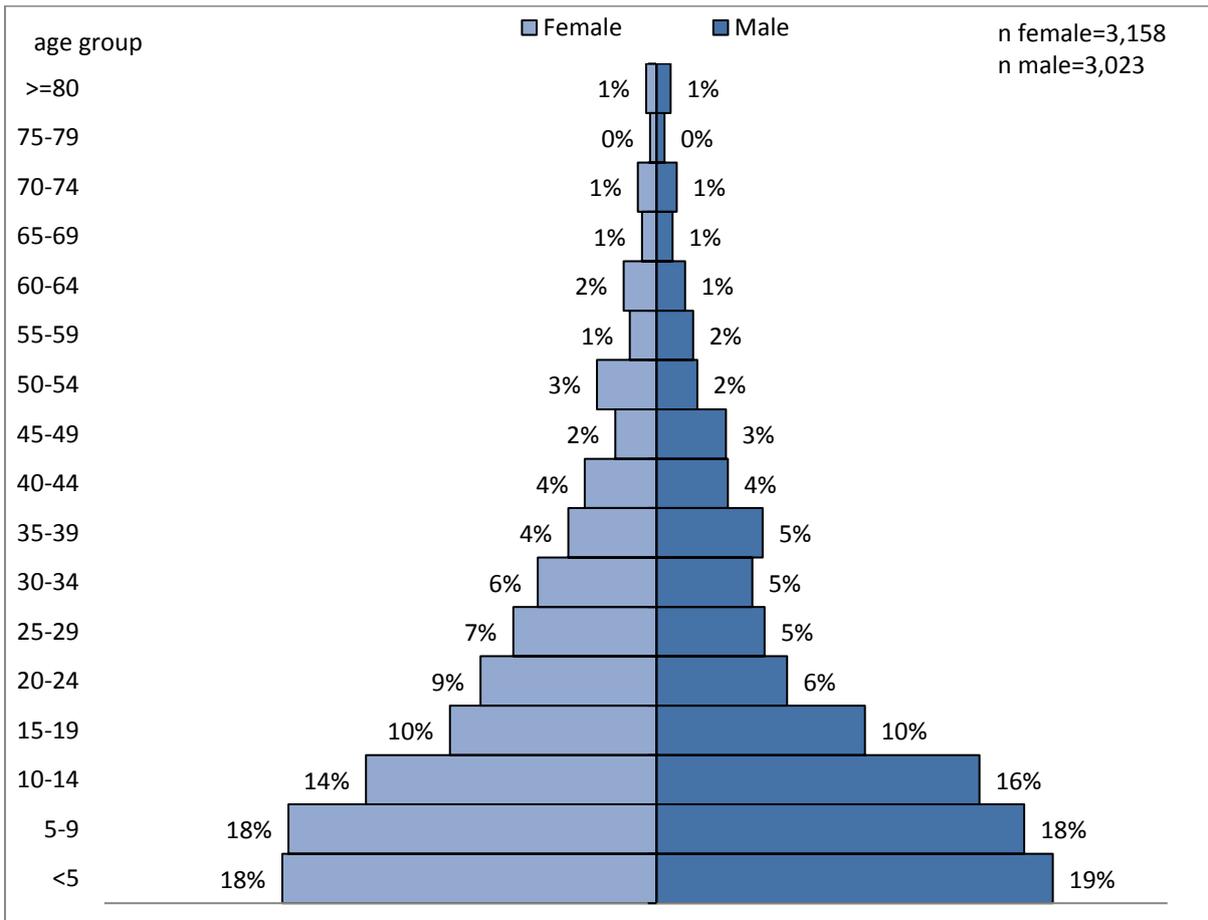


Figure 5 Population pyramid 2016

Tribal affiliation of the household head is very similar across the two surveys (Table 6). Ha is the most common tribe, followed by Tongwe, Fipa, Bembe and Goma. Other mentioned tribes include Mtabwa,

Manyema and Mhutu. For most villages, Ha is the most common tribe among household heads, but Bembe dominate in Kalilani and Katumbi (in 2016), and Tongwe are most numerous in Kalya and Kashagulu.

**Table 6 Tribal affiliation of the household head (%)**

|                 | <i>Ha</i> | <i>Tongwe</i> | <i>Fipa</i> | <i>Bembe</i> | <i>Goma</i> | <i>Other</i> | <i>n</i> |
|-----------------|-----------|---------------|-------------|--------------|-------------|--------------|----------|
| 2011 unweighted | 47        | 28            | 8           | 8            | 3           | 6            | 487      |
| 2011 weighted   | 45        | 31            | 8           | 8            | 3           | 6            | 487      |
| 2016            | 47        | 28            | 10          | 9            | 1           | 6            | 1009     |

Ignoring village restructuring,<sup>16</sup> a large minority of household heads were born in the village they live in currently, and of those who were not, most had lived there at least 20 years (Table 7). In both 2011 and 2016, Ikubulu stands out for the low proportion of household heads born there (2-4%) and short time lived in the village (9-12 years, on average).

**Table 7 Household head's time in the village (%)**

|                 | <i>Born in village</i> | <i>Years lived in village</i> |             |              |               | <i>n</i> |
|-----------------|------------------------|-------------------------------|-------------|--------------|---------------|----------|
|                 |                        | <i>0-5</i>                    | <i>6-10</i> | <i>11-20</i> | <i>&gt;20</i> |          |
| 2011 unweighted | 40                     | 8                             | 7           | 15           | 29            | 485      |
| 2011 weighted   | 45                     | 6                             | 5           | 13           | 31            | 485      |
| 2016            | 40                     | 8                             | 9           | 16           | 28            | 1003     |

## 3.2 Education

The education level of the household head was very similar in both surveys (Table 8). Just over half the heads of household finished primary school (Standard 7), while around a fifth did not attend any regular education.

**Table 8 Completed education level of the household head (%)**

|                 | <i>None or pre primary</i> | <i>Some primary</i> | <i>Completed primary</i> | <i>Some secondary</i> | <i>Completed secondary</i> | <i>Higher</i> | <i>n</i> |
|-----------------|----------------------------|---------------------|--------------------------|-----------------------|----------------------------|---------------|----------|
| 2011 unweighted | 20                         | 18                  | 58                       | 3                     | 1                          | -             | 476      |
| 2011 weighted   | 20                         | 19                  | 57                       | 3                     | 1                          | -             | 476      |
| 2016 unweighted | 22                         | 18                  | 56                       | 4                     | 0.1                        | 0.3           | 1010     |

The Adjusted Net Enrolment Rate for primary school age<sup>17</sup> is slightly higher in 2016 for both boys and girls: in 2016, 83% of all boys and 87% of all girls between 7 and 13 were attending school.<sup>18</sup> Comparable numbers for Tanzania as a whole in 2014 were 81% for boys and 82% for girls [7].

<sup>16</sup> Respondents were asked if the household head was born in their current village.

<sup>17</sup> The Adjusted Net Enrolment Rate - primary = percentage of children in the official primary school age range who are enrolled in either primary or secondary education. For Tanzania the official primary school age range is 7 to 13: <http://www.uis.unesco.org/DataCentre/Pages/country-profile.aspx?code=TZA>.

<sup>18</sup> Looking at the combined data for boys and girls, the difference with 2011 is not statistically significant using weighted data, but the bivariate logistic regression did not run to completion. Chi<sup>2</sup> analysis on unweighted data confirmed this result.

**Table 9 Adjusted net enrolment rate for primary school age children**

|         | 2011<br><i>unweighted</i> | 2011<br><i>weighted</i> | 2016 | <i>n</i><br>2011 | <i>n</i><br>2016 |
|---------|---------------------------|-------------------------|------|------------------|------------------|
| Boys    | 80                        | 80                      | 83   | 304              | 715              |
| Girls   | 83                        | 84                      | 87   | 332              | 602              |
| Overall | 81                        | 82                      | 85   | 636              | 1407             |

### 3.3 WASH

WASH stands for Water, Sanitation and Hygiene. Most of the WASH indicators discussed here were included in both surveys, with the exception of the 2016 question on handwashing.

#### Drinking water

Access to safe drinking water depends on a number of variables including the source of the water, the time needed to collect it, and the ability to purify it. The Tuungane project does not directly focus on improving water sources, but through its Model Households does aim to increase water purification by promoting the boiling of drinking water (see Section 4.1 on Model Households).

The first of the WASH indicators is whether households use an improved source of drinking water. Water sources were categorized as improved or unimproved following WHO and UNICEF standards [5]. Improved sources include public taps, protected private or public wells, and rainwater. Unimproved sources include open wells and surface water. Questions were asked for both dry and wet seasons, as water sources can differ depending on the season.

Initial results showed a large decrease in access to improved sources in the dry season, but when we looked more closely at where those differences originated, it was mostly in areas that had not been included in the 2011 survey (see Section 2.1). If we restrict the analysis to only those sub-villages that were included in both samples, we do not find such a strong deterioration. As the type of water source is influenced greatly by the location of a household, we here present the results using the restricted sample. In this restricted sample, a small decrease in access to improved sources in the dry season is still found, but it is not statistically significant (Table 10). Again using the restricted sample, in the wet season a statistically significant increase in access to improved sources was found.<sup>19</sup>

Looking at village specific differences in the full sample, we find they occur in only a few villages, and one can see the problem of Kashagulu where the full sample covered different sub-villages and comparing different geographic areas resulted in an apparent 42% drop in access and a shift from protected public wells to rivers/streams (Table 11). In Ikubulu, all improved observations are from one sub-village which was interviewed in both years (Ikubulu sub-village). Most likely a protected public well was installed there after 2011.<sup>20</sup> The same sub-villages were interviewed in Sibwesa, where the shift was from protected public wells to open public wells. During the village feedback session, people said several of the old protected wells had dried up.

<sup>19</sup> Statistical significance tested through bivariate logistic regression: Wald F=43.229; p<0.001.

<sup>20</sup> Due to the logistical challenges of reaching this remote village, no village presentations took place there, and these changes could not be corroborated.

In the wet season more villages show differences between the surveys. Almost all villages in the north show large increases in improved sources, mainly rainwater. Only Katumbi and Kalilani do not show any increase. In the south, the picture is mixed. Kashagulu shows a big drop, mainly through reduced use of protected public wells, while Kalya shows an increase due to higher use of rainwater. When asked in the village feedback session, people confirmed a general increase in the use of rainwater. The main reasons for the change was said to be an increase in metal roofing – not found in this survey – that made rainwater collection easier and also encouragement from government officials to collect rainwater.

Looking at the whole year, and again only including households from sub-villages that were covered by both surveys, 16% of the 2011 households had access to an improved source in both seasons, while 13% did in 2016, but the difference is not statistically significant.

**Table 10 Households with access to an improved source of drinking water – restricted sample (%)**

|                 | <i>Improved source<br/>Dry season</i> | <i>Improved source<br/>Wet season</i> | <i>n</i> |
|-----------------|---------------------------------------|---------------------------------------|----------|
| 2011 unweighted | 17                                    | 22                                    | 335      |
| 2011 weighted   | 17                                    | 23                                    | 335      |
| 2016            | 14                                    | 46                                    | 415      |

**Table 11 Village-level access to improved water sources – full sample (%)**

|           | <i>Dry season</i> |             | <i>Wet season</i> |             |
|-----------|-------------------|-------------|-------------------|-------------|
|           | <i>2011</i>       | <i>2016</i> | <i>2011</i>       | <i>2016</i> |
| Igalula   | 10                | 0           | 18                | 24          |
| Rukoma    | 0                 | 0           | 6                 | 32          |
| Ikubulu   | 8                 | 33          | 10                | 35          |
| Buhingu   | 0                 | 0           | 13                | 32          |
| Nkonkwa   | 10                | 4           | 10                | 42          |
| Katumbi   | 0                 | 0           | 6                 | 5           |
| Kalilani  | 3                 | 0           | 13                | 14          |
| Kalya     | 38                | 35          | 44                | 57          |
| Kashagulu | 72                | 30          | 76                | 45          |
| Sibwesa   | 54                | 21          | 54                | 50          |
| Overall   | 25                | 13          | 31                | 37          |

Average time needed to fetch water, including going, waiting, and returning, was longer in the 2016 survey in the dry season and slightly shorter in the wet (Table 12). The increase in the dry season is entirely due to changes in the southern villages. In all three southern villages, water fetching time increased by more than 20 minutes (Table 13). The small decrease in the wet season is mainly due to changes in Kalya, where the average dropped by 17 minutes and Rukoma, where it was 12 minutes shorter.

Overall, 80% of 2011 households needed at most one hour to fetch water in both the dry and wet seasons. In 2016, only 72% of households could fetch water within this time in both seasons.<sup>21</sup> This result holds for both the full and restricted samples.

**Table 12 Time needed to fetch water in the dry and wet season**

|                 | Dry season                 |                       |                      |                       |                  | <i>n</i> |
|-----------------|----------------------------|-----------------------|----------------------|-----------------------|------------------|----------|
|                 | <i>At the dwelling (%)</i> | <i>&lt;30 min (%)</i> | <i>30-60 min (%)</i> | <i>&gt;60 min (%)</i> | <i>Mean time</i> |          |
| 2011 unweighted | -                          | 47                    | 32                   | 21                    | 33               | 487      |
| 2011 weighted   | -                          | 48                    | 33                   | 19                    | 32               | 487      |
| 2016 unweighted | 0.3                        | 46                    | 27                   | 27                    | 41               | 1002     |
|                 | Wet season                 |                       |                      |                       |                  |          |
|                 | <i>At the dwelling (%)</i> | <i>&lt;30 min (%)</i> | <i>30-60 min (%)</i> | <i>&gt;60 min (%)</i> | <i>Mean time</i> | <i>n</i> |
| 2011 unweighted | 5                          | 45                    | 31                   | 18                    | 30               | 487      |
| 2011 weighted   | 5                          | 46                    | 32                   | 17                    | 30               | 487      |
| 2016 unweighted | 1                          | 60                    | 23                   | 16                    | 27               | 1003     |

**Table 13 Time needed to fetch water in the dry and wet season - village level (minutes)**

|           | Dry season  |             | Wet season  |             |
|-----------|-------------|-------------|-------------|-------------|
|           | <i>2011</i> | <i>2016</i> | <i>2011</i> | <i>2016</i> |
| Igalula   | 27          | 21          | 26          | 21          |
| Rukoma    | 45          | 38          | 40          | 29          |
| Ikubulu   | 27          | 26          | 21          | 27          |
| Buhingu   | 17          | 21          | 16          | 16          |
| Nkonkwa   | 33          | 39          | 26          | 27          |
| Katumbi   | 45          | 40          | 42          | 40          |
| Kalilani  | 12          | 14          | 17          | 20          |
| Kalya     | 45          | 72          | 48          | 31          |
| Kashagulu | 29          | 53          | 22          | 22          |
| Sibwesa   | 41          | 64          | 36          | 43          |
| Overall   | 32          | 41          | 30          | 27          |

Boiling, adding chlorine (often called ‘water guard’ in Tanzania), or using a water filter are termed ‘appropriate treatment methods’ of drinking water [5]. We found that in both dry and wet seasons relatively fewer households in the 2016 survey treated their drinking water (Table 14).<sup>22</sup> When including only households from sub-villages surveyed in both years, the dry season difference loses statistical significance. The wet season reduction in water treatment holds in both the full and the restricted samples, and could have to do with the increase in the use of rainwater.

Those households that did treat their drinking water also used an appropriate method less often in 2016. This result was found in both the dry and wet season, and in almost all villages, although the

<sup>21</sup> Statistical significance tested through bivariate logistic regression: Wald F=4.655; p=0.03.

<sup>22</sup> Both differences are statistically significant: Bivariate logistic regression: Dry season: Wald F= 4.932; p=0.03; Wet season: Wald F=16.227; p<0.001.

magnitude of the decrease differs per village.<sup>23</sup> It is not clear what caused this change. These results hold for both the full and restricted sample.

In both surveys, boiling is the most common treatment method (by far in 2011) followed by straining the water through a cloth (non-appropriate method).<sup>24</sup>

We find that treatment of water is more often applied by households that do not have access to an improved source.<sup>25</sup> We combined both factors into one indicator that measures households that neither have access to an improved water source nor use an appropriate treatment method. We find worse conditions in the 2016 survey in both the restricted and full sample. Here we present results from the full sample as it appears mainly driven by reduced treatment. In 2011, 18% of households were in this situation in the dry season and 17% in the wet season. In 2016, it applied to 32% and 28%, respectively.<sup>26</sup>

**Table 14 Treatment of drinking water (%)<sup>27</sup>**

|                 | Dry season   |                    |                        | Wet season   |                    |                        | n    |
|-----------------|--------------|--------------------|------------------------|--------------|--------------------|------------------------|------|
|                 | No treatment | Appropriate method | Non-appropriate method | No treatment | Appropriate method | Non-appropriate method |      |
| 2011 unweighted | 28           | 65                 | 7                      | 31           | 63                 | 6                      | 487  |
| 2011 weighted   | 25           | 70                 | 6                      | 28           | 67                 | 5                      | 487  |
| 2016 unweighted | 28           | 53                 | 19                     | 35           | 35                 | 30                     | 1002 |

## Toilet facilities

A household's toilet facility and whether or not it has to be shared with other households is an important well-being and health indicator. In the Mahale area, there are two common types of latrines that are used by more than 90% of the households. The first, and most common, is the open pit or pit latrine without a concrete slab, and the other is a latrine with slab. An unshared latrine with a slab is categorized by the WHO and UNICEF as an 'improved toilet facility' [5].

<sup>23</sup> A correction was made to the Kiswahili version of the question about treatment methods: in 2011, respondents were asked what they *used* to make the water safe for drinking, while in 2016, they were asked what they *do* to make water safe for drinking. It was corrected because the answer options were not read or shown to the respondent and the field team felt respondents might not mention *boiling* under the old translation. The change therefore could have increased the frequency of this answer (though this was not found in the data). Bivariate logistic regression after creating a binary variable (0=non-appropriate method; 1=appropriate method): Dry season: Wald F= 14.735; p<0.001; Wet season: Wald F=53.355; p<0.001.

<sup>24</sup> In the focus group discussions, project staff were said to have introduced a 'water guide' promoting the use of chlorine instead of boiling to save time and firewood. In the survey results we do see a reduction in the use of boiling and an increase in the use of chlorine. However, there was a large increase in the non-appropriate method of straining water through a cloth, as well.

<sup>25</sup> Correlation for use of treatment (no=0; yes=1) and improved source (no=0; yes=1): Dry season: Pearson correlation coefficient= -0.2; p<0.001; Wet season: Pearson correlation coefficient=-0.2; p<0.001.

<sup>26</sup> Combining 2011 and 2016 data, we find that 58% of households treated water from improved sources versus 77% that treated water from unimproved ones (Chi<sup>2</sup>=36.781; p<0.001).

<sup>27</sup> Respondents could enter more than one method. If an appropriate and a non-appropriate method were both mentioned, the household is considered to use an appropriate method, but it may indicate that it does not appropriately treat all of its drinking water.

In the 2011 survey, 33% of households indicated they had an unshared latrine with a concrete slab, but enumerators did not ask to see the facilities. In 2016 they did ask to see the latrine, and this most likely explains why we find a lower proportion of households with an improved latrine, and a higher proportion of households with no facilities in 2016 (Table 15).<sup>28</sup> During village feedback presentations of the survey results, large majorities indeed questioned the drop in improved latrines and pointed to an increase instead. In the focus groups, participants noted the better facilities at schools and Tuungane's Model Household strategy of promoting improved latrines. The lower proportion in 2016 is still almost two times as high as the 2015 national rural average of 10% [5]. It is not clear why the Mahale area would stand out on this variable.<sup>29</sup>

**Table 15 Toilet facilities (%)**

|                 | Improved latrine (with slab) |        | Pit latrine without slab | No facility | n    |
|-----------------|------------------------------|--------|--------------------------|-------------|------|
|                 | Unshared                     | Shared |                          |             |      |
| 2011 unweighted | 31                           | 5      | 62                       | 2           | 487  |
| 2011 weighted   | 33                           | 5      | 60                       | 2           | 487  |
| 2016            | 19                           | 4      | 72                       | 5           | 1002 |

## Hand washing

Through its Model Household strategy, the project aims to increase hand washing, specifically by encouraging the use of 'tippy taps' — a way to rinse hands without touching the water source. A new question in the 2016 survey asked whether households had a prepared place or way for members to wash their hands. Enumerators asked to see this place and noted whether it had water, soap, sand or ash.

Most households (81%) had such a place, sometimes just a jug, with at least water ready for washing (Table 16). Only 17% of the interviewed households had no such place. About half of all households had either soap, sand or ash available at the hand washing place, and slightly fewer households had both one of these and water present at the time of the interview. Focus group participants mentioned 'tippy taps' in Model Households and school toilet facilities as big improvements, and said that these together with other improvements to sanitation had reduced cholera outbreaks.<sup>30</sup>

There are some differences between the villages. Ikubulu is where the enumerators found most households without a hand washing place, but Buhingu and Igalula also stand out in a negative way. Nkonkwa and Katumbi have the best score.

**Table 16 Hand washing facilities (2016 only)**

|         | No hand washing place | Has water | Has soap/sand/ash | Has water and soap/sand/ash | n   |
|---------|-----------------------|-----------|-------------------|-----------------------------|-----|
| Igalula | 27                    | 72        | 42                | 40                          | 127 |
| Rukoma  | 15                    | 83        | 50                | 47                          | 145 |

<sup>28</sup> They were shown the facilities in 98% of the interviews in which the respondent said there were facilities. Statistical difference tested through bivariate logistic regression: Wald F=33.828; df= 1471; p<0.001.

<sup>29</sup> As far as could be established by looking at the national DHS questionnaires, enumerators in the national DHS surveys did not ask to observe the facilities, which most likely means the difference with the Mahale survey is even greater.

<sup>30</sup> The prevalence of cholera was only asked in the 2016 survey, so this cannot be corroborated using survey data.

|           | <i>No hand washing place</i> | <i>Has water</i> | <i>Has soap/sand/ash</i> | <i>Has water and soap/sand/ash</i> | <i>n</i> |
|-----------|------------------------------|------------------|--------------------------|------------------------------------|----------|
| Ikubulu   | 35                           | 63               | 39                       | 37                                 | 57       |
| Buhingu   | 31                           | 65               | 42                       | 38                                 | 142      |
| Nkonkwa   | 3                            | 97               | 70                       | 70                                 | 71       |
| Katumbi   | 7                            | 92               | 72                       | 70                                 | 60       |
| Kalilani  | 3                            | 97               | 49                       | 49                                 | 35       |
| Kalya     | 9                            | 90               | 49                       | 47                                 | 150      |
| Kashagulu | 11                           | 87               | 41                       | 39                                 | 135      |
| Sibwesa   | 17                           | 81               | 51                       | 49                                 | 88       |
| Overall   | 17                           | 81               | 49                       | 46                                 | 1,010    |

### 3.4 Housing

In both 2011 and 2016, only two options were found for flooring and roofing materials. Houses have either earth/sand or cement floors, while the roofs are of either grass/leaves or corrugated metal. More variation was found in wall materials, but the two main options are mudbrick or baked brick (together >90%), with poles and mud used by a minority of households, and other options such as grass, cement bricks or planks found only in a handful of interviews.

From the data, it appears that the 2016 sample had slightly poorer housing conditions, with fewer cement floors and metal roofs, but only the first of these differences was found to be statistically significant.<sup>31</sup> In any case, no general improvement in housing conditions is apparent over the last five years.

Combining the housing characteristics into a single indicator, which we will call an ‘improved house’ that has cement floors, brick walls, and metal roofing, only a small minority has such houses, and we find a smaller proportion in 2016: 5% vs. 9% in 2011.<sup>32</sup>

**Table 17 Housing types**

|                 | Floor             |               | Wall                   |                        |                     |              | Roof                |                     | <i>n</i> |
|-----------------|-------------------|---------------|------------------------|------------------------|---------------------|--------------|---------------------|---------------------|----------|
|                 | <i>Earth/sand</i> | <i>Cement</i> | <i>Poles &amp; mud</i> | <i>Sundried bricks</i> | <i>Baked bricks</i> | <i>Other</i> | <i>Grass/leaves</i> | <i>Metal sheets</i> |          |
| 2011 unweighted | 91                | 9             | 11                     | 41                     | 46                  | 2            | 77                  | 23                  | 487      |
| 2011 weighted   | 89                | 11            | 7                      | 42                     | 48                  | 3            | 73                  | 27                  | 487      |
| 2016 unweighted | 94                | 6             | 7                      | 45                     | 48                  | 1            | 75                  | 25                  | 1010     |

At village level, we see some big changes in ‘improved houses’. Nkonkwa goes from 0 to 7%, while Katumbi and Kashagulu drop significantly. In part, these differences appear to be caused by the different geographic focus of the surveys.

**Table 18 Household living in ‘improved houses’ (%)**

|         | 2011 | 2016 |
|---------|------|------|
| Igalula | 10   | 3    |

<sup>31</sup> Logistic regression: Floor: Wald F=10.744; p=0.001. Roof: Wald F= 0.245; p=0.6.

<sup>32</sup> Statistical significance tested through logistic regression: Wald F= 9.042; p=0.003. Including only those sub-villages that were surveyed in both 2011 and 2016 removes the difference: 6.1% in 2011 vs. 6.3% in 2016.

|           | 2011 | 2016 |
|-----------|------|------|
| Rukoma    | 6    | 9    |
| Ikubulu   | 0    | 0    |
| Buhingu   | 7    | 7    |
| Nkonkwa   | 0    | 7 *  |
| Katumbi   | 14   | 3 *  |
| Kalilani  | 10   | 3    |
| Kalya     | 6    | 5    |
| Kashagulu | 20   | 5 *  |
| Sibwesa   | 8    | 2    |
| Overall   | 9    | 5    |

\* Difference statistically significant at the 5% level

## Energy use

Firewood is the most commonly used fuel for cooking, with charcoal the only alternative in the project villages (Table 19).<sup>33</sup> Charcoal was used by fewer households in the 2016 survey. Fewer households in 2016 indicated owning a fuel-efficient stove (23 vs. 30% in 2011), although the difference is not statistically significant. Those households that owned a fuel-efficient stove did use it more often than in 2011, although the number of observations is too small to be statistically significant.

**Table 19 Cooking fuel and use of fuel-efficient stove**

|                 | Cooking fuel |           | Fuel-efficient stove | Use frequency fuel-efficient stove |                      |                       |       | n    |
|-----------------|--------------|-----------|----------------------|------------------------------------|----------------------|-----------------------|-------|------|
|                 | Fire-wood    | Char-coal |                      | almost every day                   | at least once a week | less than once a week | Never |      |
| 2011 unweighted | 76           | 23        | 27                   | 55                                 | 24                   | 19                    | 2     | 487  |
| 2011 weighted   | 72           | 28        | 30                   | 53                                 | 24                   | 21                    | 3     | 487  |
| 2016            | 85           | 15        | 23                   | 60                                 | 27                   | 12                    | 2     | 1010 |

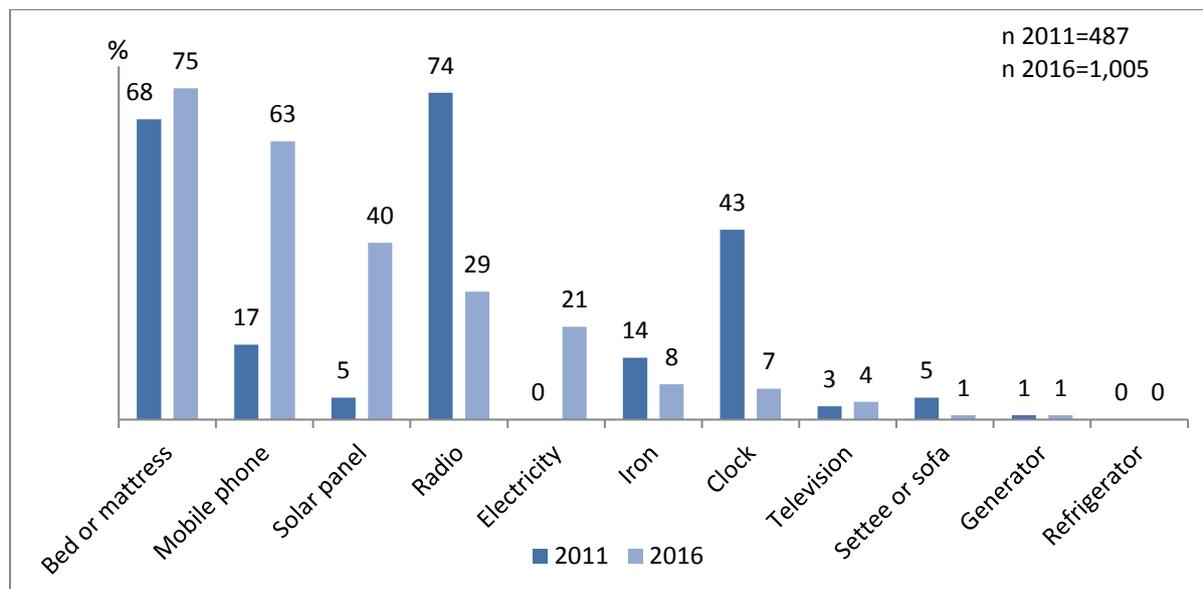
## 3.5 Household assets

Asset ownership shows several large changes (Figure 6). Mobile phone and solar panel ownership both increased strongly as did access to electricity. In 2011, none of the villages had mobile phone network coverage (except at some high elevation points), so phone ownership was low. Coverage started to improve shortly after the 2011 survey. The increase in households with solar panels and electricity could be related to increased mobile phone ownership and use, but could also have to do with recently introduced battery-powered LED fishing lights. In 2011, kerosene lights were exclusively used for night fishing, but LED lights have been gaining popularity in the last year due to cost savings.

The big drop in households that owned radios and clocks appears linked to the increase in mobile phones that can provide both a clock and a music player. The link between changes in phone and radio

<sup>33</sup> Statistical significance tested through logistic regression: Wald F= 31.917; p<0.001.

and clock ownership was confirmed in the village presentations, where radios were also said to be mainly used by older persons.<sup>34</sup> For both assets, these drops were found in all villages.



**Figure 6 Asset ownership (%)**

In 2016, respondents were also asked how many radios, mobile phones and solar panels the households owned (Table 20). Most households had only one radio or solar panel, with only about 10% having more than one. Around a quarter of mobile phone-owning households had at least two.

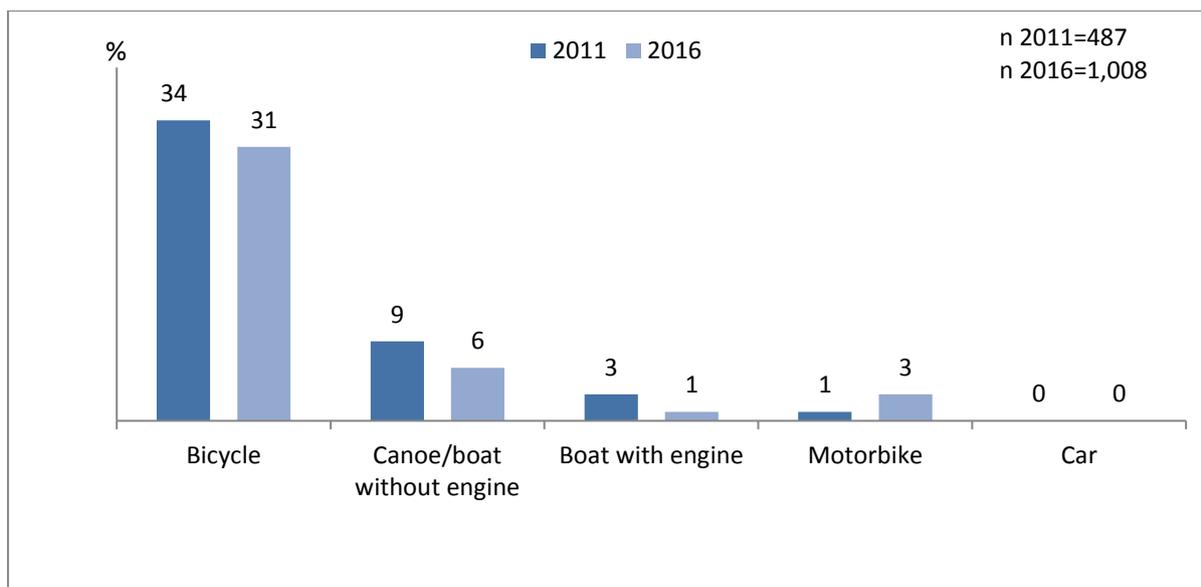
**Table 20 Number of radios, mobile phones and solar panels owned**

|             | <i>Radios</i> | <i>Mobile phones</i> | <i>Solar panels</i> |
|-------------|---------------|----------------------|---------------------|
| Mean number | 1.2           | 1.5                  | 1.3                 |
| Range       | 1-4           | 1-12                 | 1-11                |
| <i>n</i>    | 295           | 634                  | 401                 |

### Means of transport ownership

The ownership of different means of transport shows no great differences between the two surveys (Figure 7). Bicycles are most commonly owned. Boats, especially ones with engines, and motorbikes are only owned by very small proportions of households.

<sup>34</sup> According to field staff, most radios in the area are of poor quality with short working lives, which would make the big shift in a relatively short period plausible.



**Figure 7 Means of transport ownership**

Creating a combined asset indicator in which household and transport assets are included that were owned by at least 5% of the households in both surveys, we found that households in both 2011 and 2016 owned 2.6 assets, on average.<sup>35</sup>

### 3.6 Access to credit

One of the main economic interventions of the Tuungane project has been to continue the roll-out of new village saving and loans groups locally called Community Conservation Banks (COCOBA). As shown in the activities table (Table 3), COCOBAs were implemented in all villages save Ikubulu and Kalilani prior to the 2011 survey.

Slightly more respondents in the 2016 survey indicated the household had taken out credit in the previous 12 months, but the difference is not statistically significant with 2011. The same goes for the number of times households borrowed in this period: the average in 2011 was 1.1 times, and in 2016 it was 1.3 times.<sup>36</sup>

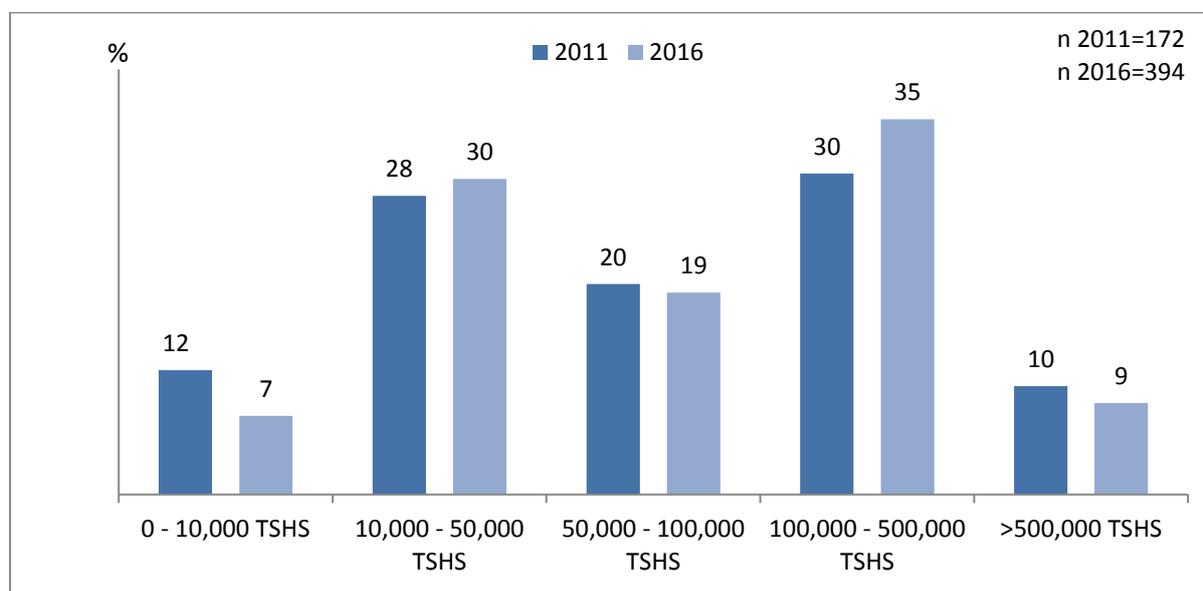
**Table 21 Borrowing in the last 12 months**

|                 | Borrowed in last 12 months (%) | Mean borrowing frequency | <i>n</i> |
|-----------------|--------------------------------|--------------------------|----------|
| 2011 unweighted | 35                             | 1.1                      | 487      |
| 2011 weighted   | 35                             | 1.1                      | 487      |
| 2016            | 39                             | 1.3                      | 1008     |

<sup>35</sup> Including only those sub-villages that were surveyed in both 2011 and 2016 results in a small significant increase in the average number of assets owned in 2016, but the big changes in ownership of specific assets make these results difficult to interpret.

<sup>36</sup> We excluded 7 observations with frequencies higher than 20 in 2016. Leaving these in gives an average of 1.6 times. Including only those sub-villages that were surveyed in both 2011 and 2016 results in a small significant increase in the average number of times a loan was taken out in 2016.

We find a similar picture looking at the total amounts that were borrowed in the prior 12 months: the 2016 data show higher amounts were more frequently indicated, but the difference with the 2011 data is not statistically significant (Figure 8).<sup>37</sup>



**Figure 8 Distribution of the borrowed amount over the prior 12 months**

Looking at what the loans were used for, we see the same order in both surveys, although there are some differences in the frequency with which the different loan uses were mentioned (Figure 9). Medical expenses top the list, followed by household expenses other than food, farming, business, food, and school expenses. Most differences between 2011 and 2016 are not statistically significant, with the exception of loans for food, which was mentioned significantly less often.<sup>38</sup> This is in line with households' self-assessment of their ability to meet daily needs, which also showed an improvement (see Livelihood Section below).

<sup>37</sup> Statistical significance tested through ordinal regression.

<sup>38</sup> Statistical significance testing through bivariate logistic regression would not run to completion, but showed significant difference in last iteration. Unweighted Chi<sup>2</sup> corroborated this result: Pearson Chi<sup>2</sup>=19.167; p<0.001.

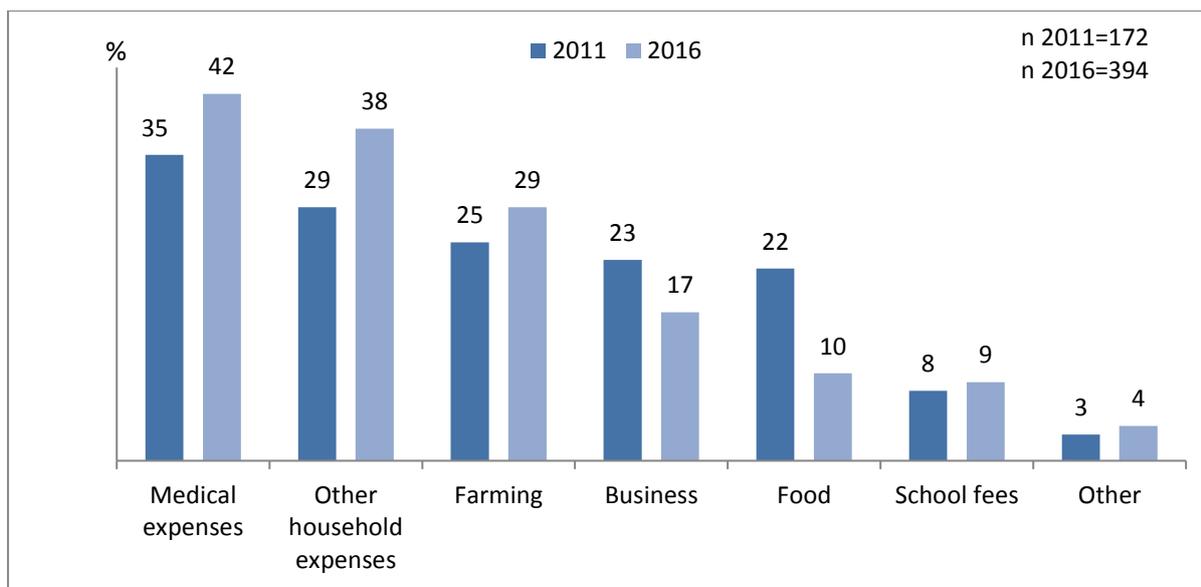


Figure 9 Borrowing purpose<sup>39</sup>

As in 2011, loans in 2016 were mainly procured from friends, neighbours, or family (Figure 10), but contrary to what we expected, the proportion of respondents mentioning COCOBAs went down significantly. The increase in family is also significant.<sup>40</sup> The drop in COCOBA loans was explored in the village feedback sessions, and people said some borrowers had had difficulty repaying their initial loans and were since afraid to take out new loans.

While at village level the small number of observations prevents any real interpretation of differences, we do find a few very large decreases in COCOBA citations in Rukoma and Buhingu, and, strangely enough, also in Kalilani, where there were no COCOBAs established in 2011. In some villages we also find small increases, such as in Ikubulu, which had no COCOBAs in 2011, Nkonkwa, Katumbi and Sibwesa.

#### COCOBA Benefits

A 2015 survey of 166 COCOBA members in 16 COCOBAs that were less than two years old found that most COCOBA investments were in new and existing businesses. Of those who had received a loan, 72% said the COCOBA had increased their income (albeit only modestly), and 80% said COCOBA membership had improved their personal self-confidence. Most COCOBA members are women, so the financial and self-confidence benefits are likely to help their families as well. COCOBAs are a widely used tool and in a number of different geographies have increased incomes for members ([www.vsla.net/aboutus/vslmodel](http://www.vsla.net/aboutus/vslmodel)).

<sup>39</sup> More than one answer was possible so proportions add up to more than 100%.

<sup>40</sup> Statistical significance tested through bivariate logistic regression: COCOBAs: Wald F=6.904; p=0.009; Family: Wald F=10.135; p=0.002.

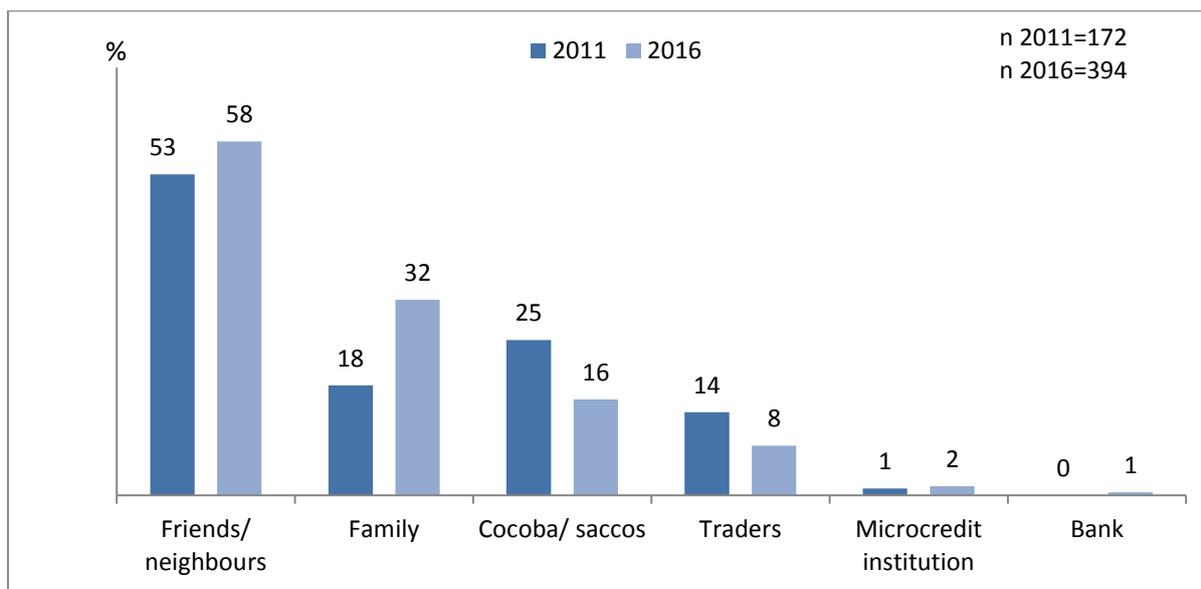


Figure 10 Borrowing source<sup>41</sup>

Those households that did not borrow were asked why not. In the 2016 survey, the option 'Afraid to be in debt' was added to the prelisted options. Although enumerators were instructed not to read out the prelisted options, the large increase in this answer (from 14 to 48%) indicates these instructions most likely were not followed. "No need" of a loan and the difficulty of the borrowing process were the other main reasons not to borrow in both surveys.

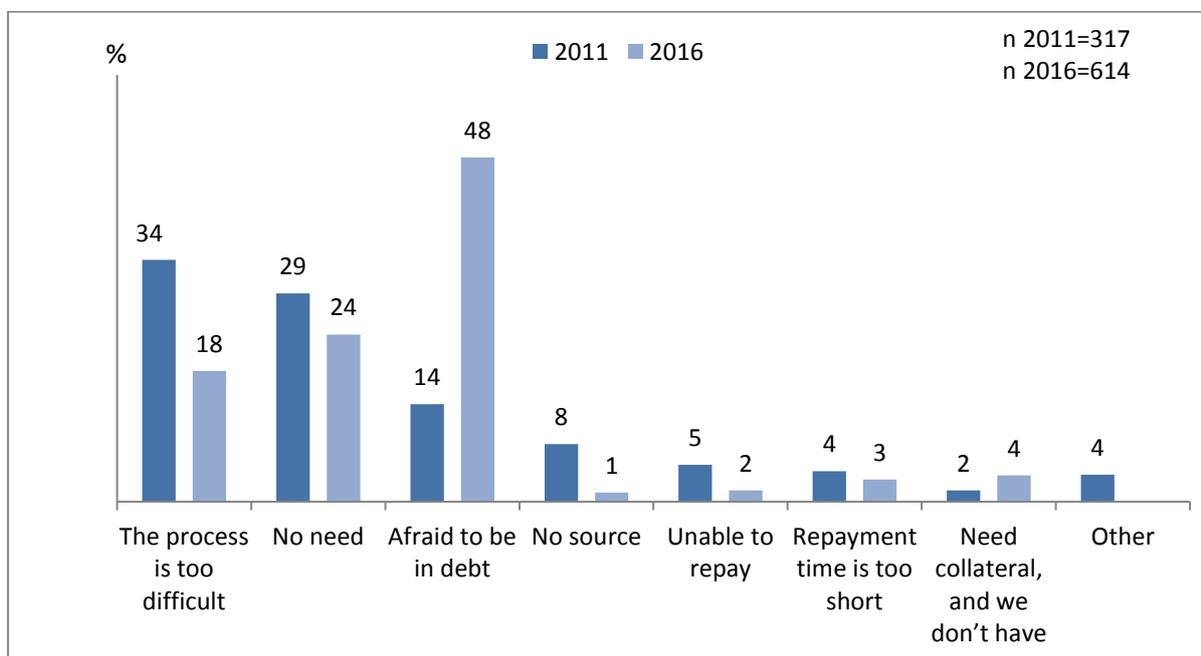


Figure 11 Main reason not to take out loans in the last 12 months

<sup>41</sup> More than one answer could be given; percentages add up to more than 100%

Familiarity with the COCOBA institution was the same and almost universal in both surveys (Table 22). No statistical difference was found in attitudes towards COCOBAs between the surveys.<sup>42</sup>

**Table 22 Familiarity and perception of COCOBA**

|                 | Heard about COCOBA | n <sup>43</sup> | Perception about COCOBA |          |                   | n   |
|-----------------|--------------------|-----------------|-------------------------|----------|-------------------|-----|
|                 |                    |                 | Positive                | Negative | Neutral/ not sure |     |
| 2011 unweighted | 93                 | 487             | 48                      | 15       | 37                | 451 |
| 2011 weighted   | 94                 | 487             | 49                      | 15       | 36                | 451 |
| 2016            | 94                 | 913             | 59                      | 12       | 28                | 859 |

### 3.7 Livelihoods

All the main income sources except farming were mentioned relatively less often in the 2016 survey (Table 23). In 2011, 26% mentioned only one source of income versus 43% in 2016, and the average number of sources was 2.1 vs. 1.7 in the respective years. It is not clear what caused these changes.

Comparing the results of this general question about income sources with the information we have about farming, livestock and fishing, we find that the proportion of farming households in 2016 corresponds to the proportion of households that indicated they had farm land. However, many more households indicated they had livestock than mentioned it as an income source. This happened in both surveys: 64% of all households held livestock in 2011, while 23% indicated livestock as an income source; in 2016, the difference was even bigger: 60 vs. 15%. This is strange considering the livelihoods questions shortly followed the livestock questions, and the livelihood question referred to activities that provided the household with both food and cash income. With regard to fishing, 37% of the households in 2011 had members who fished according to the household roster, while 30% indicated fishing as an income source. In 2016, 24% of households had fishers, while 20% indicated it as a source of income.

The results from this question therefore do not appear to give reliable information on the full range of income generating activities, but we can still see the overwhelming importance of agriculture.

**Table 23 Income sources (%)<sup>44</sup>**

|                 | Agri-culture | Business/ self-employed | Fishing | Live-stock | Fish trading | Emplo- yee | Casual work | n    |
|-----------------|--------------|-------------------------|---------|------------|--------------|------------|-------------|------|
| 2011 unweighted | 95           | 38                      | 27      | 22         | 13           | 3          | 2           | 487  |
| 2011 weighted   | 95           | 41                      | 30      | 23         | 13           | 3          | 2           | 487  |
| 2016            | 98           | 30                      | 20      | 15         | 3            | 2          | 2           | 1004 |

There was a big shift in the self-assessment of how well the household is able to meet its daily needs (Table 24). The answer options which were read out to respondent were:

- We have difficulty in meeting our daily needs

<sup>42</sup> Including only those sub-villages that were included in both surveys results in a small significant increase of positive attitudes in 2016.

<sup>43</sup> Some data are missing in 2016 due to an erroneous skip code that was only corrected a few days into the survey.

<sup>44</sup> Excluding six households whose only member was inactive.

- We can just meet our daily needs and have no extra things
- We have enough to meet our daily needs and have some extra things
- We can meet our daily needs and save money afterwards too

While 60% said they had difficulty in meeting daily needs in 2011, only 39% did so in 2016. The proportion of households that could just meet their daily needs increased slightly, but a big increase was found in the proportion of households who had some extra things after meeting daily needs (from 6 to 20%). Those households who could save some money on top of that were rare in both 2011 and 2016, but more of these were found in 2016 (0.2 to 3%). This shift to more positive answers was found in all villages and put to the participants of the village feedback sessions. Views varied strongly per village: Sibwesa was the only village where people agreed that there had been improvements, while in some villages people agreed and disagreed in equal numbers, and in others most people disagreed that the ability to meet daily needs had improved.

**Table 24 Self-assessment of the ability to meet daily needs**

|                 | <i>Have difficulty</i> | <i>Just sufficient</i> | <i>Some extras</i> | <i>Can save</i> | <i>n</i> |
|-----------------|------------------------|------------------------|--------------------|-----------------|----------|
| 2011 unweighted | 60                     | 35                     | 5                  | 0.2             | 487      |
| 2011 weighted   | 60                     | 34                     | 6                  | 0.2             | 487      |
| 2016            | 39                     | 38                     | 20                 | 3               | 1010     |

## Agriculture

The introductory question to farming in the 2016 questionnaire was slightly different than in 2011. In 2011, respondents were asked if the household had any farm or forest land (owned or rented). In 2016, they were asked if the household had any farm land, including fruit or palm trees (owned or rented). Also, while it did mention rented land, the Kiswahili phrasing in 2011 directed respondents towards owned land and was corrected in the 2016 survey. These changes will affect the comparability of the two surveys, but we feel the 2016 correction will give better data going forward.<sup>45</sup>

We do find a difference in households' landholdings between the two surveys, with more households reporting land in 2016 (98%) than in 2011 (89%), and the proportion of rented plots to total plots is also higher in 2016 (by 4% - weighted data).

We also find differences in the average number of plots and the average size of household landholdings (rented and owned) (Table 25). The (unweighted) median number of plots was one in 2011 and two in 2016, and the respective median household land size was three and four acres. Creating a binary variable that indicates whether a household had access to at least three acres showed the same pattern: 37% did in 2011 and 54% did in 2016.<sup>46</sup>

**Table 25 Landholdings**

|                 | <i>Households with land (%)</i> | <i>n</i> | <i>Mean # plots</i> | <i>n</i> | <i>Mean land size (acres)</i> | <i>n</i> |
|-----------------|---------------------------------|----------|---------------------|----------|-------------------------------|----------|
| 2011 unweighted | 89                              | 487      | 1.6                 | 433      | 5.3                           | 426      |
| 2011 weighted   | 89                              | 487      | 1.7                 | 433      | 4.9                           | 426      |

<sup>45</sup> The proportion of households with land in 2016 matches with that who said agriculture was an income source. In 2011, more households indicated agriculture as an income source than said to have land.

<sup>46</sup> Statistical significance tested through bivariate logistic regression: Wald F=38.242; p<0.001.

|      |    |      |     |     |     |     |
|------|----|------|-----|-----|-----|-----|
| 2016 | 98 | 1010 | 1.8 | 988 | 6.9 | 986 |
|------|----|------|-----|-----|-----|-----|

Larger landholdings could indicate more conversion of bush or forest lands, but looking at how land was acquired, we do not find evidence of this. Plots taken from the bush form a very small minority. Land given by the village can also be 'new' land, but its proportion was lower in 2016. Most plots in both surveys were purchased, inherited or given to the household by the village (Table 26). Differences between the surveys could have been caused by the different introductory question on land as mentioned previously. 'Given/lent land' was added as a prelisted option in 2016, and although enumerators were instructed not to read prelisted options, the much higher occurrence most likely indicates these instructions were not always followed.

**Table 26 Acquisition of the plot**

|                 | <i>Purchased</i> | <i>Inherited</i> | <i>Given by the village</i> | <i>Rented</i> | <i>Given/lent</i> | <i>Taken from the bush</i> | <i>Other</i> | <i>n</i> |
|-----------------|------------------|------------------|-----------------------------|---------------|-------------------|----------------------------|--------------|----------|
| 2011 unweighted | 37               | 24               | 25                          | 9             | 1                 | 3                          | 1            | 705      |
| 2011 weighted   | 37               | 25               | 24                          | 10            | 1                 | 3                          | 1            | 705      |
| 2016            | 32               | 25               | 17                          | 14            | 9                 | 2                          | 0            | 1802     |

In both 2011 and 2016, no ownership documents were held for the majority of plots (Table 28). The drop in sale agreement documents corresponds with the lower proportion of purchased plots found above, but why there are double the plots with village documents in 2016 is unclear.

**Table 27 Plot ownership documents (% of plots excluding rented plots or those given/lent)**

|                 | <i>No document</i> | <i>Sale agreement</i> | <i>Village document</i> | <i>Other</i> | <i>n</i> |
|-----------------|--------------------|-----------------------|-------------------------|--------------|----------|
| 2011 unweighted | 60                 | 27                    | 9                       | 3            | 705      |
| 2011 weighted   | 61                 | 28                    | 8                       | 4            | 705      |
| 2016            | 61                 | 21                    | 18                      | 1            | 1404     |

In 2016, most plots were used for cultivation (77%), but (part of) many plots were left fallow (Table 28).<sup>47</sup> Palm trees (for palm oil) can be found on almost 10% of the plots, but fruit trees are less common.<sup>48</sup> Palm and fruit trees appear less common in Ikubulu and Sibwesa.

**Table 28 Plot use in 2016 (%)<sup>49</sup>**

|          | <i>Cultivation</i> | <i>Fallow</i> | <i>Palm trees</i> | <i>Fruit trees</i> | <i>Other</i> | <i>n</i> |
|----------|--------------------|---------------|-------------------|--------------------|--------------|----------|
| Igalula  | 77                 | 19            | 9                 | 2                  | 1            | 197      |
| Rukoma   | 69                 | 23            | 19                | 8                  | 1            | 303      |
| Ikubulu  | 83                 | 24            | 1                 | 0                  | 2            | 92       |
| Buhingu  | 73                 | 23            | 8                 | 1                  | 2            | 253      |
| Nkonkwa  | 82                 | 24            | 11                | 5                  | 1            | 142      |
| Katumbi  | 76                 | 30            | 11                | 1                  | 0            | 111      |
| Kalilani | 88                 | 13            | 10                | 10                 | 0            | 40       |

<sup>47</sup> Plots were not only left fallow to restore fertility; in some cases, the owners were too sick or did not have the money or time to cultivate the plot.

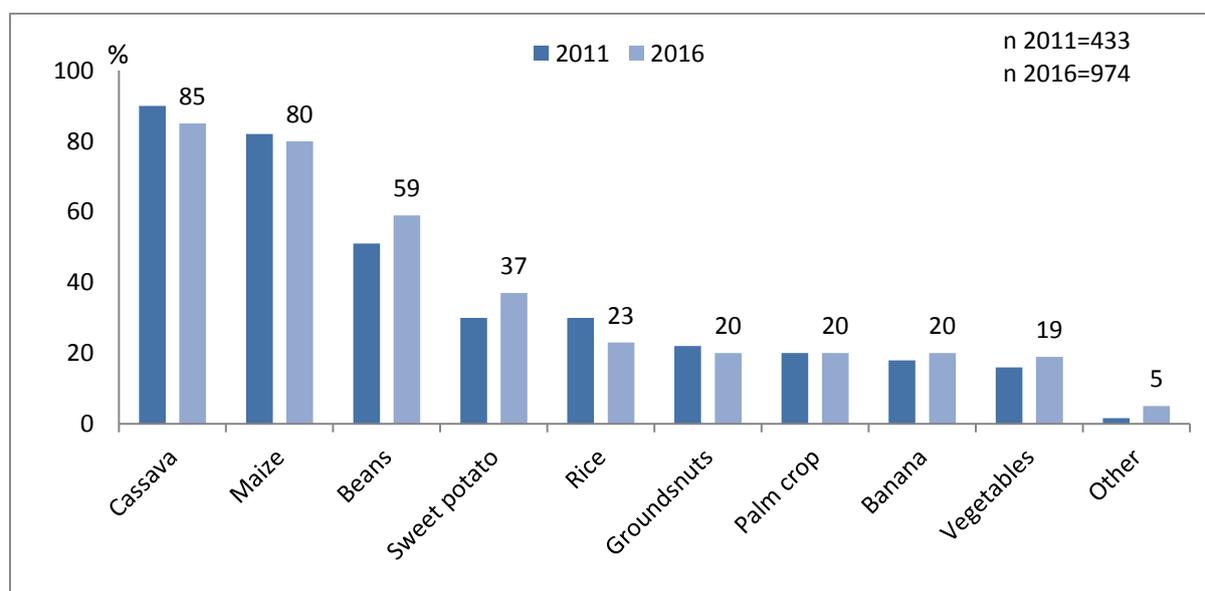
<sup>48</sup> A different question was asked in 2011.

<sup>49</sup> More than one answer could be given; percentages add up to more than 100%.

|           | <i>Cultivation</i> | <i>Fallow</i> | <i>Palm trees</i> | <i>Fruit trees</i> | <i>Other</i> | <i>n</i> |
|-----------|--------------------|---------------|-------------------|--------------------|--------------|----------|
| Kalya     | 78                 | 28            | 8                 | 3                  | 2            | 273      |
| Kashagulu | 85                 | 29            | 4                 | 3                  | 0            | 248      |
| Sibwesa   | 79                 | 42            | 1                 | 0                  | 1            | 149      |
| Overall   | 77                 | 26            | 9                 | 3                  | 1            | 1808     |

There is not much difference in the crops grown between the two surveys (Figure 12). Cassava and maize are the two most commonly grown crops with beans (*marahagwe*) and sweet potato also grown by more than a third of farming households. Rice, groundnuts, palm nuts, banana and vegetables were all grown by around a fifth of farming households. The average number of crops grown was 3.6 in 2011 and 3.7 in 2016.<sup>50</sup>

Some village differences exist. In Ikubulu, beans are the most important crop, grown by 98% of all farming households. Rice is mainly grown in Kalya and Kashagulu, by 55 and 53%, respectively. As we already saw above when land use was discussed, palm trees are rare in Ikubulu and Sibwesa ( $\cong 5\%$ ).



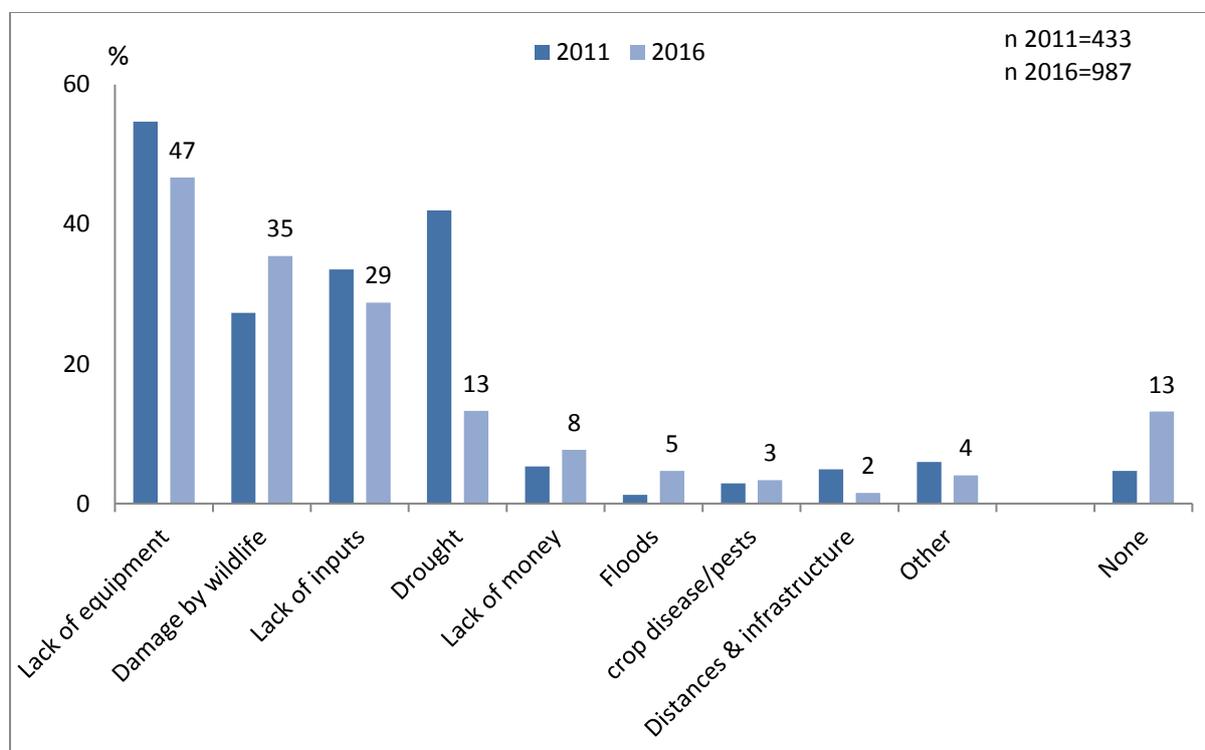
**Figure 12 Crops**

As in 2011, respondents from farming households were asked what their two main farming problems were (Figure 13). In both years, a lack of equipment tops the list, though it was mentioned by a smaller proportion in 2016. Most likely this is equipment to prepare the land for cultivation. Droughts was the second most mentioned problem in 2011, but is only fourth on the list in 2016. Flooding was mentioned more often in 2016.

Damage by wildlife was mentioned more often in 2016, but it was already a commonly cited problem in 2011, as was a lack of inputs such as fertilizer, and we'll see below how little use of purchased inputs

<sup>50</sup> Including only those sub-villages that were surveyed in both 2011 and 2016 results in a small significant increase in the average number of crops grown in 2016.

farmers make. Finally, there was also an increase in 2016 in the respondents who said they did not face any farming problems.<sup>51</sup>



**Figure 13 Farming problems**

Several agriculture questions were added to the 2016 survey and thus no comparison to 2011 is possible. Only 2% of the households' plots are closer than 60 metres to the lake (Table 29). This represents less than 1% of the acreage of all plots in the survey (not shown in the table). A larger proportion lies within 30 metres of any river or stream (30%), representing 28% of the acreage. Kalilani has relatively many plots close to rivers or streams and Sibwesa has fewest.

Most farming is done on gentle slopes or flat land. Only 6% of the plots (but 15% of the total acreage) are steep or very steep. Kalilani, which lies right against the mountains of Mahale Mountains NP has the highest proportion of steep land.

Steep or very steep land close to rivers or the lake is rare: only slightly more than 1% of the plots and total acreage.

**Table 29 Plot location and steepness (%)**

|         | <60m to the lake | <30 m to nearest stream | Very steep | Steep | Gentle slope | Flat | n   |
|---------|------------------|-------------------------|------------|-------|--------------|------|-----|
| Igalula | 2                | 29                      | -          | 5     | 52           | 43   | 197 |
| Rukoma  | 2                | 35                      | 0          | 6     | 47           | 46   | 303 |
| Ikubulu |                  | 38                      | -          | 9     | 60           | 32   | 92  |

<sup>51</sup> All the mentioned differences are statistically significant at the 1% level as tested by bivariate logistic regression.

|           | <60m to the lake | <30 m to nearest stream | Very steep | Steep | Gentle slope | Flat | n     |
|-----------|------------------|-------------------------|------------|-------|--------------|------|-------|
| Buhingu   | 3                | 31                      | -          | 9     | 53           | 38   | 253   |
| Nkonkwa   | 4                | 18                      | 1          | 3     | 37           | 60   | 142   |
| Katumbi   | 2                | 22                      | 2          | 5     | 32           | 60   | 111   |
| Kalilani  | 3                | 50                      | -          | 15    | 33           | 53   | 40    |
| Kalya     | 2                | 31                      | -          | 5     | 45           | 50   | 273   |
| Kashagulu | 1                | 37                      | -          | 5     | 36           | 60   | 248   |
| Sibwesa   | 1                | 13                      | 1          | 7     | 48           | 45   | 149   |
| Overall   | 2                | 30                      | 0          | 6     | 45           | 48   | 1,808 |

Another new question in the 2016 survey was whether erosion occurs on household land and what prevention is used. A third of households with land experienced erosion (Table 30), and most of those households had erosion control and soil conservation measures in place (71%). Many of the households that did not report erosion also used these measures (37%).

Table 30 shows the application of specific control measures for both groups combined. The most common measure is to use terracing or ridging (*matuta/mifereji*), with minimal tillage a distant second. Other measures that were mentioned include gabions, grass strips, contour farming, agroforestry, mulching and cover crops.

Erosion was reported more often by households with steep or very steep plots: 54% of households with steep or very steep plots experienced erosion, compared to 30% of households that only had flat or gently sloping land.<sup>52</sup> No correlation was found between having steep land and using erosion control measures.

**Table 30 Erosion prevalence and protection measures (%)**

|           | Suffers erosion | Erosion control measures |                       |                    | n  |       |
|-----------|-----------------|--------------------------|-----------------------|--------------------|----|-------|
|           |                 | None                     | Terracing/<br>ridging | Minimal<br>tillage |    | Other |
| Igalula   | 39              | 46                       | 48                    | 4                  | 5  | 121   |
| Rukoma    | 33              | 58                       | 26                    | 18                 | 6  | 144   |
| Ikubulu   | 26              | 53                       | 30                    | 16                 | 10 | 57    |
| Buhingu   | 31              | 53                       | 42                    | 2                  | 8  | 138   |
| Nkonkwa   | 29              | 53                       | 44                    | 1                  | 2  | 68    |
| Katumbi   | 37              | 41                       | 47                    | 12                 | 9  | 59    |
| Kalilani  | 27              | 53                       | 38                    | 3                  | 12 | 34    |
| Kalya     | 28              | 53                       | 38                    | 9                  | 10 | 144   |
| Kashagulu | 30              | 53                       | 37                    | 16                 | 7  | 134   |
| Sibwesa   | 43              | 50                       | 45                    | 8                  | 6  | 88    |
| Overall   | 33              | 52                       | 39                    | 9                  | 7  | 987   |

Two thirds of farming households exclusively use seeds they have saved from the previous harvest (Table 31). Of the remaining households, most buy all their seeds (18%), with a smaller group doing

<sup>52</sup> Statistically significance tested through Chi square analysis: Chi sq=25.359; p<0.001.

both to various extents. In Rukoma, buying seeds seems most common, while in Ikubulu it is least common.

**Table 31 Using own seed or buying (%)**

|           | <i>Only own seed</i> | <i>Mostly own seed</i> | <i>Half-half</i> | <i>Mostly purchased seed</i> | <i>Only purchased seed</i> | <i>n</i> |
|-----------|----------------------|------------------------|------------------|------------------------------|----------------------------|----------|
| Igalula   | 60                   | 13                     | 5                | 3                            | 18                         | 121      |
| Rukoma    | 47                   | 10                     | 4                | 6                            | 34                         | 144      |
| Ikubulu   | 86                   | 5                      |                  | 2                            | 7                          | 57       |
| Buhingu   | 60                   | 12                     | 7                | 4                            | 18                         | 138      |
| Nkonkwa   | 63                   | 9                      | 3                | 9                            | 16                         | 68       |
| Katumbi   | 71                   | 5                      |                  | 7                            | 17                         | 59       |
| Kalilani  | 71                   | 9                      |                  | 6                            | 15                         | 34       |
| Kalya     | 77                   | 7                      | 2                | 1                            | 13                         | 144      |
| Kashagulu | 73                   | 8                      | 2                | 6                            | 11                         | 134      |
| Sibwesa   | 72                   | 7                      | 3                | 2                            | 16                         | 88       |
| Overall   | 66                   | 9                      | 3                | 4                            | 18                         | 987      |

Less common than buying seeds, is using quality certified seeds (Table 32).

**Table 32 Use of quality certified seeds (%)**

|           | <i>None</i> | <i>Small part</i> | <i>Half-half</i> | <i>Most seeds</i> | <i>All seeds</i> | <i>n</i> |
|-----------|-------------|-------------------|------------------|-------------------|------------------|----------|
| Igalula   | 88          | 7                 | 3                | 1                 | 2                | 121      |
| Rukoma    | 86          | 9                 | 2                | 2                 | 1                | 144      |
| Ikubulu   | 95          | 4                 |                  | 2                 |                  | 57       |
| Buhingu   | 90          | 4                 | 3                | 1                 | 2                | 138      |
| Nkonkwa   | 87          | 6                 | 2                | 6                 |                  | 68       |
| Katumbi   | 92          | 3                 | 2                | 3                 |                  | 59       |
| Kalilani  | 97          |                   |                  |                   | 3                | 34       |
| Kalya     | 90          | 8                 | 1                | 1                 | 1                | 144      |
| Kashagulu | 86          | 10                | 2                | 3                 |                  | 134      |
| Sibwesa   | 82          | 7                 | 5                | 3                 | 3                | 88       |
| Overall   | 88          | 7                 | 2                | 2                 | 1                | 987      |

The large majority of households do not put any fertilizer on their land, and if fertilizer is used, it is almost always compost (Table 33). Only very few households mentioned other products, such as chemical fertilizer, rock phosphate or manure. The 'other' category also includes those households that put grass on their plots to fertilize it (2%).<sup>53</sup>

Crop rotation is practised by a minority of farmers (20%), while fallowing is common (70%). In Nkonkwa and Kalilani the latter practice is least common, perhaps due to more limited land availability, which might also be linked to the relatively higher use of fertilizer there.

Pest or disease control is also hardly practised according to respondents. In Katumbi, 10% of respondents mentioned using pest or disease control and in the other villages this percentage hovered

<sup>53</sup> This was not one of the pre-listed options, but volunteered by respondents.

between zero and five (not shown in the table). Chemical pest control was the most mentioned method (by 2% overall).

**Table 33 Fertilizer use, rotation and fallowing (%)**

|           | <i>Nothing</i> | <i>Compost</i> | <i>Other</i> | <i>Practices rotation</i> | <i>Practices fallowing</i> | <i>n</i> |
|-----------|----------------|----------------|--------------|---------------------------|----------------------------|----------|
| Igalula   | 93             | 7              | 0            | 20                        | 76                         | 121      |
| Rukoma    | 85             | 12             | 3            | 25                        | 79                         | 144      |
| Ikubulu   | 88             | 9              | 0            | 28                        | 77                         | 57       |
| Buhingu   | 88             | 11             | 2            | 12                        | 71                         | 138      |
| Nkonkwa   | 66             | 28             | 5            | 12                        | 52                         | 68       |
| Katumbi   | 78             | 20             | 2            | 17                        | 68                         | 59       |
| Kalilani  | 76             | 21             | 3            | 21                        | 53                         | 34       |
| Kalya     | 81             | 15             | 5            | 22                        | 63                         | 144      |
| Kashagulu | 84             | 13             | 3            | 24                        | 74                         | 134      |
| Sibwesa   | 88             | 10             | 2            | 18                        | 73                         | 88       |
| Overall   | 84             | 13             | 3            | 20                        | 70                         | 987      |

Most households stored agricultural produce in the last season (Table 34). Sacks with (28%) or without (21%) added pesticides and traditional granaries (13%) were used most.

**Table 34 Storage methods (%)**

|           | <i>No storage</i> | <i>Sacks - no pesticides</i> | <i>Sacks - with pesticides</i> | <i>Traditional granaries</i> | <i>Other</i> | <i>n</i> |
|-----------|-------------------|------------------------------|--------------------------------|------------------------------|--------------|----------|
| Igalula   | 55                | 19                           | 12                             | 14                           | 1            | 121      |
| Rukoma    | 50                | 19                           | 22                             | 8                            | 1            | 144      |
| Ikubulu   | 30                | 18                           | 46                             | 7                            | 0            | 57       |
| Buhingu   | 33                | 38                           | 16                             | 11                           | 2            | 138      |
| Nkonkwa   | 37                | 13                           | 19                             | 29                           | 2            | 68       |
| Katumbi   | 49                | 19                           | 10                             | 19                           | 3            | 59       |
| Kalilani  | 50                | 27                           | 9                              | 15                           | 0            | 34       |
| Kalya     | 30                | 42                           | 22                             | 4                            | 1            | 144      |
| Kashagulu | 25                | 37                           | 15                             | 23                           | 1            | 134      |
| Sibwesa   | 28                | 23                           | 44                             | 3                            | 1            | 88       |
| Overall   | 38                | 28                           | 21                             | 13                           | 1            | 987      |

Table 35 shows perceived severity of post-harvest storage losses. About half indicated having low losses. Comparing the three most common methods of storing crops to losses, we find that storing in sacks without pesticides is connected with slightly higher perceived losses. No significant difference was found between traditional granaries and using sacks with pesticides.<sup>54</sup>

**Table 35 Post-harvest storage losses in the last season (% that stored)**

|         | <i>High</i> | <i>Medium</i> | <i>Low</i> | <i>Not sure</i> | <i>n</i> |
|---------|-------------|---------------|------------|-----------------|----------|
| Igalula | 20          | 20            | 47         | 13              | 55       |

<sup>54</sup> We compared means between the storage methods after scoring high losses as 3, medium losses as 2, and low losses as 1. 'Not sure' answers were excluded. T-tests results: sacks without pesticides vs. traditional granaries: mean 1.8 vs 1.6; F=3.6; df=338; p=0.06. Sacks without pesticides vs. sacks with pesticides: mean 1.8 vs. 1.5; F=12.8; df=422; p<0.001.

|           | <i>High</i> | <i>Medium</i> | <i>Low</i> | <i>Not sure</i> | <i>n</i> |
|-----------|-------------|---------------|------------|-----------------|----------|
| Rukoma    | 19          | 14            | 62         | 6               | 73       |
| Ikubulu   | 20          | 10            | 63         | 8               | 40       |
| Buhingu   | 16          | 16            | 50         | 18              | 93       |
| Nkonkwa   | 14          | 28            | 54         | 5               | 43       |
| Katumbi   | 27          | 7             | 57         | 10              | 30       |
| Kalilani  | 29          | 18            | 53         | -               | 17       |
| Kalya     | 22          | 19            | 50         | 10              | 101      |
| Kashagulu | 22          | 13            | 51         | 15              | 101      |
| Sibwesa   | 27          | 8             | 56         | 10              | 63       |
| Overall   | 21          | 15            | 53         | 11              | 616      |

The final question about storage and post-harvest losses was whether the latter had changed in the last two years. Most felt losses had decreased.

**Table 36 Change in post-harvest storage losses in the last two years (% that stored)**

|           | <i>Increased</i> | <i>Same</i> | <i>Decreased</i> | <i>Not sure</i> | <i>n</i> |
|-----------|------------------|-------------|------------------|-----------------|----------|
| Igalula   | 24               | 26          | 49               | 2               | 55       |
| Rukoma    | 23               | 10          | 64               | 3               | 73       |
| Ikubulu   | 8                | 28          | 60               | 5               | 40       |
| Buhingu   | 22               | 30          | 45               | 3               | 93       |
| Nkonkwa   | 12               | 16          | 70               | 2               | 43       |
| Katumbi   | 20               | 23          | 57               | -               | 30       |
| Kalilani  | 24               | 29          | 47               | -               | 17       |
| Kalya     | 11               | 25          | 60               | 4               | 101      |
| Kashagulu | 28               | 16          | 50               | 7               | 101      |
| Sibwesa   | 8                | 13          | 78               | 2               | 63       |
| Overall   | 18               | 21          | 58               | 3               | 616      |

The 2016 questionnaire contained an open question asking how respondents knew whether they had made a profit from growing a certain crop. In the training and pre-testing this proved a difficult concept for both enumerators and respondents. The concept of profit does not resonate strongly in these areas where there is a lot of subsistence agriculture. Moreover, there are strong enumerator differences, with some enumerators very often to almost always entering one particular answer, or entering that the respondent was not sure. Therefore, we only generally report the question's results here and exclude answers from enumerators that mainly entered only one or two answers.

A fairly common answer was to compare the costs or effort of planting to the harvest, but enumerators during the training were also given this as an example of what to expect, so despite imprinting the importance of not influencing respondents' answers, this may in part be an enumerator effect. The majority of answers include a reference to expectations based on past experience: farmers look at the size of the harvest, how it compares to last year, to the size of the field, or to the amount of seed planted.

Related to the difficulty of answering this question is the lack of keeping farming records. Only 9% of respondents said they kept records, and of these less than two thirds could – or was willing to – show

these to the enumerator. Keeping records is equally uncommon in the different villages, hovering around 10%. Only Kalilani stood out by not having a single household with records in the survey.

## Livestock

In 2016, 60% of all households held livestock, while 65% did in 2011. The difference is not statistically significant. Chickens were the most commonly held type of livestock, followed by goats and ducks (Table 37). We found no changes in the proportion of households that had chickens, but there were fewer households in 2016 that held goats and ducks.<sup>55</sup> The average number of chickens held was higher in 2016, and the number of ducks was lower, but only the difference in the number of chickens is statistically significant.<sup>56</sup>

**Table 37 Livestock keeping**

|                 | Chickens                |                       | Goats                |                       | Ducks                |                       | <i>n</i> |
|-----------------|-------------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|----------|
|                 | <i>Has chickens (%)</i> | <i>Average number</i> | <i>Has goats (%)</i> | <i>Average number</i> | <i>Has ducks (%)</i> | <i>Average number</i> |          |
| 2011 unweighted | 49                      | 6.3                   | 29                   | 4.5                   | 24                   | 6.3                   | 487      |
| 2011 weighted   | 48                      | 6.0                   | 27                   | 4.5                   | 26                   | 6.3                   | 487      |
| 2016            | 49                      | 8.3                   | 19                   | 4.7                   | 19                   | 5.5                   | 1008     |

## Fishing

In 2016, fewer of the interviewed households had full or part-time fishing members: 24% versus 37% in 2011 (Table 38). If the sample is restricted to only the sub-villages that were included in both surveys, a similar difference is found.

Looking only at the household head, 27% fished in 2011, and for 6%, fishing was their main activity. In 2016, only 19% of household heads fished, but we found the same 6% for whom fishing was their main activity. This suggests a low number of fulltime fishers in the survey area. The drop in the number of fishers is in line with comments from focus group participants. According to them the main reason for the drop is the project's focus on confiscating illegal fishing gear. They said some of those who lost their gear did not have the money to buy legal gear and left fishing. A decline in fish populations was also given as an explanation for the lower number of fishers.

Most households where someone fished had one fishing member. In 2011, 7% of fishing households had more than one member who fished; in 2016, it was 3%. In both surveys, the maximum number of fishers in a single household was five.

<sup>55</sup> Differences tested through bivariate logistic regression: Goats: Wald F=11.852; p=0.001; Ducks: Wald F=9.591; p=0.002. Including only those sub-villages that were surveyed in both 2011 and 2016 results in reduction of these differences and the loss of their statistical significance.

<sup>56</sup> Differences tested in a bivariate general linear model: Chickens: Wald F=17.839; p<0.001. Including only those sub-villages that were surveyed in both 2011 and 2016 results in a smaller and non-significant difference in the average number of chickens held.

**Table 38 Fishing prevalence (% of all households)**

|                 | <i>Fishing household</i> | <i>Household head fishes</i> | <i>Household head fishes as main activity</i> | <i>n</i> |
|-----------------|--------------------------|------------------------------|---|----------|
| 2011 unweighted | 34                       | 25                           | 6   | 487      |
| 2011 weighted   | 37                       | 27                           | 6   | 487      |
| 2016            | 24                       | 19                           | 6   | 1010     |

In both surveys, fishers could not be interviewed in all fishing household. In 2011, a fisher was interviewed in 28% of all interviewed household (82% of all fishing households). In 2016, a fisher was interviewed in 18% of all interviewed household (75% of all fishing households). In both surveys, the fishing respondents were almost exclusively male (98%). The household head was interviewed relatively more often in 2016, and respondents were slightly older than in 2011 (Table 39). Fishing was the main activity of the respondent in 22% in 2011 and 29% in 2016, but this difference is not statistically significant.

**Table 39 Respondent characteristics fishing section (% of respondents who fish)**

| <i>Questionnaire section</i> | <i>Household role (%)</i> |               |              |              | <i>Main activity (%)</i> |               | <i>Mean age</i> | <i>n</i> |
|------------------------------|---------------------------|---------------|--------------|--------------|--------------------------|---------------|-----------------|----------|
|                              | <i>Head</i>               | <i>Spouse</i> | <i>Child</i> | <i>Other</i> | <i>Fisher</i>            | <i>Farmer</i> |                 |          |
| 2011 unweighted              | 73                        | 4             | 16           | 7            | 24                       | 68            | 34              | 136      |
| 2011 weighted                | 73                        | 3             | 17           | 7            | 22                       | 71            | 34              | 136      |
| 2016 unweighted              | 86                        | -             | 13           | 1            | 29                       | 66            | 37              | 180      |

The education level of fishing respondents was similar in both surveys: a majority finished primary school (Standard 7) (Table 40).

**Table 40 Completed education level of fishing section respondents' (%)**

|                 | <i>None or pre-primary</i> | <i>Some primary</i> | <i>Completed primary</i> | <i>Some secondary</i> | <i>Completed secondary</i> | <i>Higher</i> | <i>n</i> |
|-----------------|----------------------------|---------------------|--------------------------|-----------------------|----------------------------|---------------|----------|
| 2011 unweighted | 7                          | 26                  | 63                       | 4                     | 0.7                        | -             | 136      |
| 2011 weighted   | 7                          | 29                  | 60                       | 2                     | 0.9                        | -             | 136      |
| 2016 unweighted | 11                         | 25                  | 60                       | 4                     | -                          | 0.6           | 180      |

Most interviewed fishers had other activities besides fishing: 90% in 2011 and 97% in 2016. In a ranking exercise where respondents were asked to divide ten stones among their personal livelihood activities to indicate the importance thereof for total household income, fishing received most stones or shared a first place in around a third of the interviews in both surveys (31% in 2011, and 34% in 2016). Crop farming took (joint) first place in 71% of the interviews in 2011 and in 65% in 2016.

Table 41 shows the average number of stones given to all mentioned activities. The differences between the surveys are small. Agriculture received the most stones on average.

#### Importance of Fishing Income

In two surveys in 2014 and 2015 designed to measure local income among Beach Management Unit members, the number one source of income was fishing. The first survey of 643 households in five of the villages that were also included in the current survey found fishing contributed 53% of total cash and non-cash income earned by respondents, even though only about a quarter of them fished. The second survey a year later found fishing income dropped to 34% of total income but was still the largest source of income among respondents. In short, fishing is the engine that powers the local economy even though many do not fish.

**Table 41 Relative importance of respondents' income sources (average # of stones out of 10)**

|                 | <i>Agri-culture</i> | <i>Fishing</i> | <i>Fish trading</i> | <i>Live-stock</i> | <i>Business</i> | <i>Employ-ment</i> | <i>Other</i> | <i>n</i> |
|-----------------|---------------------|----------------|---------------------|-------------------|-----------------|--------------------|--------------|----------|
| 2011 unweighted | 4.8                 | 4.0            | 0.3                 | 0.2               | 0.3             | 0.03               | 0.2          | 133      |
| 2011 weighted   | 5.0                 | 3.9            | 0.3                 | 0.2               | 0.3             | 0.01               | 0.2          | 133      |
| 2016            | 5.3                 | 3.9            | 0.1                 | 0.1               | 0.4             | 0.03               | 0.2          | 180      |

Almost all respondents fished from a boat (99% in 2011 and 96% in 2016). A canoe or small boat was the most common type in both surveys, but we do find that more fishers used a large boat with engine in the 2016 survey (Table 42).<sup>57</sup>

For the majority in both surveys, boats used for fishing were not owned by the interviewed fishers (74% in 2011 and 83% in 2016), but most fishers (66% in both surveys) did fish for themselves (in contrast to being employed).

**Table 42 Boat use (%)**

|                 | <i>Uses no boat</i> | <i>Fishes from boat</i>  |                                  |                               | <i>n</i> |
|-----------------|---------------------|--------------------------|----------------------------------|-------------------------------|----------|
|                 |                     | <i>Canoe/ small boat</i> | <i>Large boat without engine</i> | <i>Large boat with engine</i> |          |
| 2011 unweighted | 2                   | 70                       | 13                               | 15                            | 136      |
| 2011 weighted   | 1                   | 69                       | 14                               | 16                            | 136      |
| 2016            | 4                   | 56                       | 10                               | 29                            | 180      |

Regarding the main type of gear used by the fishers, the preselected option of 'ring nets' (purse-seine) was added to the 2016 questionnaire and was mentioned by 30% of respondents in 2016 (Table 43). It had been mentioned by no one in 2011. Ring nets are a new technology in the Mahale area and can

<sup>57</sup> Statistical significance tested through bivariate logistic regression after creating a binary variable (large boat with engine =1; all other boats=0): Wald F=8.042; p=0.005.

be used in shallow water, which are the nursery grounds of the juvenile pelagic species. Ring nets are therefore problematic and are believed to have reduced fish numbers in deeper water where lift nets are mainly used. Long lines are used by around a third of fishers in both surveys. The illegal beach seine was mentioned by no one in 2016.

**Table 43 Type of gear (%)**

|                 | <i>Pole and rod/handline</i> | <i>Long lines</i> | <i>Lift nets</i> | <i>Gill nets</i> | <i>Ring nets</i> | <i>Beach seine</i> | <i>n</i> |
|-----------------|------------------------------|-------------------|------------------|------------------|------------------|--------------------|----------|
| 2011 unweighted | 2                            | 32                | 43               | 15               | -                | 8                  | 136      |
| 2011 weighted   | 2                            | 34                | 44               | 14               | -                | 6                  | 136      |
| 2016            | 2                            | 36                | 24               | 8                | 30               | -                  | 180      |

On average, half the catch is sold for cash, with most of the other half eaten in the household. Only a very small part is bartered for other goods (Table 44).<sup>58</sup>

**Table 44 Proportion of the catch that is sold, eaten or bartered**

|                 | <i>Sell</i> | <i>Eat</i> | <i>Barter</i> | <i>n</i> |
|-----------------|-------------|------------|---------------|----------|
| 2011 unweighted | 50          | 49         | 1             | 136      |
| 2011 weighted   | 51          | 48         | 1             | 136      |
| 2016            | 50          | 45         | 5             | 180      |

Fishers were asked if they targeted the following fish types: *dagaa*, a type of freshwater sardine, *migebuka*, a perch-like fish, and near-shore fish, such as *kungura* or *ngege*. *Dagaa* comes out as the most commonly targeted fish and is also rated as most important in total catch relative to other fish types.<sup>59</sup> In 2016, fewer fishers said they targeted *migebuka* and other fish (Table 45).<sup>60</sup> This is mainly caused by a drop in the number of different fish types fishers indicated they targeted. In 2011, 44% said they targeted only one fish type, while 82% did so in 2016. It is not clear what causes this difference.

**Table 45 Importance of different fish types**

|   | <i>2011 unweighted</i> | <i>2011 weighted</i> | <i>2016</i> | <i>n 2011</i> | <i>n 2016</i> |
|---|------------------------|----------------------|-------------|---------------|---------------|
| <b>Proportion of fishers targeting fish type</b>    |                        |                      |             |               |               |
| Fished for dagaa                                    | 64                     | 63                   | 57          | 136           | 180           |
| Fished for migebuka                                 | 53                     | 53                   | 36          | 136           | 180           |
| Fished for other fish                               | 51                     | 50                   | 27          | 136           | 180           |
| <b>Average number of stones assigned out of ten</b> |                        |                      |             |               |               |
| Importance in total catch: dagaa                    | 4.8                    | 4.7                  | 5.1         | 136           | 180           |
| Importance in total catch: migebuka                 | 2.1                    | 2.3                  | 2.6         | 136           | 180           |
| Importance in total catch: Other fish               | 3.1                    | 3.0                  | 2.3         | 136           | 180           |
| <b>Number of fish types targeted (%)</b>            |                        |                      |             |               |               |
| One type  | 43                     | 44                   | 82          | 59            | 148           |

<sup>58</sup> Proportions determined through the game where the respondents divided ten stones between the different options.

<sup>59</sup> Determined by means of the ten stone exercise. If only one fish type was targeted, all stones went to that type.

<sup>60</sup> Differences are statistically significant as determined through bivariate logistic regression: Migebuka: Wald F=9.821; p=0.002; Other fish: Wald F=19.063; p<0.001.

|             |    |    |    |    |    |
|-------------|----|----|----|----|----|
| Two types   | 46 | 46 | 16 | 62 | 28 |
| Three types | 11 | 10 | 2  | 15 | 4  |

In both surveys, for each type of fish they targeted, fishers were asked how much time it took to get to the fishing ground, and if this now took more or less time than five years before.

After excluding a few high entries of ten hours or more in 2011 (n=6), the difference in reported times between the surveys is not significant for any of the fish types although shorter times were reported, especially for *dagaa* (Table 46). The fishing grounds for *migebuka* were significantly further away than those for *dagaa* and other fish in both surveys.

In 2016, reported perceptions about changes in travel time compared to the previous five years match these data: majorities of fishers for *migebuka* and other fish said they needed the same amount of time to get to their fishing grounds, while more *dagaa* fishers felt travel times had gone down (Table 46). For all fish types, relatively fewer fishers in 2016 said travel times had increased.

Fishers were also asked why they needed more or less time to reach their fishing grounds, but in both surveys, the answers were problematic, with many unclear answers or obvious answers such as ‘the fish are closer/further away now’. To give some indication, in 2016, those who said they now needed more time (n=48) linked this to illegal fishing or destruction of hatcheries (13%); the wish to avoid catching juvenile fish/ catch larger fish (10%); and to the large numbers of fishers (8%). Ten percent was not sure. The other answers were either unclear, obvious or could not be grouped. With the exception of not wanting to catch juveniles, similar answers were given in 2011. Those who needed less time in 2016 (n=67) mainly linked this to wanting to reduce fuel costs or to a change in equipment (boat/gear). The latter argument was also found in 2011, but fuel costs had not been mentioned as a reason in 2011.

**Table 46 Time needed to get to fishing grounds**

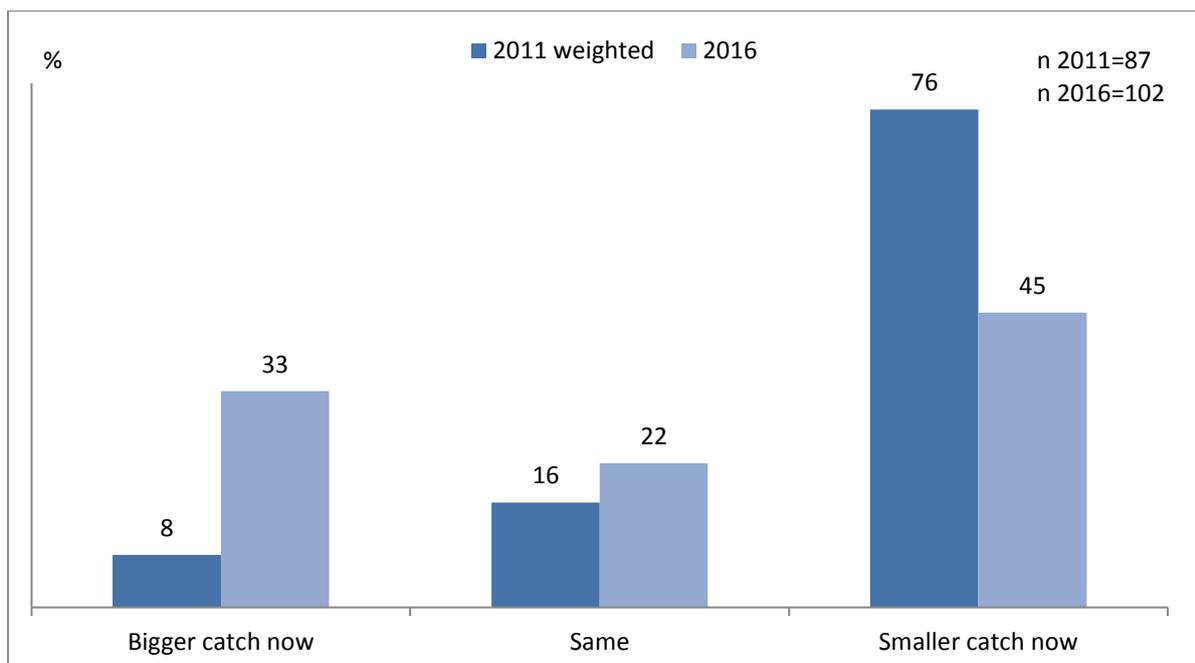
|  | 2011<br>unweighted | 2011<br>weighted | 2016 | n<br>2011 | n<br>2016 |
|--|--------------------|------------------|------|-----------|-----------|
| <b>Mean indicated time to get to fishing grounds</b> |                    |                  |      |           |           |
| Dagaa  | 102                | 98               | 76   | 86        | 103       |
| Migebuka   | 177                | 179              | 165  | 68        | 65        |
| Other fish   | 75                 | 70               | 68   | 68        | 48        |
| <b>Perceived change in time: dagaa (%)</b>           |                    |                  |      |           |           |
| Increased  | 53                 | 54               | 21   | 87        | 102       |
| No change  | 36                 | 36               | 35   | 87        | 102       |
| Decrease   | 12                 | 10               | 44   | 87        | 102       |
| <b>Perceived change in time: migebuka (%)</b>        |                    |                  |      |           |           |
| Increased  | 57                 | 61               | 28   | 72        | 64        |
| No change  | 28                 | 24               | 52   | 72        | 64        |
| Decrease   | 15                 | 15               | 20   | 72        | 64        |
| <b>Perceived change in time: Other fish (%)</b>      |                    |                  |      |           |           |
| Increased  | 45                 | 42               | 19   | 67        | 48        |
| No change  | 42                 | 43               | 63   | 67        | 48        |
| Decrease   | 13                 | 15               | 19   | 67        | 48        |

Fishers were also asked about changes in catch compared to the previous five years. Most fishers in both surveys thought they now brought home less fish from an average trip, so most fishers were negative. In 2016, this negative opinion, while still dominant, was less common for all fish types (Table 47). This change was strongest for *dagaa*: 33% of 2016 fishers reported catching more *dagaa* now than five years ago, while only 8% said the same in 2011 (Figure 14). In both surveys, there was a weak negative correlation between the change in time and the change in catch ( $r=0.2$ ).

Reasons given for why catches were smaller in the 2016 survey were mainly the same as mentioned above for increased time: illegal fishing, different gear, and many fishers. Only 44 fishers indicated an improvement in catch in 2016. Thirteen of them linked this to a reduction in illegal fishing or protected hatcheries, while nine of them said fish were reproducing a lot.

**Table 47 Perceived change in fish catch on an average trip in the last five years (%)**

|  | 2011<br><i>unweighted</i> | 2011<br><i>weighted</i> | 2016 | <i>n</i><br>2011 | <i>n</i><br>2016 |
|--|---------------------------|-------------------------|------|------------------|------------------|
| <b>Perceived change in catch: dagaa</b>      |                           |                         |      |                  |                  |
| Increased                                    | 9                         | 8                       | 33   | 87               | 102              |
| No change                                    | 14                        | 16                      | 22   | 87               | 102              |
| Decrease                                     | 77                        | 76                      | 45   | 87               | 102              |
| <b>Perceived change in catch: migebuga</b>   |                           |                         |      |                  |                  |
| Increased                                    | 6                         | 4                       | 9    | 71               | 64               |
| No change                                    | 14                        | 17                      | 17   | 71               | 64               |
| Decrease                                     | 80                        | 80                      | 72   | 71               | 64               |
| <b>Perceived change in catch: Other fish</b> |                           |                         |      |                  |                  |
| Increased                                    | 4                         | 3                       | 8    | 68               | 48               |
| No change                                    | 16                        | 18                      | 27   | 68               | 48               |
| Decrease                                     | 79                        | 79                      | 65   | 68               | 48               |



**Figure 14** Perceived change in catch on an average trip compared to five years ago

In 2016, a larger proportion of fishers believed there would still be sufficient fish for the increasing number of people in their village in the future, and this group was as large as those who believed the opposite (Table 48). In 2011, a pessimistic view clearly dominated.

**Table 48** 'Will there be sufficient fish in the future?'

|                 | <i>No</i> | <i>Yes</i> | <i>Not sure</i> | <i>n</i> |
|-----------------|-----------|------------|-----------------|----------|
| 2011 unweighted | 50        | 18         | 32              | 136      |
| 2011 weighted   | 54        | 16         | 30              | 136      |
| 2016            | 39        | 38         | 22              | 180      |

### 3.8 The natural environment and climate change: knowledge and perceptions

A number of statements about the natural environment were put to the respondents and they were asked whether they agreed or disagreed. We first discuss two statements related to knowledge about the relationship between deforestation and siltation and its effect on fish in the lake:

Statement 1: Deforestation causes siltation

Statement 2: Siltation from the rivers is harmful to the fish in the lake

We find lower proportions of 'not sure' answers for both statements in 2016, and higher proportions for both agreement and disagreement. A large majority in 2016 agreed to the link between deforestation and siltation, while opinions were more varied on the harm siltation does to fish.

**Table 49** Knowledge statements about siltation (%)

|                                       | <i>Agree</i> | <i>Disagree</i> | <i>Not sure</i> | <i>n</i> |
|---------------------------------------|--------------|-----------------|-----------------|----------|
| <b>Deforestation causes siltation</b> |              |                 |                 |          |
| 2011 unweighted                       | 48           | 10              | 42              | 485      |

|   |    |    |    |      |
|---|----|----|----|------|
| 2011 weighted   | 50 | 11 | 40 | 485  |
| 2016  | 68 | 15 | 17 | 1010 |
| <b>Siltation from the rivers is harmful to the fish in the lake</b> |    |    |    |      |
| 2011 unweighted   | 29 | 22 | 49 | 486  |
| 2011 weighted   | 30 | 24 | 46 | 486  |
| 2016  | 36 | 30 | 35 | 1010 |

To gauge the state of the forests around the project villages and the direct services they provide, the following statement was put to respondents:

Statement 3: There is sufficient forest close to this village for us to meet our day-to-day needs

For this statement, we find a higher proportion of agreement in 2016.<sup>61</sup> In some of the villages, there were large shifts from disagreement to agreement, e.g., in Kalilani and Nkonkwa.<sup>62</sup> The difference is especially large in Kalilani. In 2011, it was the village with the second highest proportion of disagreement after Nkonkwa, while it has the highest level of agreement of all villages in 2016.

**Table 50 Perception about forest availability (%)**

|   | <i>Agree</i> | <i>Disagree</i> | <i>Not sure</i> | <i>n</i> |
|---|--------------|-----------------|-----------------|----------|
| <b>There is sufficient forest close to this village for us to meet our day-to-day needs</b> |              |                 |                 |          |
| 2011 unweighted   | 36           | 56              | 8               | 486      |
| 2011 weighted   | 35           | 57              | 9               | 486      |
| 2016  | 44           | 50              | 7               | 1010     |

We also put four statements to the respondents related to opinions about conservation:

Statement 4: The village forest should be conserved.

Statement 5: Wildlife such as chimpanzees should be protected.

Statement 6: The Mahale National Park should continue to be protected.

Statement 7: The National Park provides benefits for our community.

For the first three statements, we find high levels of agreement in both surveys, with levels in 2016 being a little above those of 2011 (Table 51).<sup>63</sup> Benefits from the park—no specific benefits were mentioned—were acknowledged by around half the respondents in both surveys, with no significant difference between the two surveys.

**Table 51 Opinions about different elements of conservation**

|   | <i>Agree</i> | <i>Disagree</i> | <i>Not sure</i> | <i>n</i> |
|---|--------------|-----------------|-----------------|----------|
| <b>The village forest should be conserved</b> |              |                 |                 |          |
| 2011 unweighted                               | 79           | 11              | 9               | 486      |
| 2011 weighted                                 | 80           | 11              | 9               | 486      |
| 2016  | 88           | 6               | 6               | 1010     |

<sup>61</sup> Statistical significance tested through bivariate logistic regression excluding 'not sure' answers: Wald F=9.563; p=0.002.

<sup>62</sup> Statistical significance tested through Chi square analyses.

<sup>63</sup> Statistical significance tested through bivariate logistic regression excluding 'not sure' answers: the difference in the first two statements is statistically significant at the 1% level, while for the third it is only significant at the 10% level.

| <b>Wildlife such as chimpanzees should be protected</b>         |    |    |    |      |
|---|----|----|----|------|
| 2011 unweighted   | 77 | 11 | 12 | 486  |
| 2011 weighted   | 79 | 10 | 11 | 486  |
| 2016  | 88 | 6  | 5  | 1010 |
| <b>The Mahale National Park should continue to be protected</b> |    |    |    |      |
| 2011 unweighted   | 81 | 8  | 11 | 486  |
| 2011 weighted   | 84 | 7  | 9  | 486  |
| 2016  | 89 | 5  | 6  | 1010 |
| <b>The National Park provides benefits for our community</b>    |    |    |    |      |
| 2011 unweighted   | 53 | 30 | 17 | 486  |
| 2011 weighted   | 56 | 28 | 15 | 486  |
| 2016  | 54 | 26 | 20 | 1010 |

A new section in the 2016 survey asked about climate change and changes in weather patterns. Most of the respondents were unfamiliar with the term 'climate change' (*mabadiliko tabia nchi*); only 27% said they had heard the term before (Table 52). The age of the respondent did not affect this answer. Affirmative answers were given relatively often in Nkonkwa and Buhingu and less often in Kalilani.

More people reported having experienced changes in weather patterns, both since they were young and in the last five years.

**Table 52 Familiarity with the term climate change and observed changes to weather patterns**

|           | Heard the term 'climate change' |    |          | Observed changed in weather patterns since young | Observed changed in weather patterns in the last 5 years | n     |
|-----------|---------------------------------|----|----------|--|--|-------|
|           | Yes                             | No | Not sure |  |  |       |
| Igalula   | 24                              | 71 | 5        | 61   | 57   | 127   |
| Rukoma    | 25                              | 73 | 2        | 61   | 64   | 145   |
| Ikubulu   | 23                              | 70 | 7        | 58   | 58   | 57    |
| Buhingu   | 42                              | 54 | 4        | 56   | 51   | 142   |
| Nkonkwa   | 45                              | 52 | 3        | 58   | 56   | 71    |
| Katumbi   | 23                              | 75 | 2        | 57   | 53   | 60    |
| Kalilani  | 14                              | 80 | 6        | 57   | 51   | 35    |
| Kalya     | 21                              | 77 | 2        | 53   | 47   | 150   |
| Kashagulu | 21                              | 78 | 2        | 50   | 45   | 135   |
| Sibwesa   | 23                              | 73 | 5        | 44   | 40   | 88    |
| Overall   | 27                              | 70 | 3        | 55   | 52   | 1,010 |

If respondents said they had noticed weather changes, they were asked to describe these. These questions, however, did not produce good results, partly due to enumerator influence. One enumerator, for example, almost always entered an increase in rainfall, while two others entered a decrease in more than 70% of their interviews. Even excluding these enumerators leaves a confusing picture, with big groups indicating both more and less rainfall. The questions had already proved difficult in the training and pre-testing with both enumerators and respondents. The idea of a trend was not always understood and the current year or season strongly determined the answer of some respondents. We will therefore not present detailed results for these questions, but only give a general impression of the answers.

Changes in rainfall were mentioned most often, as said, in both directions. Decreases were mentioned (slightly) more often, and this difference was greater in the 'last five years' than the 'since young' time frame. In the focus group discussions all groups said there had been a decrease in rainfall since around 2002 and 2006, and that the rainy season was now shorter. Undependable rainfall was mentioned in the survey to different degrees by all but one enumerator. Increases in temperature were mentioned by about one in ten respondents. Decreases in temperature were also mentioned, but much less often (except for one enumerator). In the focus groups there was consensus that temperatures increased. Increases in strong winds were also indicated, and more so than decreases by almost all enumerators. Opinions in the focus groups differed on this item, but most said winds had decreased.

Those respondents who said they noticed changes in weather patterns were also asked whether they had changed anything in the way they worked or lived because of these changes and 13% said yes. Because this represents only 82 respondents, specific changes in behaviour are reported only generally. The most common changes were to start planting or preparing fields earlier in the season, with some adding a reason, namely to let the crops use all available rain. Some also mentioned starting later, or more generally having changed their timing. Participants of the focus group discussions also mentioned changes in the timing of agricultural work to deal with the shorter rainy season. They said they still prepared fields in September as in the past, but now sowed later, only in November or December. Others said they had moved to more fertile land closer to water and they now used irrigation. Adding a livelihood option was also mentioned to not solely rely on, for example, agriculture or fishing, as was growing drought resistant crops such as cassava. The latter was also mentioned in the focus group discussions.

All respondents were asked if they felt climate change would have a positive, negative, or no influence on their lives in the future. In line with the general unfamiliarity with climate change, half were not sure (Figure 15). A third thought it would have a negative effect, and the remaining respondents were split into thinking it would be positive or would not have any impact. If only looking at those respondents who had heard the term climate change somewhere before, half thought it would have a negative effect, while around 15% thought it would be good, 10% thought it would have no impact and roughly 20% was still unsure.

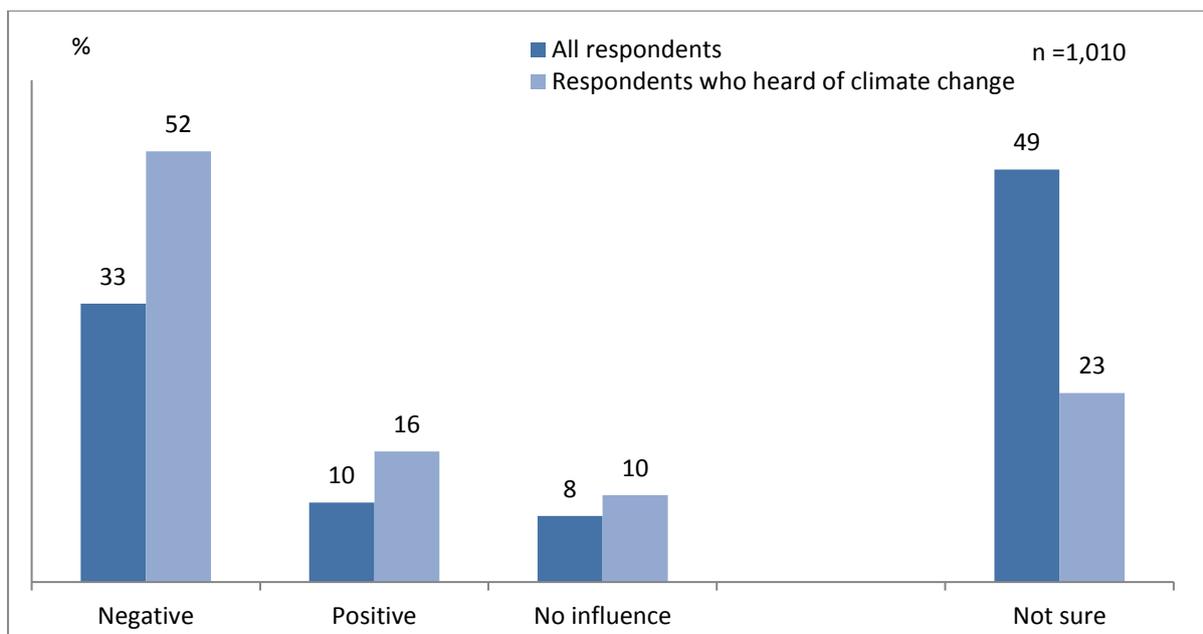


Figure 15 Perception of future impact of climate change

### 3.9 Dietary diversity, food frequency and insecurity

This section was added to the questionnaire in 2016. Following the World Food Programme (WFP) metric for measuring dietary diversity and food frequency—the Food Consumption Score (FCS)—households were asked on how many days in the last week they ate 15 different food categories. Figure 16 shows the average number of days for each category. Cassava is the main staple food, and fish is consumed often by most households. Vegetables and pulses are eaten less often, and fruit, meat, dairy products and eggs are consumed less than once a week on average.

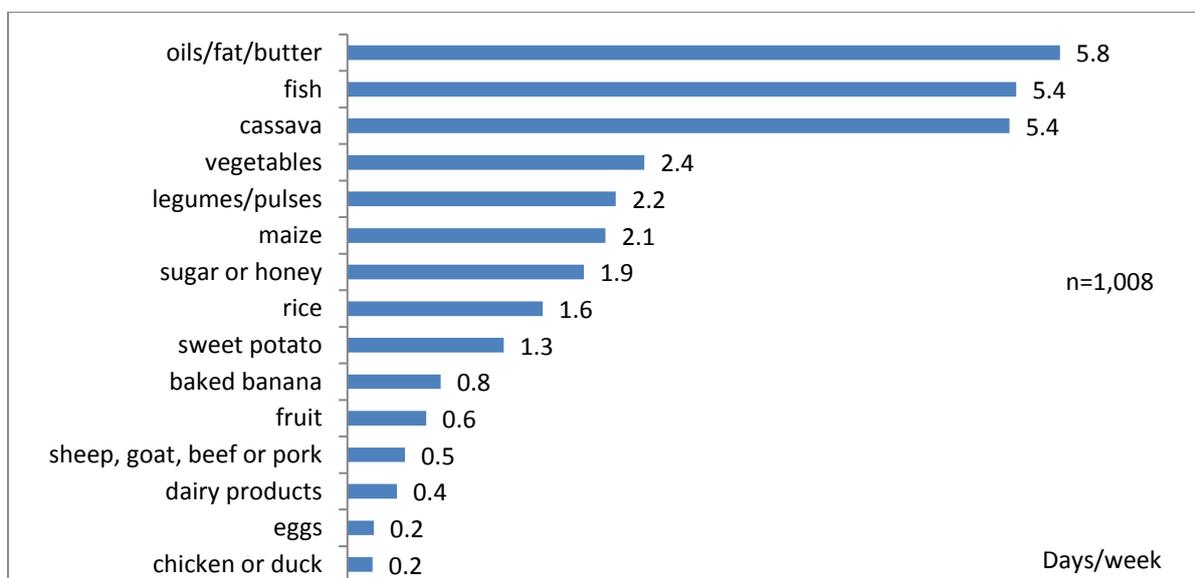
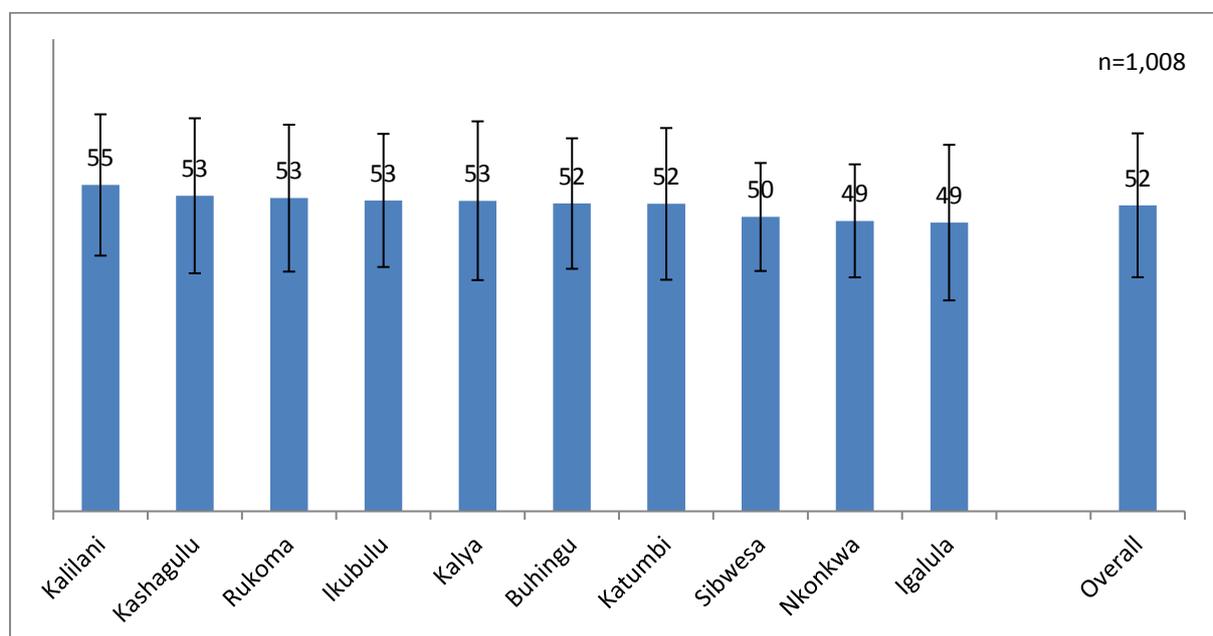


Figure 16 Average number of days a food category was consumed in the prior week

To get a single indicator for each household, the FCS is calculated by aggregating the 15 categories into 8 food groups: staples, pulses, vegetables, fruit, meat/fish/eggs, dairy products, sugar-related

products and oils/fats/butter. This is done by summing the different frequencies of food categories within each group and capping group values at seven. The value in each group is then multiplied by a standard weight, which is based on the 'nutrient density' of the group and the expected quantities eaten, and then summed for each household.<sup>64</sup>

Figure 17 shows the mean FCS for the different villages. There are some differences, but as shown by the standard deviations in the figure below, these are not statistically significant. The overall average FCS of 52 is within the WFP's 'acceptable' range, which starts at FCSs above 35. Only nine households (<1%) fell in the poor range (0-21) and 7% fell in the borderline range (21.5-35) [8]. The area's high score is strongly influenced by the consumption of fish. This is also shown in Figure 18, in which all households' FCS is plotted against the cumulative consumption frequencies (0-7) of each of the eight food groups. The meat/fish/eggs group already shows high frequencies at relatively low scores of the FCS, highlighting how commonly fish is eaten.



**Figure 17 Mean and standard deviation of the Food Consumption Score at village level**

<sup>64</sup> The standard weights for the groups are: staples=2; pulses=3; vegetables=1; fruit=1; meat/fish/eggs=4; dairy products=4; sugar-related products=0.5; oils/fats/butter=0.5. See [8] for more information about calculating the FCS.

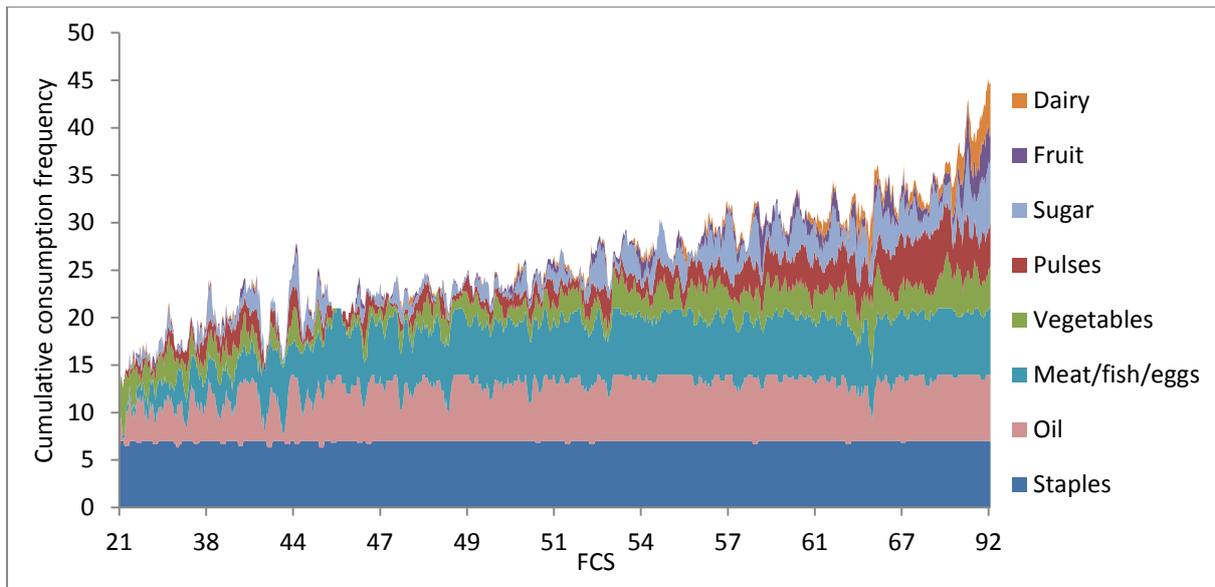


Figure 18 Food Consumption Score composition<sup>65</sup>

Another World Food Programme metric looks at the number of food groups eaten in the last week and classifies households as having low diet diversity if it consumed four or fewer groups (out of a possible seven; sugar products are not included) [9]. According to this metric, 40% of the households are classified as having low diet diversity (Figure 19). Nationally, only 18% of all households were found to have low diet diversity in 2009 [9]. Village differences are also greater than for the FCS metric, with Sibwesa having the lowest diet diversity and Ikubulu the most.

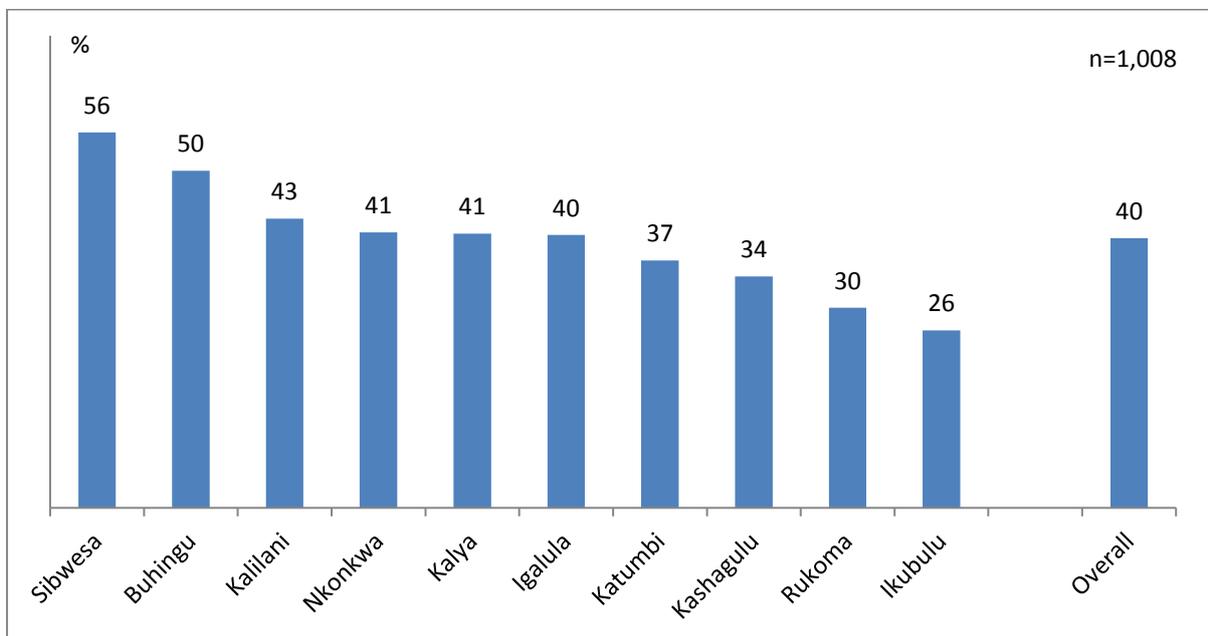


Figure 19 Percentage of households with low diet diversity

<sup>65</sup> For each FCS value, a running average of the previous five values for that food group and the value in question was used to smooth the graph. The five households with the lowest FCS are therefore not shown in the graph.

Looking at the source of food, we see that the main staples cassava and maize are mainly produced by the households, while the other staples of rice, sweet potato and plantain are mainly bought (Table 53). The other common food items oils and fish are also largely bought. Fish is received as a gift relatively often as well.

**Table 53 Source of food**

|                                | <i>Own production</i> | <i>Purchased</i> | <i>Gift</i> | <i>Other</i> | <i>n</i> |
|--------------------------------|-----------------------|------------------|-------------|--------------|----------|
| Cassava                        | 77                    | 20               | 3           | 0            | 881      |
| Eggs                           | 71                    | 23               | 6           | -            | 159      |
| Chicken or duck                | 70                    | 23               | 6           | -            | 258      |
| Maize                          | 65                    | 31               | 4           | -            | 497      |
| Sweet potato                   | 43                    | 51               | 5           | 1            | 434      |
| Beans and other legumes/pulses | 43                    | 53               | 4           | 0            | 695      |
| Baked banana                   | 39                    | 51               | 10          | -            | 359      |
| Vegetables                     | 34                    | 59               | 7           | -            | 738      |
| Fruit                          | 24                    | 64               | 12          | -            | 258      |
| Rice                           | 22                    | 71               | 6           | 1            | 629      |
| Oils, fat or butter            | 17                    | 78               | 4           | 1            | 970      |
| Fish                           | 13                    | 70               | 16          | 2            | 99       |
| Sheep, goat, beef or pork      | 4                     | 92               | 4           | 0            | 125      |
| Dairy products                 | 3                     | 88               | 8           | 1            | 547      |
| Sugar or honey                 | 3                     | 92               | 5           | 1            | 942      |

## Food insecurity

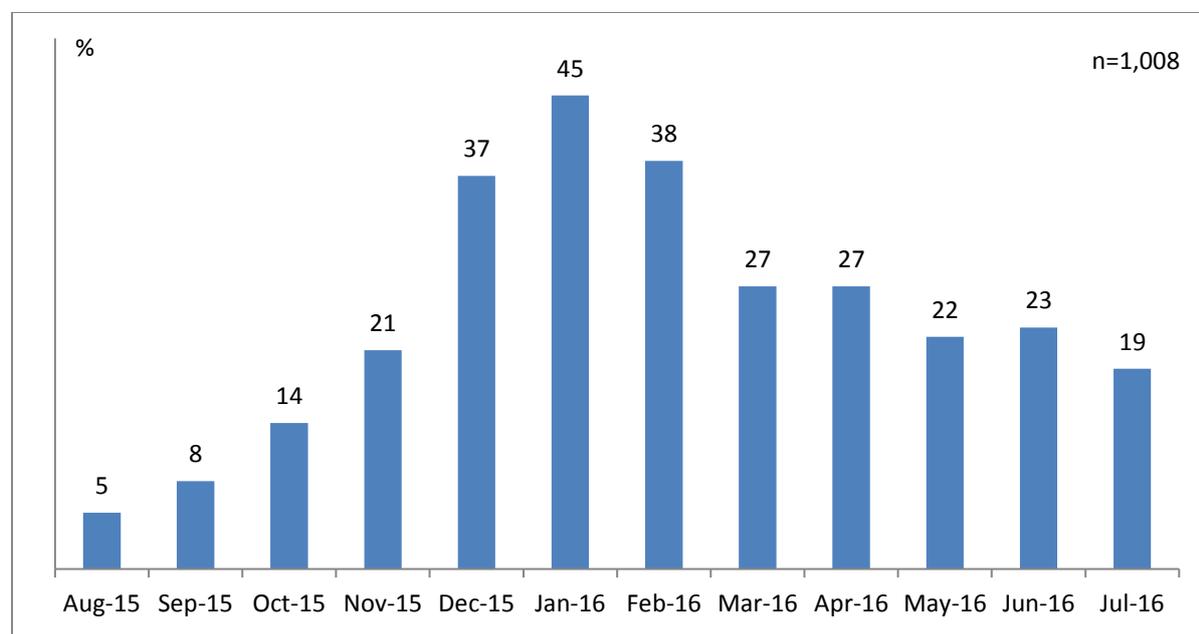
The above indicators only reflect the situation during the week prior to the survey. When asked whether the household had suffered any food shortages or had worries about food shortages in the 12 months prior to the survey, 56% said yes, 42% said no, and 2% were not sure. Female-headed households answered affirmatively slightly more often, but the difference was not statistically significant. The importance of agriculture is reflected by the reasons given for food shortages. Around half of all households with shortages or worries thereof referred to disappointing harvests, with crop failure due to bad weather being the single most common cause of the shortages (Table 54). Personal illness was also mentioned often.

**Table 54 Food shortage and causes (%)<sup>66</sup>**

|                                 |    |
|---------------------------------|----|
| No food shortage                | 42 |
| Crops failed due to bad weather | 16 |
| Illness                         | 12 |
| Normal situation                | 7  |
| Crops damaged by wild animals   | 6  |
| Low fish availability           | 5  |
| Unemployment                    | 2  |
| Crops had yet to mature         | 2  |
| Crops failed due to pests       | 2  |
| Other                           | 5  |

<sup>66</sup> Does not add to 100% as the respondents who said they were not sure if the household had food shortages or worries thereof are not included (2%).

The worst period for most households was December to February, just before the long rains, which generally start in March (Figure 20).



**Figure 20 Timing of food shortages/worries about food in the last year**

Half the respondents said the last year had been an average one for their household's food availability, while 30% had a bad year, and 17% a good one (Table 55).

**Table 55 Respondents perception of last year's food availability (%)**

|           | <i>Average</i> | <i>Worse</i> | <i>Better</i> | <i>Not sure</i> | <i>n</i> |
|-----------|----------------|--------------|---------------|-----------------|----------|
| Igalula   | 57             | 36           | 6             | 1               | 127      |
| Rukoma    | 51             | 34           | 15            | 1               | 145      |
| Ikubulu   | 37             | 39           | 21            | 4               | 57       |
| Buhingu   | 59             | 20           | 15            | 6               | 142      |
| Nkonkwa   | 48             | 24           | 27            | 1               | 71       |
| Katumbi   | 50             | 33           | 17            | -               | 60       |
| Kalilani  | 49             | 40           | 11            | -               | 35       |
| Kalya     | 48             | 31           | 19            | 2               | 150      |
| Kashagulu | 51             | 24           | 24            | 1               | 135      |
| Sibwesa   | 44             | 34           | 22            |                 | 88       |
| Overall   | 51             | 30           | 17            | 2               | 1,010    |

We also wanted to know about the trends in food security and asked respondents about the last five years. Forty percent said their household's situation had not changed in the last five years, while 35% experienced a deterioration, and 22% an improvement (Table 56).

**Table 56 Food availability now compared to five years ago (%)**

|  | <i>Same</i> | <i>Worse now</i> | <i>Better now</i> | <i>Not sure</i> | <i>n</i> |
|--|-------------|------------------|-------------------|-----------------|----------|
|--|-------------|------------------|-------------------|-----------------|----------|

|           |    |    |    |   |       |
|-----------|----|----|----|---|-------|
| Igalula   | 45 | 39 | 14 | 2 | 127   |
| Rukoma    | 38 | 37 | 23 | 1 | 145   |
| Ikubulu   | 33 | 37 | 26 | 4 | 57    |
| Buhingu   | 51 | 23 | 22 | 4 | 142   |
| Nkonkwa   | 48 | 28 | 21 | 3 | 71    |
| Katumbi   | 38 | 33 | 28 | - | 60    |
| Kalilani  | 34 | 43 | 23 | - | 35    |
| Kalya     | 40 | 39 | 20 | 1 | 150   |
| Kashagulu | 29 | 40 | 30 | 2 | 135   |
| Sibwesa   | 41 | 39 | 19 | 1 | 88    |
| Overall   | 40 | 35 | 22 | 2 | 1,010 |

Food availability in the households mainly improved or deteriorated because of personal reasons, which is a broad category, covering causes such as illness, age, working harder, buying more land, and increases in household size (Table 57). The weather was also mentioned often. A change in crop pests was more often cited as a reason of deteriorated food availability as was crop damage by wildlife.

**Table 57 Reasons behind the change in food availability (%)**

|                      | <i>Worse</i> | <i>Better</i> |
|----------------------|--------------|---------------|
| Personal reasons     | 43           | 41            |
| Weather              | 35           | 37            |
| Crop pests           | 12           | 8             |
| Land is tired        | 2            | 0             |
| Crop damage wildlife | 3            | 0             |
| <i>n</i>             | 225          | 358           |

### 3.10 Governance, social cohesion and participation

There was a big shift in the answers about satisfaction with government services provided at village and district level (Table 58). Where 67% of respondents had said they were unsatisfied in 2011, 57% indicated they were satisfied in the 2016 survey. The shift is found in all villages. Where in 2011 the unsatisfied respondents outnumbered the satisfied in all ten villages, this happens in only two villages in 2016 and by considerably smaller margins. This uniform and large shift across all villages seems more likely to suggest a difference in the survey than a change on the ground, but it is not clear what would have caused this as the question and procedures were left unchanged.<sup>67</sup> This result was shared with participants in the village feedback sessions, and in most sessions people strongly disagreed that satisfaction with services went up.

In both surveys, the majority of respondents felt their household could not influence village government decisions, but this majority was smaller in 2016.<sup>68</sup>

<sup>67</sup> There are some differences between the enumerators in both surveys, but for all enumerators in 2011 the unsatisfied answers dominate, and for all but two enumerators in 2016 the satisfied answers do. In 2011, the enumerator team was mostly non-local, while the 2016 survey used mostly local interviewers, but the overall pattern mostly holds for the exceptions in both teams.

<sup>68</sup> The difference is statistically significant at the 1% level; tested through logistic regression after excluding 'not sure' answers: Wald F=14.912; p<0.001.

**Table 58 Influence on and satisfaction with local government<sup>69</sup>**

|                 | Satisfaction with village and district government services |                    |                         | <i>n</i> | Household influence on village government decisions |           |                 | <i>n</i> |
|-----------------|--|--------------------|-------------------------|----------|---|-----------|-----------------|----------|
|                 | <i>Satisfied</i>   | <i>Unsatisfied</i> | <i>Neutral/not sure</i> |          | <i>Yes</i>  | <i>No</i> | <i>Not sure</i> |          |
| 2011 unweighted | 28   | 67                 | 5                       | 487      | 24  | 66        | 11              | 486      |
| 2011 weighted   | 28   | 67                 | 5                       | 487      | 25  | 64        | 11              | 486      |
| 2016            | 57   | 38                 | 4                       | 1010     | 36  | 55        | 9               | 1010     |

The relationship between villagers and the Tanzania National Park Authority (TANAPA) is more often perceived as good than bad in both surveys, although there is small shift toward bad in 2016 (Table 59).<sup>70</sup> In both years around a third of respondents were neutral or not sure.

In an open question, respondents were also asked to explain why they felt the relationship between villagers and TANAPA was good or bad. The responses of those who feel the relationship is good are very similar across the two surveys. A lot of people simply say there is no conflict and the relationship is good (45 vs. 51%). Those who are more specific mainly mention the services provided by TANAPA in the village, such as helping to build schools and bridges (37 vs. 31%). Providing environmental education was mentioned in both surveys by a smaller proportion ( $\cong 10\%$ ).

Boundary or land disputes rank highly in both surveys as a reason why the relationship is bad ( $\cong 30\%$ ). A lack of help of the sort referred to above was mentioned often in 2011 ( $\cong 40\%$ ), but less so in 2016 ( $\cong 20\%$ ). Fishing, forest or farming restrictions upheld by TANAPA were mentioned in both surveys ( $\cong 11-14\%$ ). In 2016, (intended) confiscation of land ( $\cong 20\%$ ) and unwarranted harassment, beatings or arrests ( $\cong 10\%$ ) were also mentioned often, while these were not or rarely mentioned in 2011.

At village level, Ikubulu and Kalilani were the only villages in 2011 where more respondents thought the relationship was bad than good. In 2016, this reversed in Ikubulu, but became stronger in Kalilani, where 71% now saw the relationship as bad, against 47% in 2011. In Sibwesa, there was also a reverse from more 'good' to more 'bad' answers (a 40:30% ratio in 2011 vs. 20:51% ratio in 2016).<sup>71</sup>

**Table 59 Perceived relationship between villagers and TANAPA**

|                 | <i>Good</i> | <i>Bad</i> | <i>Neutral/not sure</i> | <i>n</i> |
|-----------------|-------------|------------|-------------------------|----------|
| 2011 unweighted | 43          | 22         | 35                      | 486      |
| 2011 weighted   | 45          | 23         | 33                      | 486      |
| 2016            | 40          | 26         | 34                      | 1010     |

<sup>69</sup> Proportions do not add up to 100% due to rounding.

<sup>70</sup> Statistically significant at the 10% level; tested through logistic regression after excluding 'neutral/not sure' answers: Wald F=3.058; p=0.08.

<sup>71</sup> The difference in Sibwesa is statistically significant at the 1% level. Tested through Chi square analysis after excluding 'neutral/not sure' answers.

## Trust

Three questions related to trust were added to the 2016 questionnaire to improve insights into social cohesion. Respondents were asked how much they thought they could trust people in their own village, people in nearby villages, and the local (village and sub-village) government. Respondents were read a Likert scale to choose from, ranging from 1 'they can never be trusted' to 5 'they can always be trusted'.<sup>72</sup>

Excluding respondents who were not sure, the mean value of the Likert scale is presented in Table 60 and the distribution of the answers is shown in Figure 21. Respondents generally have more trust in people from their own village than in inhabitants of nearby villages, although running a Wilcoxon signed rank test showed that the difference was not unidirectional: more people gave a lower score to people from other villages, but some also gave these a higher score than to people from their own village.<sup>73</sup> It should also be mentioned that more people chose the 'not sure' answer in the question about other villages (29 vs. 9%).

Overall, people trust their village government more than fellow villagers. Even though the mean score is not that much higher and the median is the same at 3, a Wilcoxon signed rank test did show the difference to be statistically significant.<sup>74</sup>

Village differences are not very big, but the difference in trust of fellow villagers and those from nearby villages is biggest in Kalilani.

**Table 60 Trust in people from this village, nearby villages, and local government**

|           | <i>People in this village (1 to 5 scale)</i> | <i>People in nearby villages (1 to 5 scale)</i> | <i>Local government (1 to 5 scale)</i> |
|-----------|--|---|--|
| Igalula   | 3.1  | 2.6   | 3.3                                    |
| Rukoma    | 2.9  | 2.6   | 3.0                                    |
| Ikubulu   | 3.2  | 2.8   | 3.1                                    |
| Buhingu   | 3.1  | 2.7   | 3.1                                    |
| Nkonkwa   | 3.3  | 2.6   | 3.6                                    |
| Katumbi   | 3.4  | 2.7   | 3.4                                    |
| Kalilani  | 3.2  | 2.2   | 3.3                                    |
| Kalya     | 3.1  | 2.7   | 3.2                                    |
| Kashagulu | 3.0  | 2.7   | 3.3                                    |
| Sibwesa   | 2.9  | 2.5   | 3.1                                    |
| Overall   | 3.1  | 2.6   | 3.2                                    |
| <i>n</i>  | 924  | 718   | 938                                    |

<sup>72</sup> 1: They can never be trusted; 2: They can rarely be trusted; 3: Sometimes people can be trusted, sometimes they can't; 4: They can usually be trusted; 5: They can always be trusted. A 'Not sure' option was not read to respondents.

<sup>73</sup> 303 respondents gave a lower score to other villages, 146 gave a higher score, and 253 gave the same score:  $Z=-8.395$ ;  $p<0.001$ .

<sup>74</sup> 294 respondents gave a more positive score to their village government, 233 gave a lower score, and 367 gave the same score:  $Z=-2.734$ ;  $p=0.001$ .

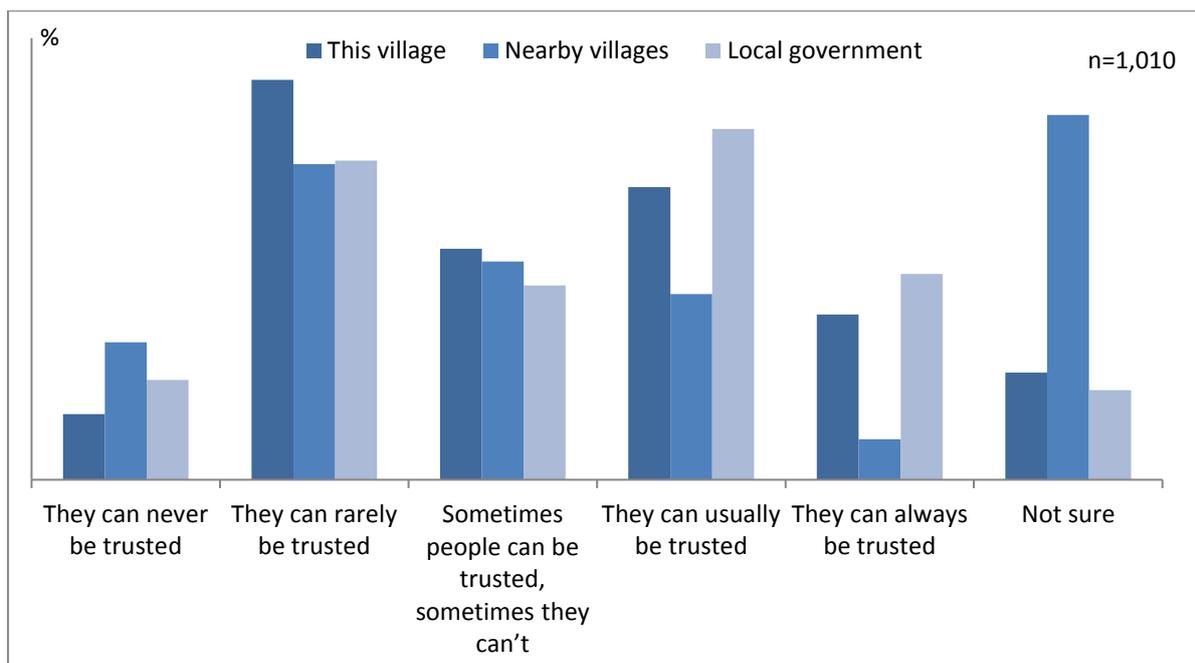


Figure 21 Trust: distribution of Likert-scale answers

## Conflict and disputes

Slightly fewer respondents in 2016 said disputes or conflicts about land use, the use of forest products or fishing in their village occurred often, but the difference with 2011 is not statistically significant (Table 61).<sup>75</sup>

Table 61 Occurrence/frequency of conflicts about land use, forest products or fishing

|                 | <i>Never</i> | <i>Rarely</i> | <i>Often</i> | <i>Not sure</i> | <i>n</i> |
|-----------------|--------------|---------------|--------------|-----------------|----------|
| 2011 unweighted | 27           | 30            | 29           | 14              | 487      |
| 2011 weighted   | 28           | 31            | 29           | 12              | 487      |
| 2016            | 33           | 28            | 26           | 13              | 1010     |

Those who had indicated that conflicts occurred (rarely or often) were asked what the cause of the conflicts was and who the actors were. Disputes about private land or land boundaries were most common in both 2011 and 2016, but the proportion was considerably larger in the 2016 survey. The increase may be linked to the expanded landholdings we discussed above. In both surveys, those who indicated this type of conflict, most often said both sides in the conflict were local villagers ( $\cong 60\%$ ).<sup>76</sup> The second most commonly mentioned pair of actors for this conflict was local villagers and TANAPA ( $\cong 34\%$ ). Local villagers with people from other villages and with local government were also mentioned in both surveys. In the 2016 survey, around 10% mentioned farmers and pastoralists,

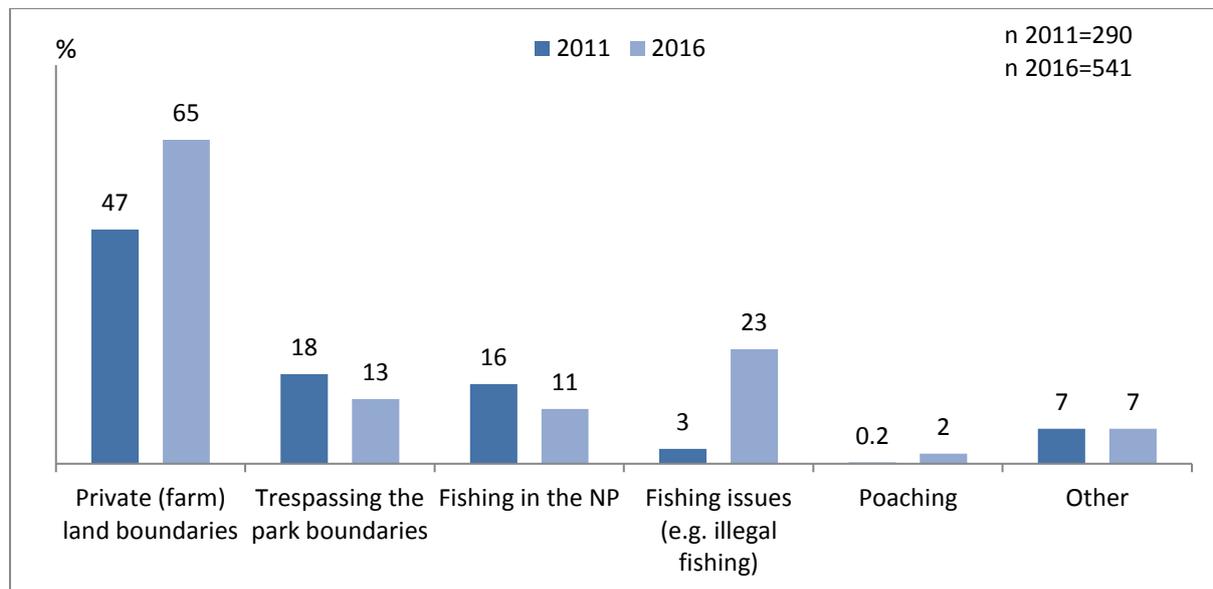
<sup>75</sup> Difference tested through bivariate logistic regression, combining the options never and rarely and excluding 'not sure' answers.

<sup>76</sup> A precise link between type of conflict and actors cannot be made as respondents could identify more than one cause and different actors.

which was only mentioned once in 2011, but could have been included in the other actor categories then. It is therefore hard to say if this specific type of conflict increased.

Fishing-related conflicts were also reported more frequently in 2016. Mostly illegal fishing was mentioned in this context, both in general or related to fishing undersized fish. These conflicts were said to mainly occur between fishers and the Beach Management Units and between legal and illegal fishers. TANAPA and village government were also mentioned to be in conflict with local villagers over this topic.

One cause of conflict that was a prelisted option in 2011 was robberies. This option was removed from the prelisted options in 2016 as it does not relate to the type of conflicts referred to in the question. Around 20% chose or mentioned robberies in 2011, but no mention was made in 2016.



**Figure 22 Cause of conflict**

When asked how people in the villages generally solved these types of conflicts, the most common answer in 2011 was to do nothing (45%), while only 8% said this in 2016. Instead, the most common answer in 2016 was to go to the village government (63%), which was only selected by 37% in 2011. Direct negotiations between the parties was mentioned by 24% in 2016 and by 15% in 2011. Fourteen percent in 2016 also mentioned going to the ward or district governments, which was not a prelisted option and was not mentioned in 2011.

Finally, about equal proportions agree and disagree that these disputes are usually resolved fairly (Table 62). This was the case in both surveys. Differences are not statistically significant.<sup>77</sup>

**Table 62 Disputes usually solved fairly (%)**

|                 | Yes | No | Not sure | n   |
|-----------------|-----|----|----------|-----|
| 2011 unweighted | 35  | 40 | 26       | 290 |
| 2011 weighted   | 36  | 41 | 24       | 290 |
| 2016            | 42  | 37 | 21       | 541 |

<sup>77</sup> Tested through bivariate logistic regression after excluding the ‘not sure’ answers.

## Membership of organisations

In the 2011 survey, 19% of the respondents indicated one or more household member participated in a village organization, such as a women’s group, a cooperative, a self-help group or some other group. In 2016, this was 16%, but the difference is not statistically significant.

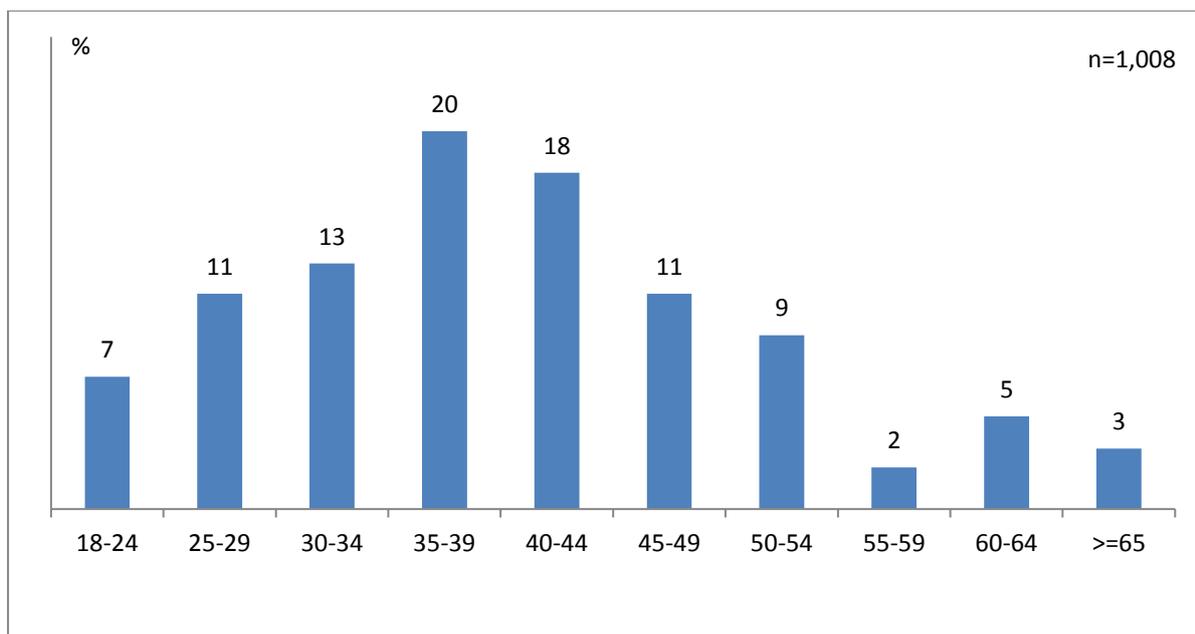
In 2011, the type of organisation or group was predominantly the COCOBA (71%) followed by women's groups, including women's unions (8%). In 2016, the COCOBA was also the most mentioned type of group, but by a smaller proportion (40%). This was followed by various government functions (14%) and women's groups (12%). Beach Management Units (see below) were also mentioned by 12% of respondents.

New in the 2016 questionnaire was the question who in the household belonged to such groups or organisations. Of the 163 households with participants in such organisations, 22 had more than one participating household member, and there were three households that had three participating members, giving a total of 188 members. Table 63 presents their main characteristics. Members were almost always the head of the household or their spouse; slightly more women than men were reported, and participating members mean age was 40. Figure 23 gives their full age distribution.

Participating members were more likely to have finished primary school than the general population: two thirds had finished primary school (Standard 7) against just over half in the general population; 14% had not had any schooling against 24% in the general population; and 4% had completed a level above primary school against 7% in the general population (education data not shown in the table).

**Table 63 Characteristics of participants in organisations**

| <i>Questionnaire section</i> | <i>Relationship to the household head (%)</i> |               |              |              | <i>Sex (%)</i> |               | <i>Mean age</i> | <i>n</i> |
|------------------------------|---|---------------|--------------|--------------|----------------|---------------|-----------------|----------|
|                              | <i>Self</i>                                   | <i>Spouse</i> | <i>Child</i> | <i>Other</i> | <i>Male</i>    | <i>Female</i> |                 |          |
| Participant                  | 53  | 43            | 4            | 3            | 46             | 54            | 40              | 188      |



**Figure 23 Age distribution of participants in organisations**

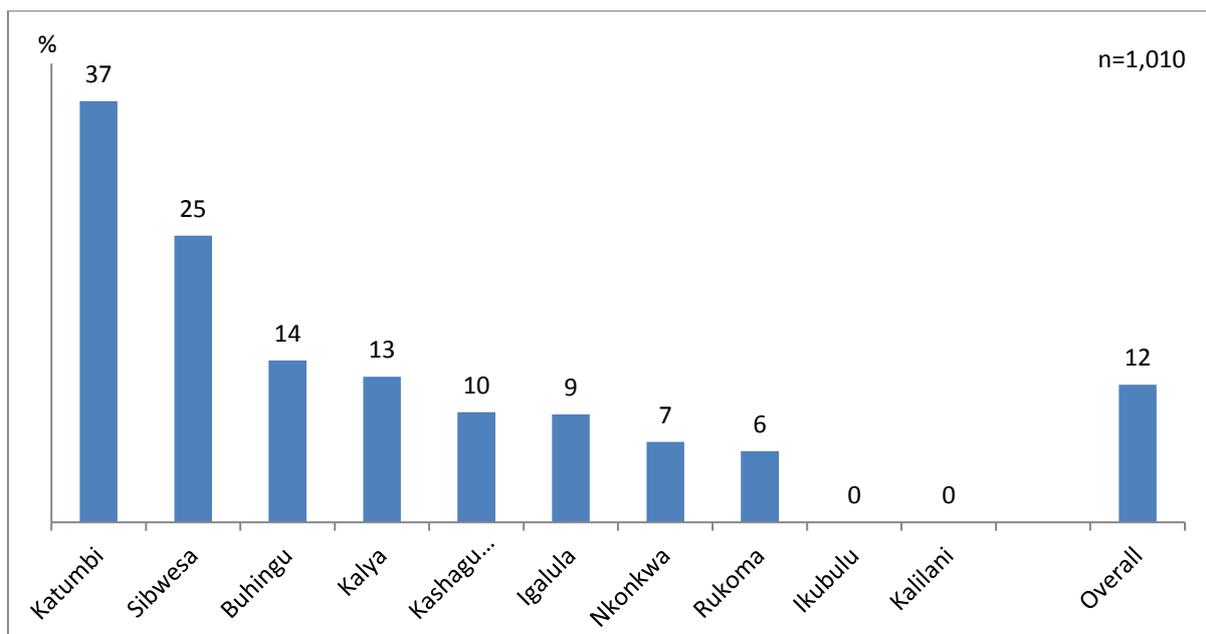
Beach Management Units (BMU) were already mentioned above in the discussion about participation in village organisations. BMUs are groups that bring together everyone who works in a fishery at a local beach and are the government-supported strategy for co-management of local fisheries. They were set-up with the help of the Tuungane project in several of the project villages. The first was established in 2012 in Sibwesa (see activities Table 3), and currently all survey villages except Nkonkwa, Kalilani, and inland Ikubulu have BMUs.

Both the survey in 2011 and 2016 asked whether anyone in the household participated in a BMU, and surprisingly, 3% in 2011 said this was so, although there was no BMU established at the time. It is probably an example of false positive answers that are sometimes given, for instance out of politeness or insecurity. In 2016, 12% answered affirmatively.<sup>78</sup>

Figure 24 shows the proportions of BMU membership at village level. Although Nkonkwa does not yet have an official BMU, part of the fishing community organised in the project's Model Households would like to establish a Nkonkwa BMU and have been in touch with the project about fisheries related issues. This is the most likely reason why some households in Nkonkwa identified as BMU members.<sup>79</sup>

<sup>78</sup> Statistical significance tested through bivariate logistic regression: Wald F=28.013; p<0.001.

<sup>79</sup> Personal communication with project staff.



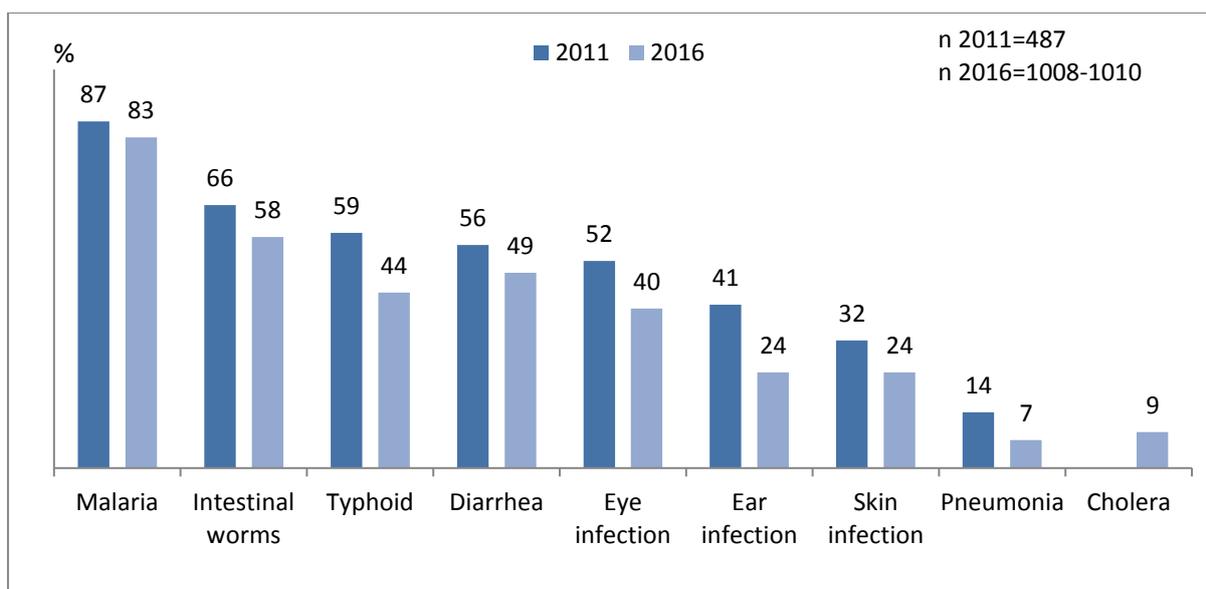
**Figure 24 BMU membership at village level**

Slightly more respondents in 2016 said anyone in the households had attended a public meeting in the last year about village land-use planning, health issues, lake management and/or forest management (36 vs. 31% in 2011), but the difference is not statistically significant.

### 3.11 Health

Prevalence rates of common diseases and symptoms were measured by asking respondents if anyone in the household had suffered from these in the last 12 months. For all problems, average reported rates were lower in 2016 but the difference for malaria was not statistically significant (Figure 25).<sup>80</sup> Malaria was the most commonly mentioned problem in both surveys. Cholera was only included in the 2016 questionnaire.

<sup>80</sup> Differences were statistically significant at the 5% level for diarrhea and at the 1% level for the other illnesses or symptoms. Tested through bivariate logistic regression and Chi Square analysis. Including only those sub-villages that were surveyed in both 2011 and 2016 results in smaller and non-significant differences for some of these symptoms or illnesses.



**Figure 25 Disease prevalence rates (% households with any household member ill in the last 12 months)**

Malaria is a big problem in the area with 83% of households reporting a household member suffered from it in the last 12 months, and pregnant women and children under five are especially vulnerable to the illness. All women who participated in the reproductive health section were asked whether they had slept under a mosquito net the night before the survey. The same question was asked for all living children born in the 6 years prior to the survey. It was not specified in the survey whether the nets were treated with insecticide.

We find high proportions sleeping under nets in both surveys, with the 2016 values being slightly higher for both women of reproductive age and children below five (Table 64), but only the latter difference is statistically significant.<sup>81</sup> Compared to national averages, the proportions are high: only 61% of children under five slept under a net in Tanzania as a whole in 2015 [5].

In 2016, we found fewer of the pregnant respondents slept under a net than in 2011, but the difference is not statistically significant. Nationally, 56% of pregnant rural women slept under a net in 2015 [5].

**Table 64 Children and mothers sleeping under a mosquito net the prior night**

| Age in months (years) | Proportion sleeping under a net |                  |      | n<br>2011 | n<br>2016 |
|-----------------------|---------------------------------|------------------|------|-----------|-----------|
|                       | 2011<br>unweighted              | 2011<br>weighted | 2016 |           |           |
| 79-72 (6)             | 81                              | 82               | 82   | 21        | 44        |
| 60-71 (5)             | 82                              | 85               | 89   | 73        | 137       |
| 48-59 (4)             | 78                              | 80               | 86   | 74        | 146       |
| 36-47 (3)             | 80                              | 75               | 88   | 59        | 168       |
| 24-35 (2)             | 84                              | 86               | 87   | 104       | 171       |
| 12-23 (1)             | 84                              | 84               | 86   | 92        | 180       |
| 0-11 (<1)             | 87                              | 84               | 91   | 103       | 183       |
| All children <5       | 83                              | 83               | 88   | 432       | 848       |

<sup>81</sup> Statistical significance tested through bivariate logistic regression: Children: Wald F=5.782; p=0.02.

| Age in months<br>(years) | Proportion sleeping under a net |                         |      | <i>n</i><br>2011 | <i>n</i><br>2016 |
|--------------------------|---------------------------------|-------------------------|------|------------------|------------------|
|                          | 2011<br><i>unweighted</i>       | 2011<br><i>weighted</i> | 2016 |                  |                  |
| Women 18-49              | 86                              | 85                      | 89   | 357              | 765              |
| Pregnant women           | 90                              | 92                      | 83   | 58               | 87               |

Children are recommended to receive a measles vaccination preferably at 9 months but before 12 months. The Tanzanian DHS reports vaccination rates for living children between 12 and 23 months. The 2011 survey included information about 87 children of this age, of whom 97% had received a vaccination.<sup>82</sup> In 2016, 90% of 181 children did, but the difference is not statistically significant.<sup>83</sup> Comparison to national or regional values is hampered by differences in the elicitation method,<sup>84</sup> but values for the Mahale area appear to be higher than the national average of 73% for rural Tanzania and 66% for the Western zone in 2015 [5].

There seems to have been a slight shift in the main sources of medical assistance between 2011 and 2016. The overall ranking of the different sources has not changed: village dispensaries<sup>85</sup> top the list, followed by the Buhingu health centre and pharmacies (Figure 26), but both dispensaries and the centre were mentioned slightly more often in 2016, while pharmacies and other remaining options were mentioned less than in 2011. Differences for the Buhingu health centre, dispensaries and pharmacies are statistically significant.<sup>86</sup> This is in line with results from the focus group discussions in which the rehabilitation and building of clinics and dispensaries and the training of healthcare staff were mentioned as some of the main impacts of the Tuungane project. Not measured in the household survey was the distance people have to travel to the nearest source of medical assistance. The focus groups indicated improvements to that aspect as well. Participants mentioned that health care had improved in remote sub-villages through the use of mobile clinics, and that the project helped with transportation in case of emergencies or referral to the Kigoma hospital with its boats and cars.

<sup>82</sup> In the (July) 2011 survey, the question was restricted to children between 12 and 23 months, born between July 2009 and June 2010, which according to DHS calculations using the Century Month Code equates to 13 and 24 months. In the 2016 survey, all children were asked, but the same period is used to allow a clean comparison.

<sup>83</sup> Statistical significance tested through bivariate logistic regression.

<sup>84</sup> In the national DHS survey, mothers were asked to show a child's vaccination card, and only if she couldn't provide one, was she asked to answer from memory. In this survey only the latter method was used. Also because information of only measles vaccinations was elicited in this survey, in contrast to all commonly administered vaccinations in the national survey, it is possible that mothers were confused about which particular vaccination she was asked about, and answered positively if the child had received any vaccination.

<sup>85</sup> Dispensaries include those in villages other than where the respondent lived, but this is a minority.

<sup>86</sup> Statistical significance tested through bivariate logistic regression after creating a binary variable with dispensary=1 and other options=0; Buhingu health centre=1 and other options=0; pharmacy=1 and other options=0. Dispensary: Wald F=4.269; p=0.04; Buhingu medical centre: Wald F=9.864; p=0.002; pharmacy: Wald F=18.711; p<0.001.

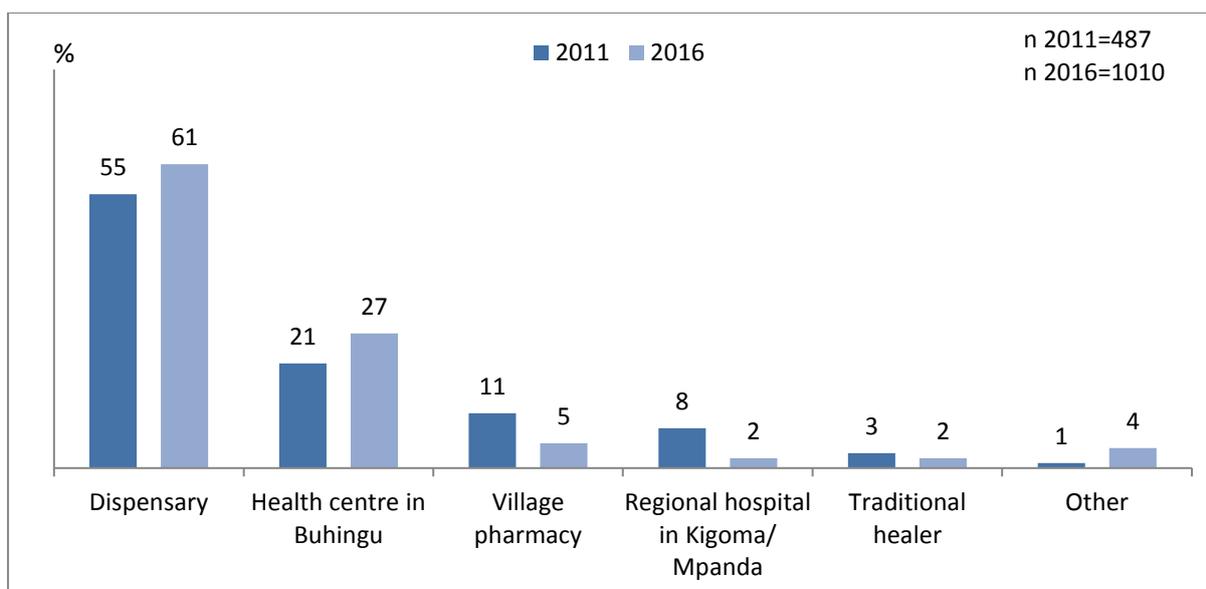


Figure 26 Main source of medical assistance

### 3.12 Population change

A large majority in both surveys believed the village population had increased in the prior five years (Table 65). This proportion is slightly lower in 2016, but the difference is not statistically significant.<sup>87</sup>

Table 65 Perception about change in population size of the village in the last five years (%)

|                 | <i>Increased</i> | <i>The same</i> | <i>Decreased</i> | <i>Not sure</i> | <i>n</i> |
|-----------------|------------------|-----------------|------------------|-----------------|----------|
| 2011 unweighted | 79               | 5               | 6                | 9               | 487      |
| 2011 weighted   | 80               | 6               | 6                | 9               | 487      |
| 2016            | 74               | 6               | 8                | 12              | 1010     |

Those who thought the population was increasing were asked what they thought the main reason behind the increase was. In 2011, the two options births and migration were sometimes selected together although this had not been intended, and makes a comparison to 2016 difficult. In 2016, more respondents mentioned births than migration (Table 66). In the focus group discussions and village presentations, population growth was perceived to be linked to immigration.

Table 66 Main reason behind the population increase (%)

|                 | <i>Births</i> | <i>Migration</i> | <i>Both</i> | <i>Not sure</i> | <i>n</i> |
|-----------------|---------------|------------------|-------------|-----------------|----------|
| 2011 unweighted | 39            | 40               | 14          | 7               | 385      |
| 2011 weighted   | 41            | 38               | 14          | 7               | 385      |
| 2016            | 53            | 42               | -           | 5               | 751      |

In the 2011 survey, slightly less than half the respondents did not think population growth was causing problems. This proportion increased to 60% in 2016 (Figure 27).<sup>88</sup> The problems that were identified seem roughly similar in the two surveys, with a lack of land, more crime and rising food prices being

<sup>87</sup> Statistical significance tested through bivariate logistic regression after creating a binary dependent variable, with increase=1 and else=0.

<sup>88</sup> The difference is statistically significant: tested through bivariate logistic regression: Wald F=21.379; p<0.001.

mentioned most often. The pressure on social services and the environment were mentioned by slightly more than 10% of respondents in 2016, but were added to the prelisted options, so a comparison with 2011 is not valid.<sup>89</sup> The same problems were mentioned in the focus group discussions and village presentations, but positive effects of a larger population were also found in the qualitative study. These included its economic push, e.g., by having more customers and a larger labour force, a hope that a larger population would lead to better infrastructural and social services, and the influx of new ideas and technologies. As in the survey, slightly more people in the village feedback sessions felt population growth is not a problem.

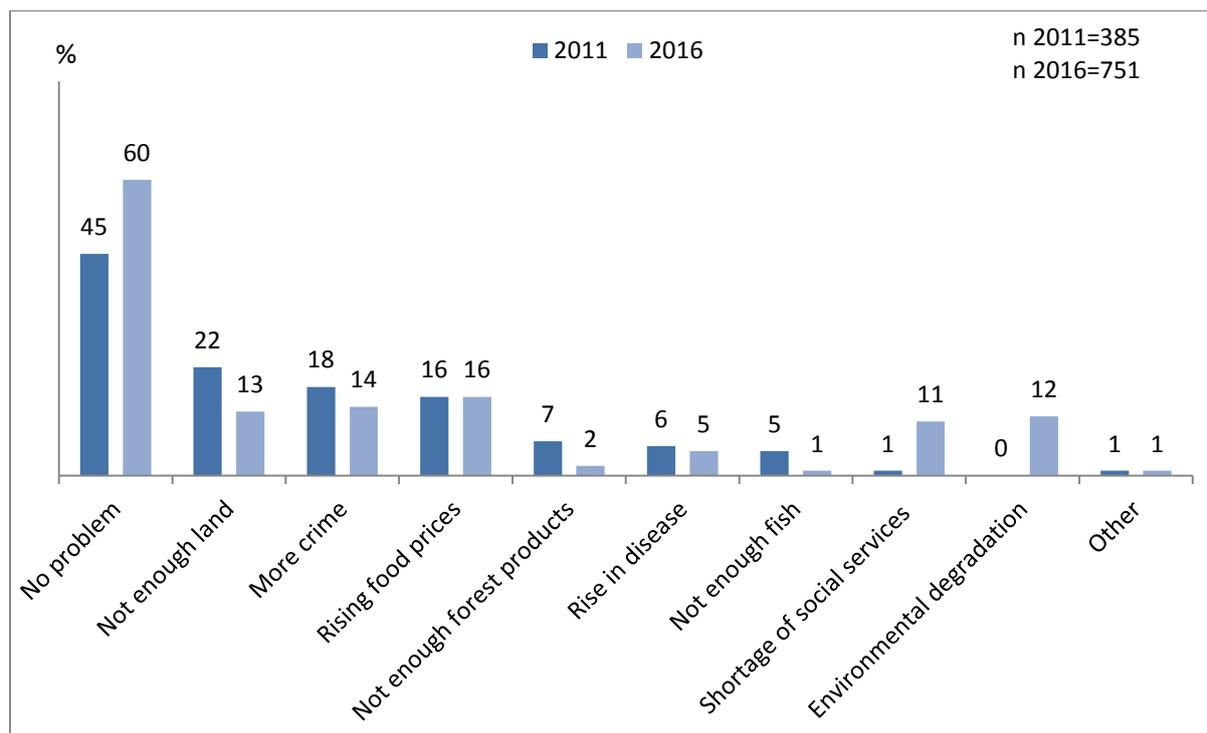


Figure 27 Problems caused by population growth<sup>90</sup>

### 3.13 Family planning and reproductive health

The introductory question to the family planning sequence in the household section of the questionnaire asked whether the respondent knew what family planning is. In 2011, as a check, respondents who said yes were asked to explain and their answer was corrected if they could not. In 2016, this procedure was not followed. Instead, following the question, all respondents were given a description of family planning to help answer the subsequent questions which were new to the questionnaire. The change in procedure may have led to more false positives in 2016.

<sup>89</sup> As already mentioned above, enumerators seem to have read out the options to respondents although instructed otherwise.

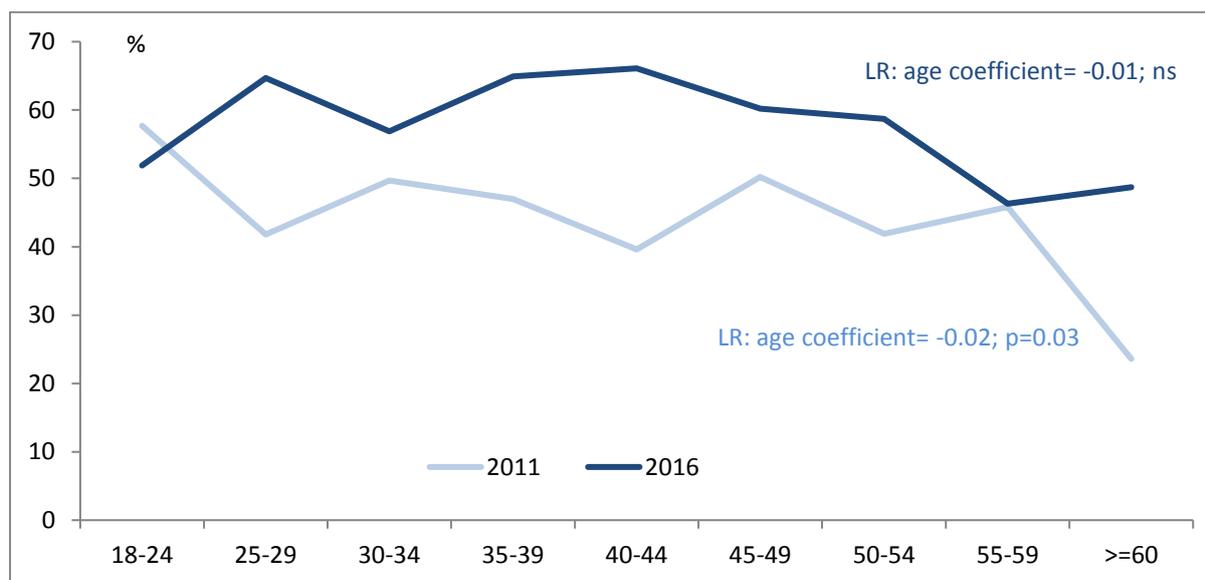
<sup>90</sup> More than one answer was possible. Totals add to more than 100%.

We find a higher familiarity in the 2016 survey compared to 2011: 59 vs. 45% (Table 67).<sup>91</sup> The difference between men and women is greater and statistically significant in the 2016 survey.<sup>92</sup> Even the higher familiarity in 2016 appears very low compared to national data. In a more specific question in the 2010 DHS, 98% of women and 99% of men could mention at least one family planning method. It is possible that the question in the current survey was misunderstood by some, as there were cases where respondents reported not knowing about family planning, yet later reported using it. In both surveys, this happened in 7% of the interviews in which the respondent to the household section and reproductive health section were the same person (11 times in 2011, and 28 times in 2016).

**Table 67 Familiarity with family planning**

|                 | <i>All</i> | <i>n</i> <sup>93</sup> | <i>Women</i> | <i>n</i> | <i>Men</i> | <i>n</i> |
|-----------------|------------|------------------------|--------------|----------|------------|----------|
| 2011 unweighted | 43         | 479                    | 42           | 222      | 44         | 257      |
| 2011 weighted   | 45         | 479                    | 43           | 222      | 46         | 257      |
| 2016            | 59         | 1009                   | 55           | 515      | 62         | 494      |

In 2011, we found a small but statistically significant age effect on familiarity with family planning.<sup>94</sup> Looking at family planning familiarity by age group shows this was mainly the result of higher familiarity among the youngest age group and lower familiarity among the highest age group (Figure 28). In 2016, no significant age effect was found.



**Figure 28 Familiarity with family planning by age group<sup>95</sup>**

A new question in the 2016 questionnaire asked whether respondents approved or disapproved in general of couples using family planning. Overall, 75% of the respondents said they approve, 22% said

<sup>91</sup> Statistical significance tested through bivariate logistic regression: Wald F=23.835; p<0.001.

<sup>92</sup> Statistical significance tested through Chi square analysis: Chi sq=5.394; p=0.02.

<sup>93</sup> Eight respondents below 18 from the 2011 survey were excluded from this analysis to make the data more comparable to the 2016 data.

<sup>94</sup> Statistical significance tested through bivariate logistic regression with age as a continuous variable: Wald F=4.593; p=0.03.

<sup>95</sup> LR=logistic regression.

to disapprove, and 4% were not sure (Table 68). Those respondents who knew about family planning were more likely to approve. Village differences in approval rates are not very large (Table 69).

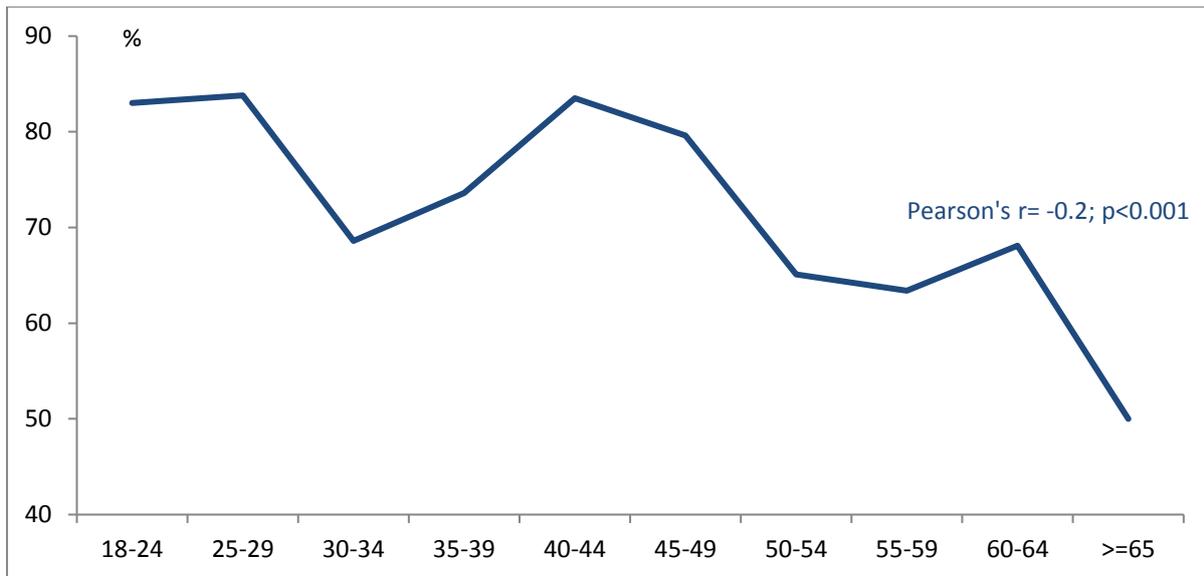
**Table 68 Approval of family planning in 2016, separated by awareness (%)**

| <i>n=1,009</i> | Do you know what family planning is? |           |              |
|----------------|--------------------------------------|-----------|--------------|
|                | <i>Yes</i>                           | <i>No</i> | <i>Total</i> |
| Approve        | 79                                   | 69        | 75           |
| Disapprove     | 20                                   | 24        | 22           |
| Not sure       | 2                                    | 7         | 4            |
|                | 100                                  | 100       | 100          |

**Table 69 Approval of family planning (village level)**

|           | <i>Knows about family planning</i> | <i>Approve</i> | <i>Disapprove</i> | <i>Not sure</i> | <i>n</i> |
|-----------|------------------------------------|----------------|-------------------|-----------------|----------|
| Igalula   | 39                                 | 76             | 17                | 8               | 127      |
| Rukoma    | 46                                 | 74             | 23                | 3               | 145      |
| Ikubulu   | 65                                 | 81             | 12                | 7               | 57       |
| Buhingu   | 61                                 | 82             | 14                | 4               | 142      |
| Nkonkwa   | 76                                 | 76             | 21                | 3               | 71       |
| Katumbi   | 72                                 | 70             | 27                | 3               | 60       |
| Kalilani  | 56                                 | 74             | 27                | -               | 34       |
| Kalya     | 62                                 | 73             | 22                | 5               | 150      |
| Kashagulu | 62                                 | 69             | 30                | 2               | 135      |
| Sibwesa   | 69                                 | 71             | 26                | 3               | 88       |
| Overall   | 59                                 | 75             | 22                | 4               | 1,009    |

We find a negative and statistically significant relationship between approval and age, with older respondents less likely to approve of family planning than younger ones (Figure 29). Approval was slightly higher among male respondents, but the difference with female respondents is not statistically significant.



**Figure 29 Approval of family planning by age group**

Reasons for approval and disapproval are presented in Figure 30. The main reason for approval is the ability of choosing the number of children that can be cared for well. Also mentioned by many are the health benefits for both mother and child and the ability to time and space births well (41% for both). Negative health/side effects of the family planning methods were the main reason for disapproval (53%) followed by religious reasons (40%). A small number of respondents wanted people to have many children, in order for the population to grow, for example, because of the high prevalence of death and disease (4%).

Male respondents were also asked if they would ever approve of their wife or partner using family planning. Only respondents who did not disapprove of family planning in general were asked the question. Only very few of the male respondents who approved in general wouldn't approve their wife's use (2%), mostly due to a worry about side effects. In all, 65% of all men approved of their wife's use, although the proportion is probably slightly higher in reality, as 5% reported their wife was menopausal. The reasons for approving of a partner's use were mainly the same as mentioned above; some also wanted their wives to have time for work or other activities.

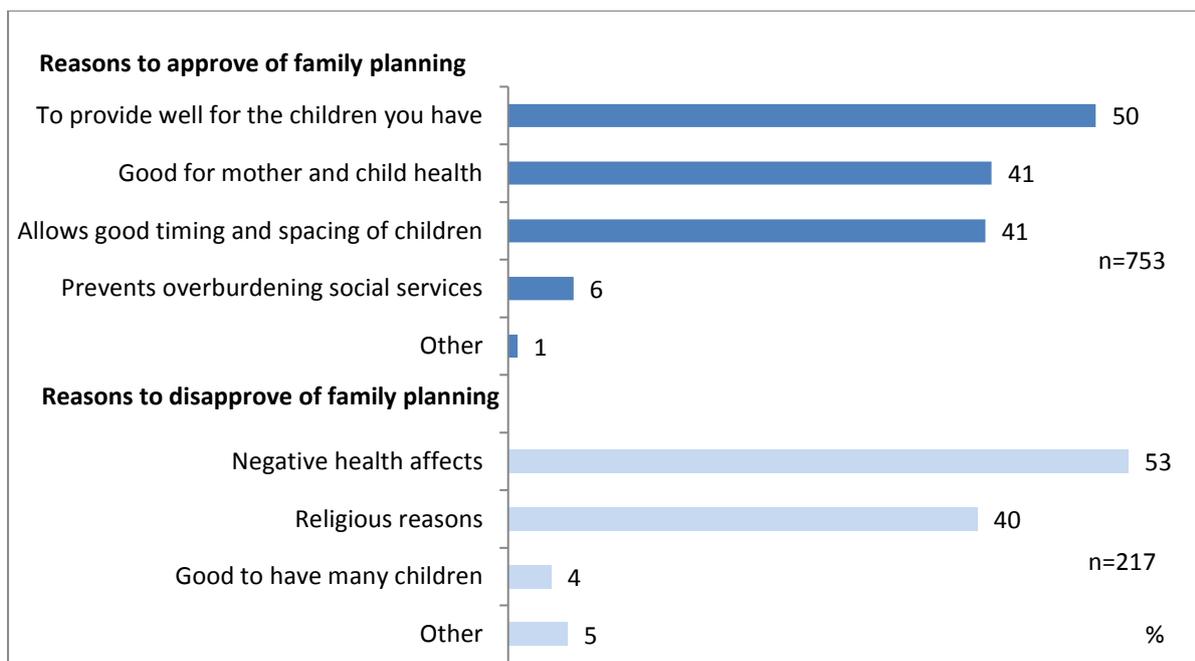


Figure 30 Reasons for (dis)approving of family planning<sup>96</sup>

Two questions were added to the 2016 questionnaire asking respondent whether they believed family planning had any impact on how they could provide for their family and on the availability of natural resources such as forest and fish. Unfortunately, the questions were interpreted differently by different enumerators, making it impossible to interpret the results and these are therefore not reported here.

As in the survey, most focus group participants were positive about family planning, although religious objections and concerns about side effects were mentioned there as well. The positive effects of family planning mentioned were the lower costs of having fewer children and the better care this allowed giving each child. Better maternal and child health were mentioned as well, as was the extra time it afforded women to work and get an education.

Most focus group participants recognised that if all families were to use family planning, the resulting smaller families would lead to lower environmental degradation and over-use of natural resources. However, the benefits of having a large family seemed to dominate at an individual level for both older and younger participants. Large families were said to provide a labour force for farming and help diversify the family income as each child would have different skills. Having many children would also provide a social safety net for parents as they aged and older children could help pay for younger children's expenses.

This seeming contradiction between approval of family planning and the desire for large families was also found in the survey, as shown below. People's positive opinions appear to mostly relate to birth spacing rather than birth reduction. Respondents in both the focus group discussions and the survey may to some extent also reproduced what they learned in family planning awareness sessions but still hold traditional ideas about the benefits of large families.

<sup>96</sup> More than one answer was allowed, so the proportions add up to more than 100%.

A majority of respondents in both surveys wanted to have more children than they had at the time, and this proportion is significantly higher in the 2016 survey (Table 70).<sup>97</sup> In both surveys, men more often wanted to have additional children than women.<sup>98</sup> Current household size is related to the desire for more children, with respondents from larger households less likely to want more children.<sup>99</sup>

**Table 70 Proportion of respondents who want more children than they have today (%)**

|                 | <i>All</i> | <i>n</i> | <i>Women</i> | <i>n</i> | <i>Men</i> | <i>n</i> |
|-----------------|------------|----------|--------------|----------|------------|----------|
| 2011 unweighted | 57         | 479      | 54           | 222      | 60         | 257      |
| 2011 weighted   | 58         | 479      | 53           | 222      | 62         | 257      |
| 2016            | 69         | 1010     | 67           | 515      | 73         | 494      |

When asking what respondents thought would be the ideal number of children, 85% in 2011 and 82% in 2016 could mention a number. In 2011, the remaining respondents were listed under 'not sure'. In 2016, codes for the options 'up to God' and 'as many as possible' were also available to the enumerators, and for most respondents who did not mention a number in 2016, the first of these options was selected. According to the local field team, this answer should also be interpreted as 'as many as possible'. We assume many of the 'not sure' answers in 2011, would have fallen in the 'up to God' category. Very high numbers, up to 100 children, were also mentioned in both surveys, and are probably a reflection of the same idea.

Looking at the respondents who answered with a number, we see that the ideal number of children is higher in 2016 than in 2011 (Table 71). While the difference in the average number is not statistically significant, we do find a significantly higher proportion of respondents in 2016 who want at least 5 children: 77% did in 2011, and 86% did in 2016.<sup>100</sup> The single most common answer in both surveys was five children, and the (unweighted) median was six children in 2011, and seven in 2016.

The average ideal number of children differs among men and women in both surveys, with men having higher ideal numbers, but the difference between the sexes is only significant in 2016.<sup>101</sup>

**Table 71 Ideal number of children**

|                     | <i>1-3</i> | <i>4-6</i> | <i>7-15</i> | <i>&gt;15</i> | <i>Up to God/<br/>not sure</i> | <i>n</i> | <i>Mean ideal<br/>number</i> | <i>n</i> |
|---------------------|------------|------------|-------------|---------------|--------------------------------|----------|------------------------------|----------|
| 2011 unweighted     | 7          | 42         | 30          | 4             | 16                             | 479      | 7.7                          | 401      |
| 2011 weighted       | 8          | 45         | 29          | 4             | 15                             | 479      | 7.4                          | 401      |
| 2016                | 4          | 35         | 39          | 5             | 17                             | 1010     | 7.9                          | 824      |
| 2011 Women weighted | 8          | 46         | 27          | 2             | 17                             | 222      | 7.1                          | 185      |
| 2016 Women          | 5          | 34         | 39          | 4             | 19                             | 516      | 7.4                          | 409      |
| 2011 Men weighted   | 7          | 43         | 30          | 5             | 14                             | 257      | 7.6                          | 216      |

<sup>97</sup> Statistical significance tested through bivariate logistic regression: Wald F=19.034; p<0.001.

<sup>98</sup> Statistical significance tested through bivariate logistic regression: 2011: Wald F=4.955; p=0.03; 2016: Wald F=4.603; p=0.03.

<sup>99</sup> Statistical significance tested through multivariate logistic regression, controlling for survey year: Wald F=23.299; p<0.001. The variable survey year remained significant.

<sup>100</sup> Statistical significance of the mean values tested through a bivariate general linear model. The binary variable was tested through bivariate logistic regression: Wald F=14.809; p<0.001. The significance is even higher if cut-offs of at least 6 or 7 children are used to create the binary variable.

<sup>101</sup> Statistical significance tested through a bivariate general linear model: 2011 versus 2016: Wald F=8.047; p=0.005. No statistically significant difference between men and women in 2011 is found either if a binary variable is created from the ideal number of children with cut-offs of five or six children.

|          | 1-3 | 4-6 | 7-15 | >15 | Up to God/<br>not sure | n   | Mean ideal<br>number | n   |
|----------|-----|-----|------|-----|------------------------|-----|----------------------|-----|
| 2016 Men | 3   | 37  | 38   | 7   | 14                     | 494 | 8.5                  | 415 |

For both 2011 and 2016, age has a clear effect on the ideal number of children, with older respondents reporting higher ideal numbers (Figure 31).<sup>102</sup> We also found a significant positive relationship between current household size and wanting a large family (5+ children) in both surveys.<sup>103</sup>

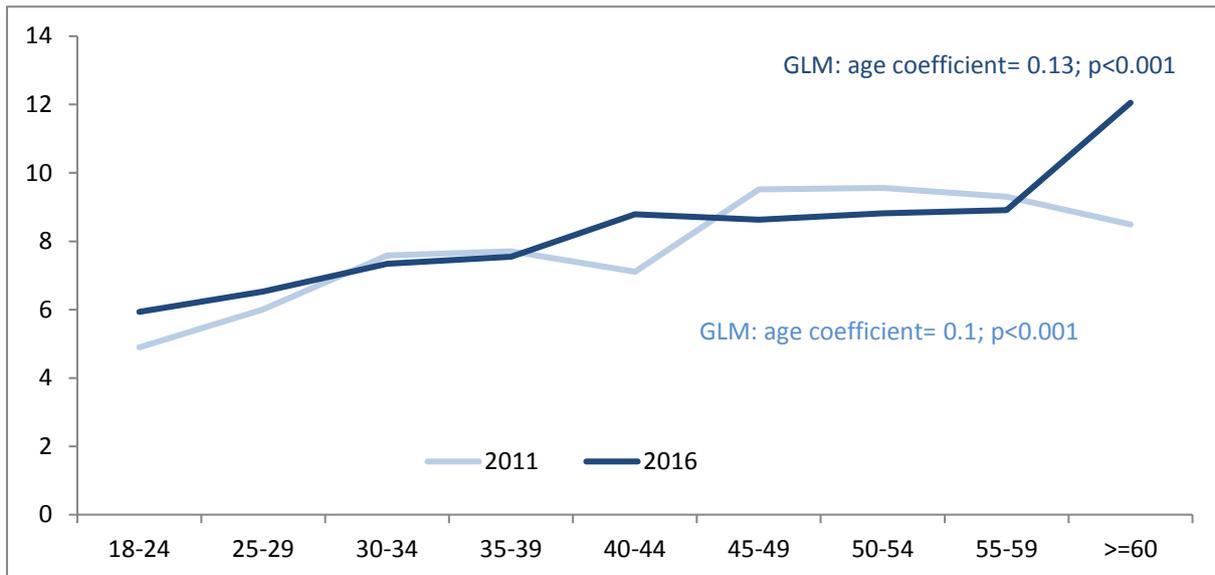
No robust significant relationship was found with family planning familiarity. A relationship with education was only found for 2016: those who finished primary school or had attended higher education were less likely to want a large family, but the difference is modest: 90% of those who did not finish primary school wanted a large family, compared to 84% who did finish primary school or attended higher education.

A positive relationship was found between access to farming land (having more than 3 acres) and wanting a large family (5+ children), but the relationship only holds for 2011. In 2011, 72% of those with three acres or less wanted a large family, while 85% of those with more than three acres wanted this. In 2016, the respective proportions were 84 and 88%, but, as said, the difference is not significant. A household's ability to meet daily needs did not affect the likelihood of wanting a large family in either 2011 or 2016. The same was found for housing quality. Facing food shortages or not had no effect either. Furthermore, whether or not respondents thought population growth was problematic did not influence the likelihood of wanting a large family. Overall, the only robust relationships that held in both surveys were with age and current household size.<sup>104</sup>

<sup>102</sup> Statistical significance tested through a bivariate general linear model with age as a continuous variable: 2011: Wald F=18.732; p<0.001; 2016: Wald F=38.554; p<0.001.

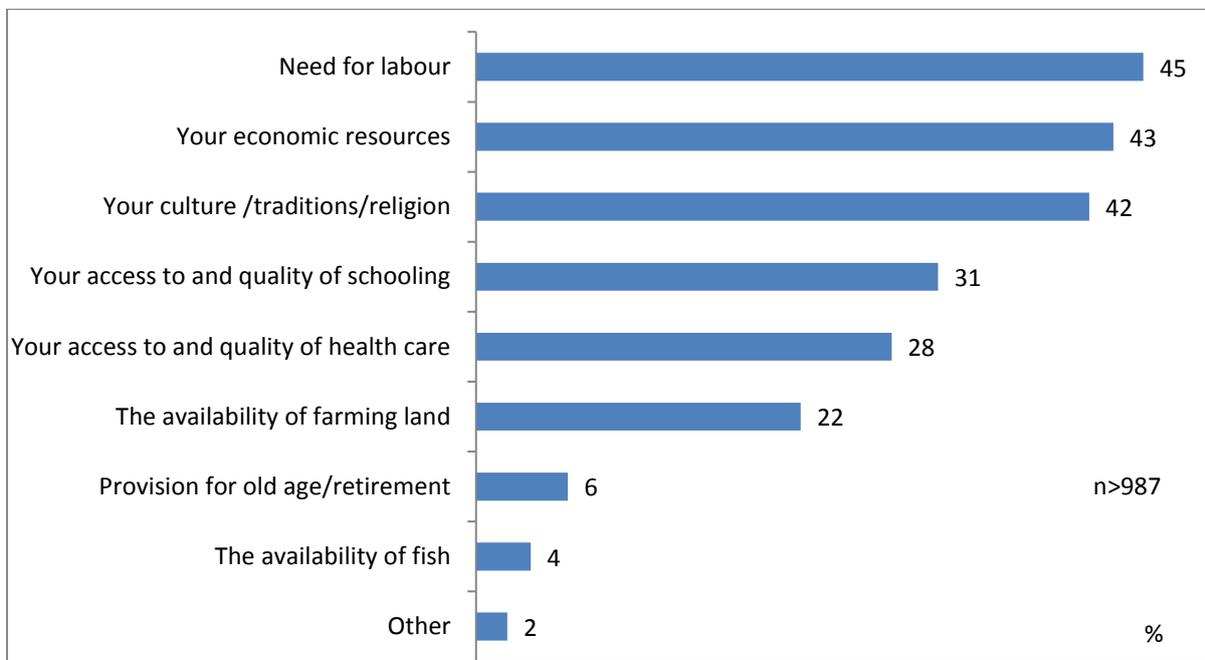
<sup>103</sup> Tested through multivariate logistic regression, controlling for the survey year: Wald F=14.659; p<0.001. Survey year remained significant.

<sup>104</sup> Bivariate regression models were also run on household size and various well-being and family planning indicators. Besides the abovementioned relationship with respondents' ideal number of children, the only other significant relationships found were with asset ownership (higher for larger households) and school enrolment (lower for larger households). Indicators tested but not found significant were house materials; ability to meet daily needs; food diversity; population growth seen as problematic; and awareness, approval and use of family planning.



**Figure 31 Average ideal number of children by age group**

Respondents in the 2016 survey were also read a number of factors that might influence someone's desired number of children and asked if these applied to them. Figure 32 shows the results. The need for labour, someone's economic resources, and a person's culture, traditions or religion were most commonly selected—all by more than 40% of respondents. Less common, but still selected by more than 20% were the access and quality of schooling and health care, and the availability of farm land. Having children as a provision for old age was only selected by 6%, and availability of fish was a factor for only 2% of the respondents.



**Figure 32 Factors influencing the number of desired children (% agreeing with influence of each factor)**

## 3.14 Reproductive health

### Respondent characteristics

This section presents results from the reproductive health questionnaire that was administered to women of reproductive age. Some questions from this questionnaire were already discussed in the health section above, i.e., the use of mosquito nets and vaccinations against measles. In 2011, women aged 15 to 49 were interviewed, while in 2016 only women from 18 to 49 were eligible. To aid comparability between the surveys, seven respondents below 18 were removed from the 2011 data. This left 357 respondents in 2011 and 765 in 2016. The difference in age range may affect comparisons with the national DHS data as these include 15-17 year olds.

Comparing respondent characteristics, we see that in both surveys the majority were the spouse of the household head (Table 72). In 2011, more 'other' household members answered this section. Respondents' marital status is very similar in the two surveys (Table 73). The average age of the respondent is also the same, but the distribution across age groups differs somewhat, with a smaller proportion of 2016 respondents in the 25-29 category and a higher proportion in the 40-44 group (Table 74). The age of 12 women in 2011 was not known.<sup>105</sup> These are included in the overall results, but not in the age-specific results.

The completed level of education of the respondents was similar in both surveys: the majority finished primary school (Standard 7), while around a quarter did not attend any regular education, and no one completed secondary school (Form 6) (Table 75).

**Table 72 Respondents' relationship to the household head (%)**

|                 | <i>Relationship to the household head (%)</i> |               |              |              | <i>n</i> |
|-----------------|---|---------------|--------------|--------------|----------|
|                 | <i>Self</i>                                   | <i>Spouse</i> | <i>Child</i> | <i>Other</i> |          |
| 2011 unweighted | 8   | 70            | 9            | 13           | 357      |
| 2011 weighted   | 7   | 66            | 12           | 15           | 357      |
| 2016            | 9   | 74            | 10           | 7            | 767      |

**Table 73 Respondents' marital status (%)**

|                 | <i>Married/ living together</i> | <i>Divorced/ separated</i> | <i>Widowed</i> | <i>Never married</i> | <i>n</i> |
|-----------------|---------------------------------|----------------------------|----------------|----------------------|----------|
| 2011 unweighted | 84                              | 7                          | 3              | 6                    | 357      |
| 2011 weighted   | 82                              | 8                          | 3              | 7                    | 357      |
| 2016            | 80                              | 9                          | 4              | 8                    | 767      |

**Table 74 Respondents' age distribution**

|           | <i>2011 unweighted</i> | <i>2011 weighted</i> | <i>2016</i> | <i>n 2011</i> | <i>n 2016</i> |
|-----------|------------------------|----------------------|-------------|---------------|---------------|
| 18-24 (%) | 26                     | 25                   | 28          | 88            | 217           |
| 25-29 (%) | 26                     | 29                   | 21          | 91            | 160           |
| 30-34 (%) | 22                     | 21                   | 19          | 77            | 142           |

<sup>105</sup> In 2016 the respondent's birth month and year were asked at the beginning of the reproductive health section. This together with data from the household roster meant there was no missing age information in the 2016 survey.

|             | 2011<br><i>unweighted</i> | 2011<br><i>weighted</i> | 2016 | <i>n</i><br>2011 | <i>n</i><br>2016 |
|-------------|---------------------------|-------------------------|------|------------------|------------------|
| 35-39 (%)   | 12                        | 12                      | 15   | 41               | 112              |
| 40-44 (%)   | 7                         | 6                       | 12   | 24               | 91               |
| 45-49 (%)   | 7                         | 7                       | 6    | 24               | 43               |
| Total (%)   | 100                       | 100                     | 100  | 345              | 765              |
| Average age | 30                        | 30                      | 30   | 345              | 345              |

**Table 75 Completed education level of the reproductive health section respondents (%)**

|                 | <i>None or pre-<br/>primary</i> | <i>Some<br/>primary</i> | <i>Completed<br/>primary</i> | <i>Some<br/>secondary</i> | <i>Completed<br/>secondary</i> | <i>Higher</i> | <i>n</i> |
|-----------------|---------------------------------|-------------------------|------------------------------|---------------------------|--------------------------------|---------------|----------|
| 2011 unweighted | 28                              | 15                      | 55                           | 2                         | -                              | -             | 136      |
| 2011 weighted   | 27                              | 16                      | 55                           | 2                         | -                              | -             | 136      |
| 2016 unweighted | 26                              | 16                      | 56                           | 3                         | -                              | -             | 180      |

### Ever given birth and age at first birth

Table 76 shows the proportion of respondents who have never given birth grouped by age. The weighting seems to have a relatively big impact on the results for this question, most likely because the number of observations per age group is fairly low.

Compared to 2011, fewer of the 2016 respondents of the youngest age group (18-24) had already given birth, but the difference is not statistically significant. The average age at first birth was also slightly higher in 2016, but again the difference is not statistically significant. The (unweighted) median age at first birth was 18 in both surveys, indicating that at least half of the respondents had already given birth at age 18. In 2015, the median age for the whole of rural Tanzania was 19 [5].

**Table 76 Proportion of respondents who have never given birth and age at first birth**

|                           | Never given birth         |                         |      | <i>n</i><br>2011 | <i>n</i><br>2016 |
|---------------------------|---------------------------|-------------------------|------|------------------|------------------|
|                           | 2011<br><i>unweighted</i> | 2011<br><i>weighted</i> | 2016 |                  |                  |
| 18-24 (%)                 | 11                        | 14                      | 20   | 88               | 217              |
| 25-29 (%)                 | 0                         | 0                       | 6    | 91               | 160              |
| 30-34 (%)                 | 4                         | 3                       | 1    | 77               | 142              |
| 35-39 (%)                 | 0                         | 0                       | 3    | 41               | 112              |
| 40-44 (%)                 | 4                         | 7                       | 2    | 24               | 91               |
| 45-49 (%)                 | 0                         | 0                       | 0    | 24               | 43               |
| Overall (%)               | 4                         | 5                       | 8    | 357              | 765              |
| Mean age at first birth   | 18.2                      | 18.3                    | 18.5 | 333              | 685              |
| Median age at first birth | 18                        | -                       | 18   | 333              | 685              |

## Use of contraception

Use of contraception in 2016 was higher than in 2011 among all women and married/cohabiting women (Table 77).<sup>106</sup> In both surveys, most women using contraception used a modern method. Nationally in rural areas, married women's use of a modern method of contraception increased from 26 to 31% between 2010 and 2015. In Kigoma Region, the proportion increased from 14 to 18% [5 & 11].

In Table 78 we also show contraception use by age. Use is lowest in the oldest age group in both surveys. What explains the relatively low proportion among 35-39 year olds in 2016 is unclear.

In Table 79 we specify the methods used. Injectables were most common in both surveys. More implants were mentioned in 2016 than in the baseline survey. The other methods are used by only a small fraction of women.

**Table 77 Current use of contraception (%)<sup>107</sup>**

|                                 | <i>Using any method</i> | <i>Using a modern method</i> | <i>Using a traditional method</i> | <i>Missing</i> | <i>Not using</i> | <i>Pregnant</i> | <i>n</i> |
|---------------------------------|-------------------------|------------------------------|-----------------------------------|----------------|------------------|-----------------|----------|
| <b>All women</b>                |                         |                              |                                   |                |                  |                 |          |
| 2011 unweighted                 | 16                      | 14                           | 2                                 | 0.3            | 67               | 16              | 357      |
| 2011 weighted                   | 17                      | 15                           | 2                                 | 0.3            | 67               | 16              | 357      |
| 2016                            | 23                      | 20                           | 3                                 | -              | 66               | 11              | 765      |
| <b>Married/cohabiting women</b> |                         |                              |                                   |                |                  |                 |          |
| 2011 unweighted                 | 17                      | 15                           | 2                                 | -              | 66               | 17              | 299      |
| 2011 weighted                   | 17                      | 16                           | 1                                 | -              | 66               | 16              | 299      |
| 2016                            | 25                      | 22                           | 3                                 | -              | 62               | 13              | 611      |

**Table 78 Current use of contraception by age (%)**

|         | Using any method       |                      |             | <i>n</i><br>2011 | <i>n</i><br>2016 |
|---------|------------------------|----------------------|-------------|------------------|------------------|
|         | <i>2011 unweighted</i> | <i>2011 weighted</i> | <i>2016</i> |                  |                  |
| 18-24   | 16                     | 16                   | 25          | 88               | 217              |
| 25-29   | 18                     | 20                   | 27          | 91               | 160              |
| 30-34   | 20                     | 21                   | 25          | 77               | 142              |
| 35-39   | 17                     | 19                   | 13          | 41               | 112              |
| 40-44   | 13                     | 7                    | 24          | 24               | 91               |
| 45-49   | 8                      | 6                    | 5           | 24               | 43               |
| Overall | 16                     | 17                   | 23          | 357              | 765              |

<sup>106</sup> Statistical significance tested through bivariate logistic regression with a binary dependent variable (using contraception or not): All women: Wald F=3.880; p=0.049; married women: Wald F=6.062; p=0.014. Including only those sub-villages that were surveyed in both 2011 and 2016 results in a smaller and non-significant difference in contraception use among married women.

<sup>107</sup> If a modern and traditional method were used, this is counted in the modern method category.

**Table 79 Current contraception use by method (%)<sup>108</sup>**

|                                 | Using any method          |                         |           |
|---------------------------------|---------------------------|-------------------------|-----------|
|                                 | 2011<br><i>unweighted</i> | 2011<br><i>weighted</i> | 2016      |
| Injectables                     | 10                        | 11                      | 10        |
| Implants                        | 0.6                       | 0.6                     | 5         |
| IUD                             | 0.6                       | 0.6                     | 2         |
| Condom                          | 1                         | 0.8                     | 1         |
| Female sterilization            | 1                         | 1                       | 0.7       |
| Pill                            | 0.8                       | 0.8                     | 0.4       |
| Lactational amen. method        | 0.3                       | 0.4                     | 0.3       |
| <b>Modern method total</b>      | <b>14</b>                 | <b>16</b>               | <b>20</b> |
| Rhythm method                   | 1                         | 0.9                     | 3         |
| Withdrawal                      | 0.3                       | 0.1                     | 0.8       |
| Other method                    | 0.6                       | 0.5                     | -         |
| <b>Traditional method total</b> | <b>2</b>                  | <b>2</b>                | <b>4</b>  |
| <b>Any method</b>               | <b>16</b>                 | <b>17</b>               | <b>23</b> |
| Missing                         | 0.3                       | 0.3                     | -         |
| <i>n</i>                        | 357                       | 357                     | 765       |

We find a number of differences between the surveys with regard to the reasons for not using contraception (Table 80). ‘Not knowing any method’ topped the list in 2011 with 15% of all women who were not using contraception at the time of the survey giving this answer. In 2016, only 2% mentioned this as a reason. Opposition to the use of contraception from respondents themselves was higher in 2016, but opposition from husbands or partners was lower. Other reasons that were mentioned more in 2016 were breastfeeding and answers related to having no or infrequent sex or not being married. All mentioned differences are statistically significant at the 5% level.<sup>109</sup>

**Table 80 Reason for not using contraception (% women not using contraception)<sup>110</sup>**

|                                  | 2011<br><i>unweighted</i> | 2011<br><i>weighted</i> | 2016 |
|----------------------------------|---------------------------|-------------------------|------|
| Knows no method                  | 17                        | 15                      | 2    |
| Says she wanted to get pregnant  | 13                        | 14                      | 15   |
| Concern about side effects       | 10                        | 10                      | 16   |
| Menopausal/hysterectomy          | 8                         | 8                       | 4    |
| Breastfeeding                    | 10                        | 8                       | 15   |
| Husband/partner opposed          | 8                         | 8                       | 4    |
| Not menstruated since last birth | 5                         | 6                       | 7    |
| Not having sex                   | 5                         | 5                       | 11   |
| Health concerns                  | 5                         | 5                       | 7    |
| Knows no source                  | 3                         | 4                       | 3    |
| Not sure                         | 3                         | 4                       | 3    |

<sup>108</sup> Totals differ to those presented in earlier tables because some respondents indicated both modern and traditional methods.

<sup>109</sup> Statistical significance tested through bivariate logistic regression with a binary dependent variable on weighted data and Chi square analysis on unweighted data. Difference in ‘opposition from the respondent’ was only significant at the 10% level using weighted data, but the model would not run to closure. It was significant at the 5% level using unweighted data.

<sup>110</sup> More than one answer could be given: adds up to more than 100%.

|   | 2011<br><i>unweighted</i> | 2011<br><i>weighted</i> | 2016 |
|---|---------------------------|-------------------------|------|
| Up to god/fatalistic                    | 3                         | 3                       | 2    |
| Respondent opposed                      | 3                         | 3                       | 6    |
| Other                                   | 3                         | 3                       | 0.2  |
| Infrequent sex                          | 1                         | 1                       | 2    |
| Religious prohibition                   | 1                         | 1                       | 3    |
| Lack of access/too far                  | 1                         | 1                       | 1    |
| Not married                             | 0.8                       | 0.8                     | 8    |
| Inconvenient to use                     | 0.8                       | 0.8                     | 0.2  |
| Others opposed                          | 0.4                       | 0.6                     | 0.6  |
| Says she cannot get pregnant            | -                         | -                       | 0.4  |
| Costs too much                          | -                         | -                       | 0.2  |
| Interferes with body's normal processes | -                         | -                       | 2    |
| <i>n</i>                                | 240                       | 240                     | 506  |

Of the 87 pregnant respondents in 2016, 41% said to have used contraception in the past. Mentioned methods in order of importance were injectables, the pill, implants, the rhythm method and withdrawal. Reasons for not using contraception in the past include wanting to get pregnant, concern about side effects and opposition from the respondent herself or her partner.<sup>111</sup>

### Fertility planning status

In both surveys, women were asked if the pregnancy preceding the most recent live birth had been wanted. In 2016, women who were pregnant at the time of the interview were asked the same question.

In 2016, a higher proportion of these pregnancies had been wanted at the time than in 2011, and there were fewer that were wanted later (Table 81).<sup>112</sup> In both 2011 and 2016, the large majority of respondents who had wanted to postpone a pregnancy, would have preferred it to come at least two years later.<sup>113</sup>

**Table 81 Fertility planning status of the pregnancy of the latest birth (%)**

|                 | <i>Wanted then</i> | <i>Un-wanted</i> | <i>Wanted later</i>       |                        |                         | <i>Not sure</i> | <i>n</i> |
|-----------------|--------------------|------------------|---------------------------|------------------------|-------------------------|-----------------|----------|
|                 |                    |                  | <i>Total wanted later</i> | <i>&lt;2 yrs later</i> | <i>&gt;=2 yrs later</i> |                 |          |
| 2011 unweighted | 54                 | 6                | 40                        | 2                      | 36                      | 3               | 280      |
| 2011 weighted   | 52                 | 5                | 43                        | 3                      | 38                      | 2               | 280      |
| 2016            | 62                 | 4                | 34                        | 1                      | 33                      | 1               | 564      |

<sup>111</sup> Past use of contraception among pregnant women was not asked in 2011.

<sup>112</sup> Statistical significance tested through bivariate logistic regression with a binary dependent variable (wanted then or not); Wald F=7.011; p=0.01. Including only those sub-villages that were surveyed in both 2011 and 2016 results in a smaller and non-significant difference.

<sup>113</sup> We cannot compare to national data, as the 2015 DHS collected this information for all births in the five years before the survey – not only for the latest birth as here.

The proportion of current pregnancies was slightly lower in 2016, but the difference is not statistically significant (Table 82).<sup>114</sup> Of the currently pregnant respondents in 2016, 49% had wanted the pregnancy, while almost all remaining respondents would have liked to wait, and only 3% had not wanted any more children. This is lower than for the latest birth data presented above but is based on only 87 respondents and has a 95% confidence interval of 40 to 59%.

**Table 82 Current pregnancies, and pregnancy planning status 2016 (%)**

|                 | <i>Currently pregnant</i> | <i>n</i> | <i>Wanted</i> | <i>Un-wanted</i> | <i>Wanted later</i> | <i>n</i> |
|-----------------|---------------------------|----------|---------------|------------------|---------------------|----------|
| 2011 unweighted | 16                        | 357      | -             | -                | -                   | -        |
| 2011 weighted   | 16                        | 357      | -             | -                | -                   | -        |
| 2016            | 11                        | 765      | 49            | 3                | 47                  | 87       |

### Unmet need for family planning 2016

Women who are using family planning are said to have a met need for family planning. Women who are married or cohabitating who say that they do not want any more children or that they want to wait two or more years before having another child and who moreover say they are not using contraception are said to have an unmet need for family planning. Met need and unmet need can be divided into need for spacing (respondent wants more children after two or more years) and need for limiting (respondent does not want any more children) [5]. In the 2011 survey, women were not asked about the desire for more children in the future, and this indicator is therefore only available for 2016.

Total met need for family planning stood at 25% (Table 83).<sup>115</sup> Met need can be split into met need for spacing (19%) and limiting (6%). Fifty-one percent of married women had an unmet need, 42% for spacing and 9% for limiting. As would be expected, the need for limiting goes up with age and need for spacing goes down.

Met need is lower than the 35% found nationally in 2015 for rural areas, but the same as what was found in the Kigoma Region. Unmet need is considerably higher than the national rural proportion of 23%, and also higher than the 28% of the Kigoma Region [5]. Total demand for family planning (sum of met need and unmet need) in our survey was 76%, of which a third was satisfied. This compares to a total rural demand of 58% nationally and 52% for the Kigoma Region in 2015, of which 60% nationally and 47% in the Kigoma Region was satisfied.

**Table 83 Met and unmet need 2016 by age (% of married women)**

|       | Met need for family planning |                 |              | Unmet need for family planning |                 |              | <i>No unmet need</i> <sup>116</sup> | <i>Infecund</i> | <i>n</i> |
|-------|------------------------------|-----------------|--------------|--------------------------------|-----------------|--------------|-------------------------------------|-----------------|----------|
|       | <i>Spacing</i>               | <i>Limiting</i> | <i>Total</i> | <i>Spacing</i>                 | <i>Limiting</i> | <i>Total</i> |                                     |                 |          |
| 18-24 | 29                           | 2               | 31           | 46                             | 2               | 48           | 22                                  | -               | 158      |
| 25-29 | 23                           | 3               | 26           | 48                             | 3               | 51           | 22                                  | 1               | 141      |
| 30-34 | 21                           | 8               | 29           | 47                             | 8               | 54           | 15                                  | 2               | 118      |

<sup>114</sup> Statistical significance tested through bivariate logistic regression: Wald F=3.063; p=0.08.

<sup>115</sup> This does not equate with the proportion of married women using a family planning method (29%), because in this calculation pregnant women are included.

<sup>116</sup> "No unmet need" includes those women who were pregnant and had wanted the pregnancy; women who gave birth in the last two years, had wanted that pregnancy at the time and indicated not be menstruating; and women who were not using birth control and wanted a child in the next two years.

|         | Met need for family planning |          |       | Unmet need for family planning |          |       | No unmet need <sup>116</sup> | Infecund | n   |
|---------|------------------------------|----------|-------|--------------------------------|----------|-------|------------------------------|----------|-----|
|         | Spacing                      | Limiting | Total | Spacing                        | Limiting | Total |                              |          |     |
| 35-39   | 9                            | 4        | 13    | 43                             | 21       | 64    | 20                           | 3        | 91  |
| 40-44   | 10                           | 18       | 27    | 22                             | 19       | 41    | 15                           | 16       | 73  |
| 45-49   | -                            | 7        | 7     | 20                             | 23       | 43    | 7                            | 43       | 30  |
| Overall | 19                           | 6        | 25    | 42                             | 9        | 51    | 19                           | 5        | 611 |

## Births, survival and birth intervals

The Kiswahili version of the question about a respondent's total number of births was modified slightly in the 2016 questionnaire because the 2011 version mainly referred to living children according to the field team. This change may therefore have increased the number of births reported in 2016. The average number of births is similar in 2011 and 2016 (Table 84). The proportion of living children to total births is slightly higher in 2016 (89 vs. 86%), but the difference is not statistically significant.<sup>117</sup>

**Table 84 Mean number of births and children still alive (if respondent ever gave birth)**

|         | Mean number of births |                  |      | Number of children alive |                  |      | n   | n   |
|---------|-----------------------|------------------|------|--------------------------|------------------|------|-----|-----|
|         | 2011<br>unweighted    | 2011<br>weighted | 2016 | 2011<br>unweighted       | 2011<br>weighted | 2016 |     |     |
| 18-24   | 2.4                   | 2.4              | 2.1  | 2.1                      | 2.2              | 1.9  | 78  | 174 |
| 25-29   | 3.3                   | 3.4              | 3.9  | 3.0                      | 3.1              | 3.5  | 91  | 151 |
| 30-34   | 5.5                   | 5.4              | 5.4  | 4.6                      | 4.5              | 4.7  | 74  | 140 |
| 35-39   | 6.2                   | 5.9              | 6.2  | 4.8                      | 4.6              | 5.4  | 41  | 109 |
| 40-44   | 8.0                   | 7.9              | 7.4  | 6.2                      | 6.4              | 6.3  | 23  | 89  |
| 45-49   | 8.5                   | 8.6              | 8.1  | 6.7                      | 6.9              | 6.0  | 24  | 43  |
| Overall | 4.7                   | 4.6              | 4.8  | 3.9                      | 3.8              | 4.1  | 342 | 706 |

Specific questions were asked about the children born in the six years before both surveys (since 2005 in the 2011 survey, and since 2010 in the 2016 survey).<sup>118</sup> In total, information was collected about 558 children from 294 mothers in the 2011 survey, and 1,051 children from 597 mothers in the 2016 survey. This includes 10 twins in 2011 and 22 in 2016. Using the standard DHS age range of births preceding the survey of 0 to 59 months, we have 453 births in 2011 and 868 in 2016 in the previous six years. The latter range of observations is used in all analyses except child mortality for which the full range was used.

The average number of births per respondent in the prior six years was 1.6 in 2011 and 1.4 in 2016.<sup>119</sup> Survival rates of the children born in this period are shown in Table 85 and suggest higher survival in 2016, but these numbers look so good (99-100% survival for five to six year olds) that we suspect births of children who later died were not always mentioned.<sup>120</sup> Nevertheless, focus group participants

<sup>117</sup> The two questions measure slightly different numbers, births would count twins as one, and living children would count them as two. Enumerators relatively often reported twins in comments to this question.

<sup>118</sup> Six years was selected in 2011 instead of the normal five to cover the same years as the 2010 DHS survey.

<sup>119</sup> Statistical significance tested through a bivariate general linear model: Wald F=4.169; p=0.041.

<sup>120</sup> This would appear to be in line with the drop in the average birth rate in 2016, but assuming a fixed mortality rate and calculating and adding the supposedly non-entered births from this to the birth number of 2016, would only raise this average number marginally (from 1.37 to 1.42). We have attempted to look for enumerator

mentioned reduced infant mortality, achieved through better-equipped local birth facilities and training on safe deliveries, as one of the positive impacts of the project. Combining all evidence, we feel that infant and child mortality decreased, but perhaps not by as much as shown in the data. Unfortunately, omitted births of later deceased children directly affect a number of indicators that are based on these data, such as mortality, total fertility rate (TFR), and birth intervals. These results are therefore most likely biased towards positive changes, as not mentioning deceased children will reduce mortality and TFR and increase birth intervals. We find that these indicators indeed moved in this direction.

Of all the children born in the six years prior to the survey, 5% had died at the time of the survey in 2011, compared to 1.6% in 2016.

The total fertility rate is calculated by looking at the number of births for each woman in the three years prior to the survey. The average number of births in these three years is then separately calculated for each age in the 18-49 range and summed over all ages. This indicator reflects the average number of births a woman would have had over her reproductive life if the age-specific fertility levels were the same as found now. For 2011, we find a TFR of 9.9 using unweighted data, and in 2016 TFR was 9.1. We therefore find a decrease, but as mentioned above, this could be influenced by incomplete birth records in 2016.

The TFR in both years is considerably higher than the 6.0 rural average for Tanzania as a whole and also the 6.7 average for Tanzania's Western zone [5]. We used a slightly different calculation method because we lacked information about the birth date of the female respondent in 2011. Moreover, in the national DHS survey, all women of reproductive age in a household are interviewed, while only one person was interviewed in our survey, who was selected based on availability. It is possible this could have influenced results, but the difference still seems large.

**Table 85 Child survival rates grouped by birth date**

| Months since birth date* | Proportion of children alive at survey date |                         |      | <i>n</i><br>2011 | <i>n</i><br>2016 |
|--------------------------|---|-------------------------|------|------------------|------------------|
|                          | 2011<br><i>unweighted</i>                   | 2011<br><i>weighted</i> | 2016 |                  |                  |
| 79-72 (6)                | 88  | 86                      | 100  | 24               | 44               |
| 60-71 (5)                | 94  | 94                      | 99   | 79               | 139              |
| 48-59 (4)                | 91  | 92                      | 97   | 81               | 153              |
| 36-47 (3)                | 95  | 94                      | 98   | 62               | 171              |
| 24-35 (2)                | 95  | 95                      | 98   | 109              | 174              |
| 12-23 (1)                | 99  | 99                      | 99   | 93               | 182              |
| 0-11 (<1)                | 96  | 97                      | 99   | 107              | 185              |

\* *Century month code (CMC) survey date minus CMC birth date; in brackets the age if the child had survived.*

The time interval between births is an important indicator for the health of young children, especially during infancy, and for the health of the mother. Short birth intervals, especially those shorter than

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influence. Although this is difficult to assess with a low total number of recorded deaths (17), we did find that 76% of all deaths were recorded by just 3 of the 11 enumerators. If we calculate a mortality rate using only the data from those 3 enumerators, this rises from 1.6 to 3.7%, which is still below the 5% found in 2011.

24 months, increase the risk of health problems and death at a young age for children and maternal mortality for women [5].

The (unweighted) median birth interval was 25 months in 2011 and 27 months in 2016.<sup>121</sup> In 2011, 62% of subsequent births occurred at least 24 months after a previous birth, while in 2016 67% did. Neither difference is statistically significant. The national median for rural Tanzania was 35 months in 2015 [5].

### Antenatal care

Under normal circumstances, WHO recommends that a pregnant woman without complications has at least four antenatal care visits with a health professional [5]. Compared to 2011, a slightly lower proportion of 2016 respondents had at least four visits, but the difference is not statistically significant (Table 86).<sup>122</sup> The national rural average was 45% in 2015 [5].

**Table 86 Number of antenatal visits (%)<sup>123</sup>**

|                 | <i>0<br/>times</i> | <i>1<br/>time</i> | <i>2-3<br/>times</i> | <i>4+<br/>times</i> | <i>Missing</i> | <i>n</i> |
|-----------------|--------------------|-------------------|----------------------|---------------------|----------------|----------|
| 2011 unweighted | 1                  | 3                 | 43                   | 53                  | 1              | 278      |
| 2011 weighted   | 1                  | 3                 | 40                   | 56                  | 1              | 278      |
| 2016            | 1                  | 3                 | 42                   | 51                  | 2              | 553      |

### Assistance at birth

In 2011, a traditional birth assistant had been the most common presence during delivery, while in 2016 first place was shared between traditional assistants and nurses or midwives (Table 87). Doctors were also mentioned more in the 2016 survey. Professional health providers (doctor, nurse or midwife) were present in 40% of the births in 2011, and in 49% in 2016.<sup>124</sup> The national rural average was 55%, and the average for the Kigoma Region was 47% in 2015 [5]. The improvement in this indicator matches comments by focus group participants about new and improved health facilities, including a new delivery room in the Buhingu health centre and the installation of solar panels that facilitate deliveries at night. Also important was the training of the community based distributors (CBDs) who sensitised women about giving birth at a health facility and about safe deliveries in general.

<sup>121</sup> Included were all second- and higher-order births that occurred in the 0–59 months preceding the interviews. Birth interval was measured as the Century Month Code (CMC) of the birth date of all non-first-born children minus the CMC of the birth date of the preceding child [10].

<sup>122</sup> Statistical significance tested through both a bivariate general linear model to test for differences as a continuous variable and bivariate logistic regression after creating a binary variable (4+ visits=1; fewer visits=0; missing=excluded).

<sup>123</sup> Only latest birth included.

<sup>124</sup> Statistical significance tested through bivariate logistic regression: Wald F=10.162; p=0.001. Including only those sub-villages that were surveyed in both 2011 and 2016 results in a smaller and non-significant difference.

**Table 87 Assistance during delivery (%)**<sup>125</sup>

|                 | <i>No one</i> | <i>Doctor</i> | <i>Nurse/<br/>midwife</i> | <i>Traditional<br/>birth<br/>attendant</i> | <i>Relative/<br/>friend</i> | <i>n</i> |
|-----------------|---------------|---------------|---------------------------|--|-----------------------------|----------|
| 2011 unweighted | 1             | 6             | 30                        | 49   | 14                          | 453      |
| 2011 weighted   | 1             | 7             | 33                        | 44   | 16                          | 453      |
| 2016            | 2             | 11            | 38                        | 38   | 11                          | 868      |

## Breastfeeding

For the most recent birth, women were asked whether the child was ever breastfed, and whether the child was fed with anything other than breast milk during the first three days after delivery. No real differences were found between the surveys (Table 88). Almost all children in the surveys were breastfed at some point, and between 15 and 18% were given something else to drink besides breast milk during the first three days after delivery.

Nationally, the same proportion of breastfed children was found, and 32% were fed something besides breast milk in the first three days [11].<sup>126</sup>

**Table 88 Breastfeeding and other food given in first three days (%)**

|                             | <i>2011<br/>unweighted</i> | <i>2011<br/>weighted</i> | <i>2016</i> | <i>n<br/>2011</i> | <i>n<br/>2016</i> |
|-----------------------------|----------------------------|--------------------------|-------------|-------------------|-------------------|
| Ever breastfed              | 97                         | 97                       | 97          | 280               | 564               |
| Other food first three days | 18                         | 15                       | 18          | 272               | 549               |

## Facilities and community health worker visits

In the 2016 questionnaire, respondents to the household section were asked if they now had better access to family planning health care than five years ago. The majority said it had improved, and only a small proportion indicated it had deteriorated (Table 89). Buhingu is where the highest proportion of respondents saw an improvement; in Ikubulu and Rukoma this proportion is relatively low and more people saw a deterioration. The results from these three villages are significantly different from that of the other villages combined.<sup>127</sup>

**Table 89 Change in access to family planning and maternal health care in the last five years (%)**

|         | <i>Improved</i> | <i>The same</i> | <i>Deteriorated</i> | <i>n</i> |
|---------|-----------------|-----------------|---------------------|----------|
| Igalula | 62              | 25              | 13                  | 126      |
| Rukoma  | 43              | 35              | 21                  | 145      |
| Ikubulu | 44              | 30              | 26                  | 57       |

<sup>125</sup> If more than one person was present, the attendant with the highest qualifications is counted. Included were births 0 to 59 months prior to the survey. Rounding leads to sums different than 100%.

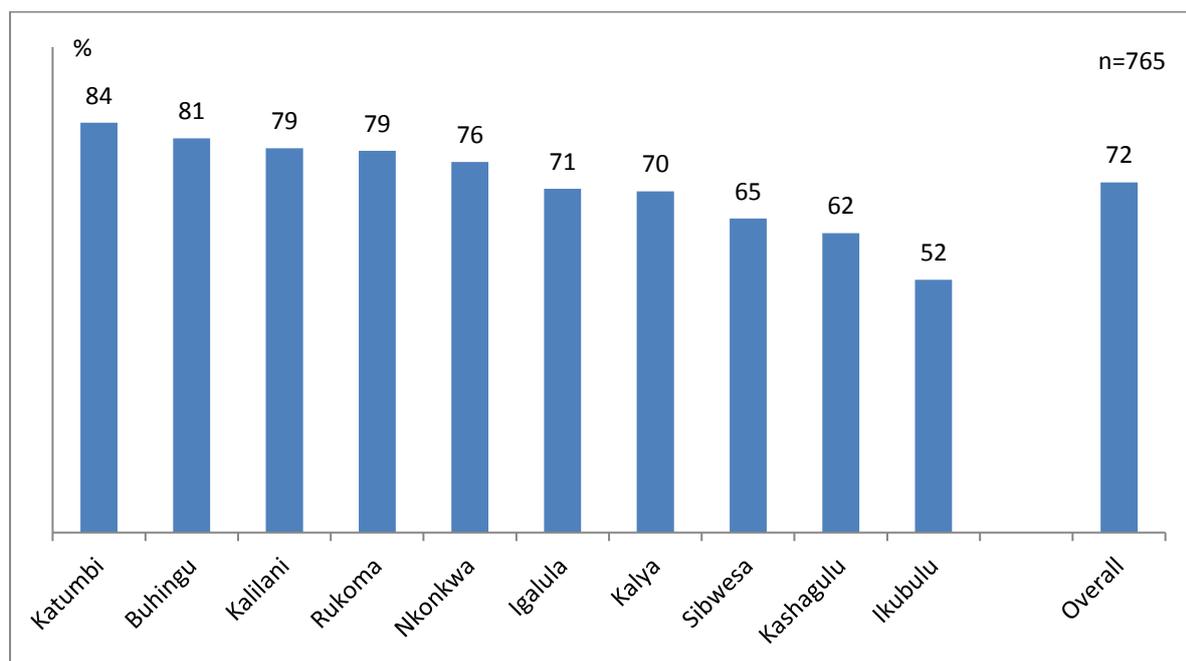
<sup>126</sup> The 2010 DHS report presents the proportion of breastfed children for all those born in the last 5 years prior to their survey, instead of the last-born presented here. The second question, about other food given during the first three days after delivery, was phrased slightly differently in the DHS. In the national survey, it was mentioned specifically that this food was given before the mother's milk began flowing, while in this survey a reference was only made to the first three days after delivery.

<sup>127</sup> Statistical significance tested through Chi square analysis: Buhingu: Chi square=29.999; p<0.001; Ikubulu: Chi square=8.023; p=0.03; Rukoma: Chi square=12.738; p=0.002.

|           | <i>Improved</i> | <i>The same</i> | <i>Deteriorated</i> | <i>n</i> |
|-----------|-----------------|-----------------|---------------------|----------|
| Buhingu   | 77              | 18              | 5                   | 142      |
| Nkonkwa   | 62              | 28              | 10                  | 71       |
| Katumbi   | 63              | 22              | 15                  | 60       |
| Kalilani  | 49              | 43              | 9                   | 35       |
| Kalya     | 55              | 32              | 13                  | 150      |
| Kashagulu | 49              | 34              | 17                  | 135      |
| Sibwesa   | 49              | 39              | 13                  | 88       |
| Overall   | 56              | 30              | 14                  | 1009     |

Respondents of the reproductive health section were asked whether they had visited a health facility (a health centre or dispensary) in the last 12 months and/or had been visited by a community health worker. If they had, they were asked a number of questions about the visits.

Most women interviewed in the reproductive health section had visited a health facility in the last 12 months (72%). There are some village differences, with significantly fewer women in Ikubulu and Kashagulu visiting a facility and significantly more in Buhingu (Figure 33).<sup>128</sup> Katumbi even had a higher proportion of positive answers, but this result is not significantly different from the other villages due to the lower number of respondents in Katumbi. The other differences are also not statistically significant.



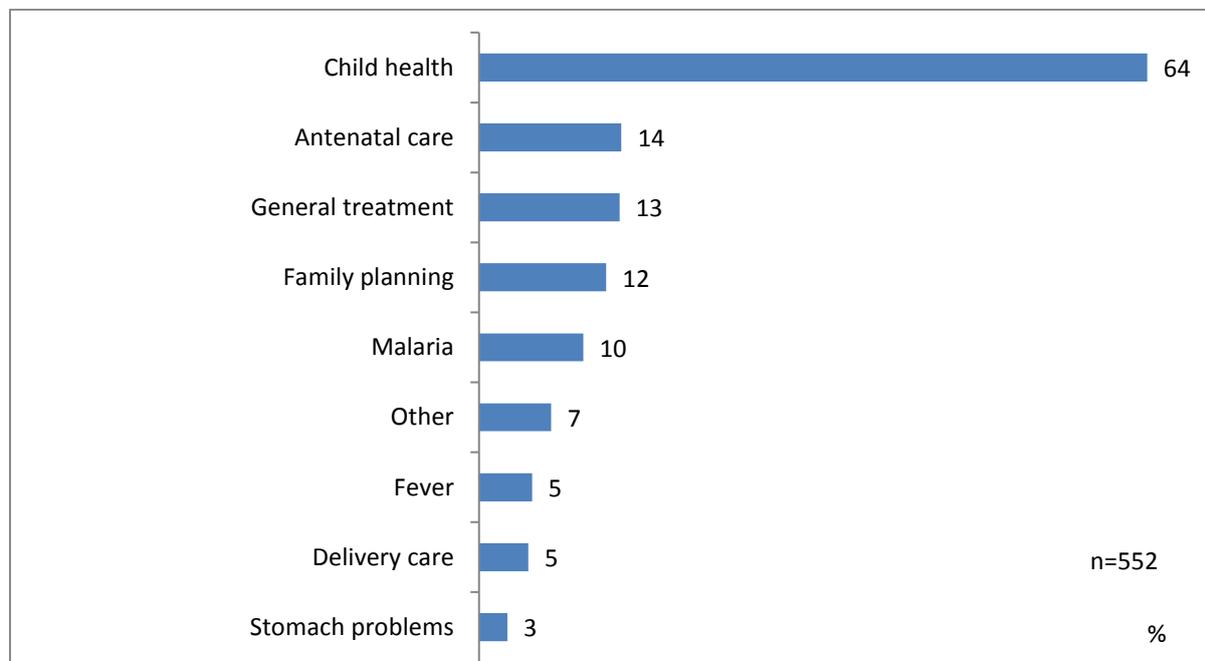
**Figure 33 Proportion of respondents who visited a health facility in the last 12 months**

We asked about the type of service women received in a closed question with prelisted options related to child and reproductive health, but other services could be mentioned as well. By far the most common service received at the facility was related to child health (Figure 34). At a distance follow

<sup>128</sup> Comparing one village to the remaining ones combined, using the non-parametric Chi<sup>2</sup>-test gives: Ikubulu: 10.272; p=0.001; Kashagulu: 5.830; p=0.02; Buhingu: 5.618; p=0.02.

antenatal care and family planning. Only 5% mentioned having received delivery care. Non-prelisted options (not related to reproductive health) mentioned were 'general treatment' and malaria treatment.

Only 12% mentioned family planning services in this initial general question, but when asked directly in the next question whether they had received a family planning method, 41% said yes. A third of this 41% had reported earlier that they were not currently using family planning, although one does not exclude the other. It is possible that women were shy about mentioning family planning as a reason.<sup>129</sup> Another factor may be that the direct question did not include the 12-month timeframe. Even if it did follow the general question directly, some women may have referred to receiving a family planning method during earlier visits. It is also possible the family planning method was not the main purpose of the visits and enumerators did not probe sufficiently in the general question. In any case, of those women who said they received a family planning method, 85% said it was the method they had wanted.



**Figure 34 Service received at the health facility<sup>130</sup>**

Figure 35 shows an evaluation of the health facility visits on three levels: satisfaction with the service, cleanliness of the facility, and the level of respect with which the visitor was treated by the staff. The former two were measured on a five-point Likert scale ranging from 1 *very satisfied/clean* to 5 *very unsatisfied/unclean*, and the latter on a three-point scale, ranging from 1 *with respect* to 3 *with no*

<sup>129</sup> We asked the enumerators at the beginning of the reproductive health interview to indicate if they were alone with the respondent, or others were present. In only 24 cases there were others, but the difference between the proportions is much greater in these cases (4% indicating family planning in the general question, and 45% in the direct question) indicating that shyness may have been a factor, although others' presence did not prevent them saying they had received a family planning method when asked directly.

<sup>130</sup> More than one answer was allowed, so the proportions add up to more than 100%.

respect. Most respondents rated visits positively on all three criteria. As show in Table 90, there are no great differences between the villages.<sup>131</sup>

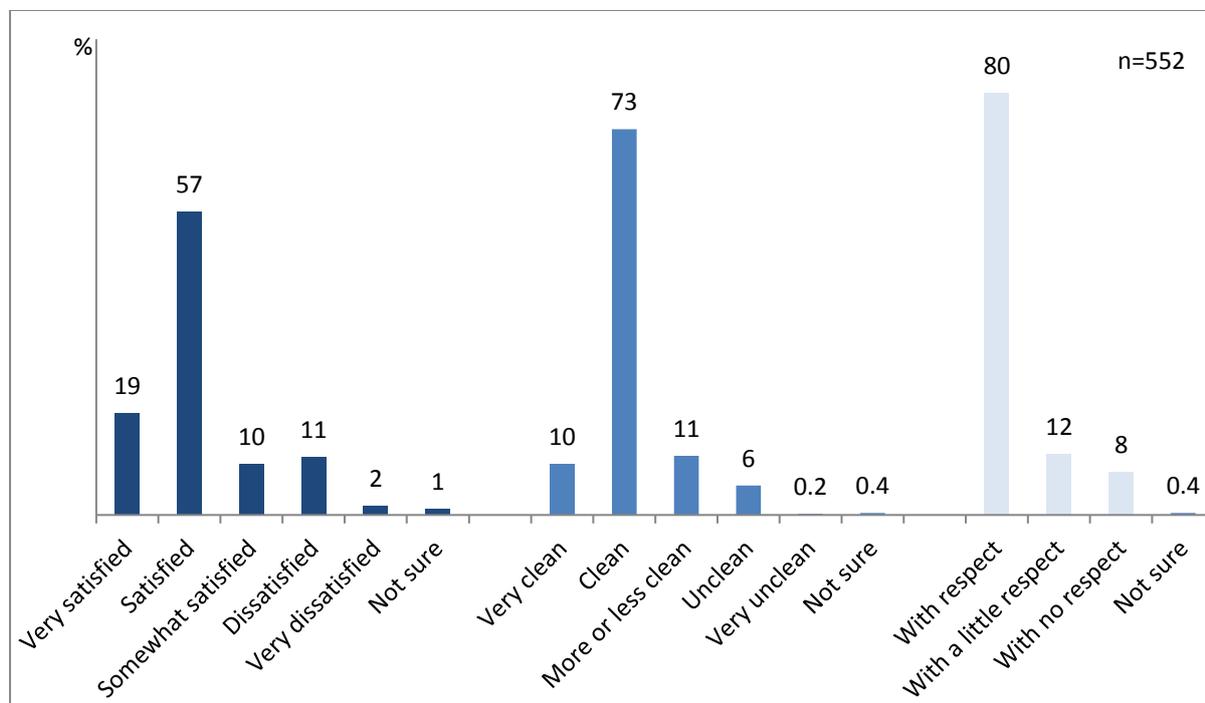


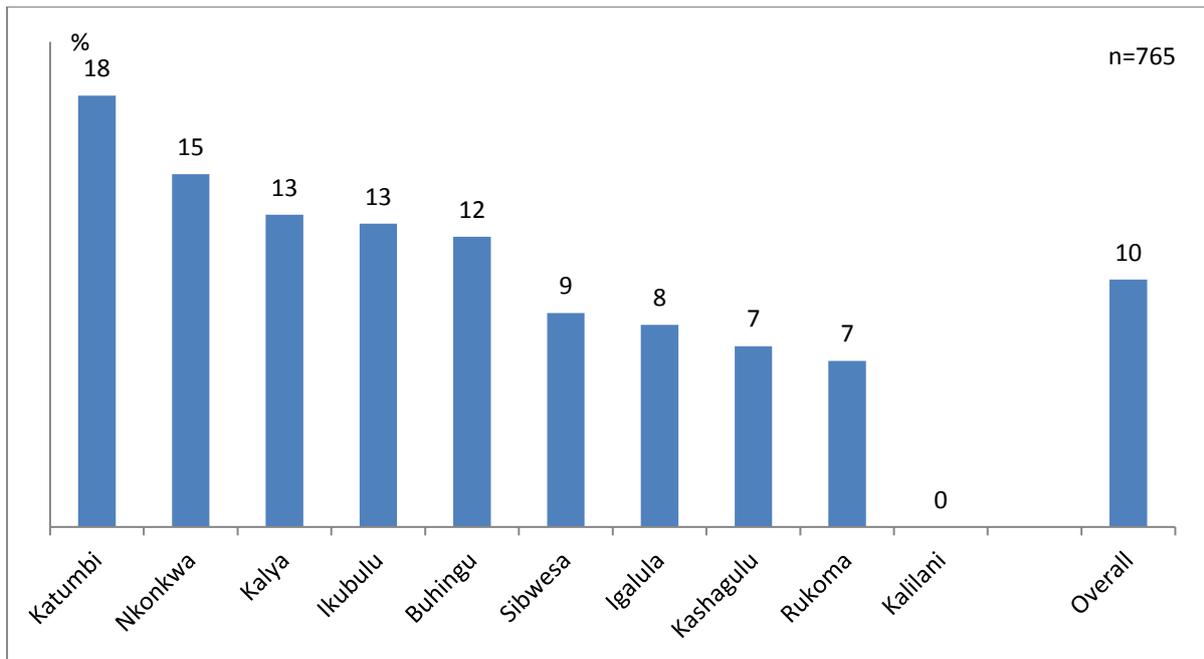
Figure 35 Health facility visit evaluation

Table 90 Health facility visits and visit evaluation

|           | <i>Satisfaction</i> | <i>Cleanliness</i> | <i>Respect</i> | <i>n</i> |
|-----------|---------------------|--------------------|----------------|----------|
| Igalula   | 3.8                 | 3.9                | 2.7            | 65       |
| Rukoma    | 3.7                 | 3.8                | 2.7            | 91       |
| Ikubulu   | 4.1                 | 4.1                | 2.8            | 24       |
| Buhingu   | 4.0                 | 3.9                | 2.8            | 93       |
| Nkonkwa   | 3.9                 | 3.8                | 2.9            | 42       |
| Katumbi   | 3.8                 | 3.8                | 2.6            | 38       |
| Kalilani  | 3.8                 | 4.1                | 2.5            | 19       |
| Kalya     | 3.8                 | 4.0                | 2.6            | 70       |
| Kashagulu | 3.6                 | 3.7                | 2.7            | 58       |
| Sibwesa   | 3.7                 | 3.8                | 2.8            | 44       |
| Overall   | 3.8                 | 3.9                | 2.7            | 546      |

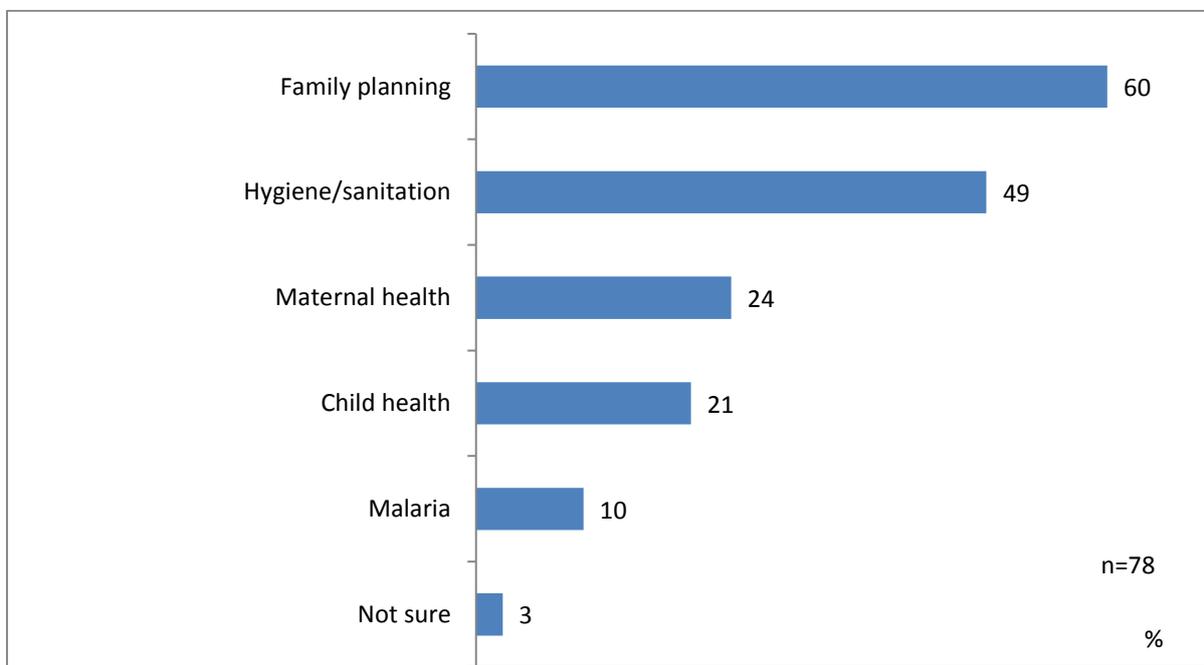
Compared to health facility visits, far fewer respondents received a visit by a community health worker: 10% overall (Figure 36). None of the village differences are statistically significant (using Chi<sup>2</sup> tests), although Kalilani stands out for not having any respondent who received a visit.

<sup>131</sup> In the table, the order of the Likert scales is reversed to let higher values denote more positive results and make the presentation more intuitive.



**Figure 36 Proportion of respondents visited by community health workers in the last 12 months**

Family planning, and hygiene and sanitation were the most commonly discussed topics with community health workers (Figure 37). Twenty-two out of the 78 respondents who received a community health worker visit received a family planning method as well. For 13 of these, it was the family planning method that they had wanted.



**Figure 37 Topics discussed with community health worker**

## 4 Comparing Tuungane participants

The previous sections looked at differences in the overall population between 2011 and 2016. Using the 2016 data, we also checked whether there are any differences between households that participated in project initiatives and those that did not. We looked at three groups: Model Households (n=104), BMU member households (n=122) and COCOBA member households (n=99). We analysed these groups separately, although there is some overlap: 52 households belonged to two of these groups, and 10 households belonged to all three.

### 4.1 Model Households

The Tuungane project uses the Model Household approach as one of its strategies to promote positive health and environmental behaviours. Voluntarily participating households receive training and some inputs to encourage desired behaviours in three areas: *Health and hygiene*, e.g., building an improved latrine and using a ‘tippy tap’ handwashing station; *Environment*, e.g., using a fuel-efficient stove and only legal fishing gear; and *Integration*, e.g., being a COCOBA (savings and loans group) member and sending their children to school. The project’s Model Household approach was started in Nkonkwa, Katumbi, Buhingu and Mgambo (the latter falls under Buhingu in the graph below). Except for Buhingu, these are the villages where the survey found the highest proportion of model households. Overall, 10% of the households in this survey self-identified as Model Households.

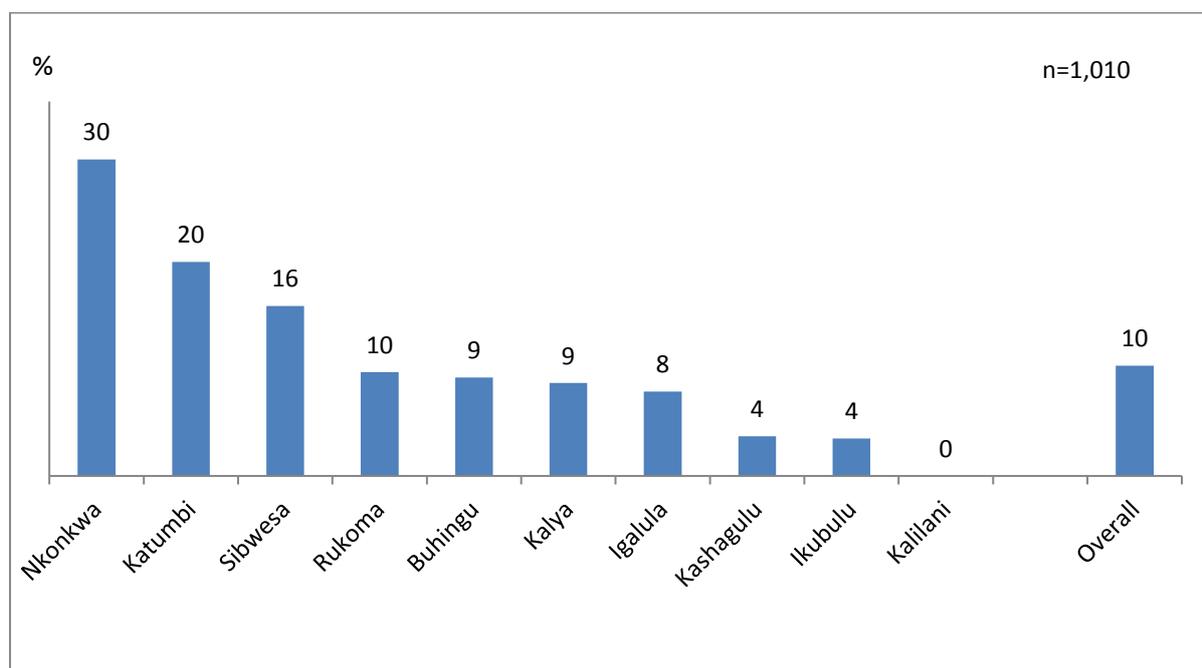


Figure 38 Model household participation by village

We compared Model Households to the other households in the survey on all the indicators that Model Households seek to model and that were included in the survey. Table 91 shows the comparison for WASH, family planning, education and participation categories. Model Households scored better on all indicators, except the use of an improved source of drinking water in the dry

season, which is largely determined by the location of the household. Not all differences are statistically significant, and hence we will limit the discussion to those that are.<sup>132</sup>

Model Households were more likely to treat their drinking water before use, but a statistically significant difference was found only in the dry season (67 vs. 57%). Model Households were also more likely to collect rainwater in the wet season (35 vs. 25%).

With regard to handwashing, more Model Households had water ready for this purpose (91 vs. 80%), and they also more often had soap, sand or ash available than non-Model Households (61 vs. 45%). Model Households were also more likely to use an improved latrine (32 vs. 17%).

A positive attitude towards family planning is also part of the Model Household approach. More Model Household respondents identified population growth as problematic, but the ideal number of children between Model and non-Model Households was not statistically different. While we do not find a statistically significant difference between family planning approval levels between Model and non-Model Households, the former are more likely to be aware of family planning (83 vs. 56%), and to use it (47 vs. 27%).

Model Households showed higher participation in Beach Management Units (31 vs. 10%) and COCOBAs (24 vs 8%).

**Table 91 Model Household evaluation: WASH, family planning, education and participation**

|   | <i>Model households</i> | <i>Non-model households</i> |    |   |
|---|-------------------------|-----------------------------|----|---|
| <b>WASH</b>   |                         |                             |    |   |
| Access to an improved source of drinking water in the dry season                  | 9%                      | 14%                         | ns | ↔ |
| Access to an improved source of drinking water in the wet season                  | 40%                     | 36%                         | ns | ↔ |
| Use of rainwater in the wet season  | 35%                     | 25%                         | *  | ↑ |
| Appropriate treatment method in the dry season                                    | 68%                     | 57%                         | *  | ↑ |
| Appropriate treatment method in the wet season                                    | 46%                     | 43%                         | ns | ↔ |
| Household has a hand washing place with water present                             | 91%                     | 80%                         | ** | ↑ |
| Household has a hand washing place with water and soap, sand or ash               | 61%                     | 45%                         | ** | ↑ |
| Household uses an unshared latrine with a concrete slab                           | 32%                     | 17%                         | ** | ↑ |
| <b>FAMILY PLANNING</b>  |                         |                             |    |   |
| Respondent believes population growth causes problems <sup>133</sup>              | 51%                     | 38%                         | *  | ↑ |
| Respondent's ideal number of children is five or more <sup>134</sup>              | 84%                     | 87%                         | ns | ↔ |
| Respondent is aware of family planning  | 83%                     | 56%                         | ** | ↑ |
| Respondent approves of family planning  | 80%                     | 74%                         | ns | ↔ |
| Respondent reproductive health section used or using birth control <sup>135</sup> | 47%                     | 27%                         | ** | ↑ |
| <b>EDUCATION</b>  |                         |                             |    |   |
| All children in the household between 7 and 13 attend school <sup>136</sup>       | 83%                     | 75%                         | ns | ↔ |
| <b>PARTICIPATION</b>  |                         |                             |    |   |
| Household said to participate in a BMU  | 31%                     | 10%                         | ** | ↑ |
| Household participates in COCOBAs   | 24%                     | 8%                          | ** | ↑ |

ns: not statistically significant; \* significant at 5% level; \*\* significant at 1% level

<sup>132</sup> The relatively small number of Model Households in the survey makes it harder to find significant results.

<sup>133</sup> Smaller sample: n=751 of which 82 Model Households.

<sup>134</sup> Smaller sample: n=843 of which 92 Model Households.

<sup>135</sup> Smaller sample: n=740 of which 70 Model Households.

<sup>136</sup> Smaller sample: n=676 of which 84 Model Households.

Table 92 shows the comparison results for Model Households for natural resource use and attitudes, farming practices and food security. More Model than non-Model Households have a fuel efficient stove (33 vs. 21%), but a difference in use frequency could not be proven due to the small number of households that have such stoves. Around half of those with a stove use it every day or almost every day. A higher proportion of Model Households agreed with all conservation statements in the questionnaire. A difference in use of the problematic ring nets was not found between fishing Model and non-Model Households.

With regard to farming practices, Model Households scored better on all indicators, but the only statistically significant differences were found for the use of fertilizer (26 vs. 15%) and having fruit or palm trees on their land (26 vs. 15%).

Finally, a difference in diet or food security could not be shown.

Overall, Model Households showed significantly better scores on 15 of the 29 indicators we compared. They also scored better on almost all of the other 14 indicators, but the differences were too small to be statistically significant with the relatively small sample of Model Households (n=104). Because we have no information about the households prior to joining the Model Household initiative, we cannot say whether these better practices are due to their participation or whether households with better practices were more likely to participate.

**Table 92 Model Household evaluation: Natural resource use and attitudes, farming and food security**

|   | <i>Model households</i> | <i>Non-model households</i> |  |   |
|---|-------------------------|-----------------------------|--|---|
| <b>NATURAL RESOURCE USE AND ATTITUDES</b>                             |                         |                             |  |   |
| Household has a fuel efficient stove                                  | 33%                     | 21% **                      |  | ↑ |
| Household uses fuel efficient stove (almost) every day <sup>137</sup> | 53%                     | 61% ns                      |  | ↔ |
| Respondent agrees that the village forest should be conserved         | 94%                     | 87% *                       |  | ↑ |
| Respondent agrees that wildlife should be protected                   | 94%                     | 88% *                       |  | ↑ |
| Respondent agrees that the National Park should stay protected        | 95%                     | 89% *                       |  | ↑ |
| Fisher uses ring nets (problematic gear) <sup>138</sup>               | 26%                     | 31% ns                      |  | ↔ |
| <b>FARMING<sup>139</sup></b>  |                         |                             |  |   |
| Household uses erosion control measures                               | 57%                     | 47% ns                      |  | ↔ |
| Household practices rotation  | 24%                     | 20% ns                      |  | ↔ |
| Household practices fallowing   | 74%                     | 70% ns                      |  | ↔ |
| Household uses fertilizer (mostly compost)                            | 26%                     | 15% **                      |  | ↑ |
| Household uses pest control   | 4%                      | 3% ns                       |  | ↔ |
| Household has fruit or palm trees on its plots                        | 23%                     | 15% *                       |  | ↑ |
| <b>FOOD SECURITY<sup>140</sup></b>                                    |                         |                             |  |   |
| Food Consumption Score (FCS)  | 52.2                    | 51.8 ns                     |  | ↔ |
| Household categorised as having a low diet diversity                  | 31%                     | 41% ns                      |  | ↔ |
| Households suffered (worries about) food shortages                    | 53%                     | 57% ns                      |  | ↔ |

ns: not statistically significant; \* significant at 5% level; \*\* significant at 1% level

<sup>137</sup> Smaller sample: n=227 of which 34 Model Households.

<sup>138</sup> Smaller sample: n=180 of which 23 Model Households.

<sup>139</sup> Smaller sample: n=987 of which 100 Model Households.

<sup>140</sup> Smaller sample: n=1008 of which 103 Model Households.

## 4.2 Beach Management Unit households

BMU member households were more likely to fish (43 vs. 21%), although considering the purpose of the BMUs, surprisingly many BMU households did not fish, which was also observed in the 2014 and 2015 Fisher Income Surveys. No statistically significant difference in the use of ring nets was observed, which is again surprising given the goals of the BMU (Of the 15 indicators examined, BMU households scored better on eight and worse on one. On the six indicators for which we did not find significant differences, BMU households had better scores on all, but the differences were too small to be significant with the relatively low number of BMU households in the sample (n=122). Just as in the Model Households comparison, we cannot know whether BMU households had higher scores due to participation in the project or if these differences preceded that participation.

Table 93).

On the main well-being indicators, relatively more BMU households lived in an 'improved house' with cement floors, brick walls, and metal roofing (10 vs. 5%). On average, BMU households also owned more assets (2.9 vs. 2.5). No difference was found in the respondents' perceptions about their household's ability to meet daily needs, nor could we find a difference in the Food Consumption Score. BMU households were categorised less often as a low-diet diversity household (30 vs. 41%), but appear to have suffered relatively more often from food shortages or worries thereof (65 vs 55%). The latter is the only compared indicator on which BMU households showed a relatively negative score.

Participation in COCOBAs was higher among BMU households (20 vs. 8%), but no difference was found in school attendance of primary school age children of BMU households.

With regard to family planning, a higher proportion of BMU respondents thinks population growth is linked to problems (53 vs. 38%), but we found no difference in the ideal number of children. This is similar to what we found for Model Households. More BMU respondents were aware of family planning (75 vs. 56%) and approved of it (82 vs. 74%), but the difference in use of family planning methods was not statistically significant.

Of the 15 indicators examined, BMU households scored better on eight and worse on one. On the six indicators for which we did not find significant differences, BMU households had better scores on all, but the differences were too small to be significant with the relatively low number of BMU households in the sample (n=122). Just as in the Model Households comparison, we cannot know whether BMU households had higher scores due to participation in the project or if these differences preceded that participation.

**Table 93 BMU household evaluation**

|   | <i>BMU household</i> | <i>Non-BMU household</i> |    |   |
|---|----------------------|--------------------------|----|---|
| <b>FISHING</b>                                  |                      |                          |    |   |
| Household has at least one fisher               | 43%                  | 21%                      | ** | ↑ |
| Fisher respondent uses ring nets <sup>141</sup> | 26%                  | 31%                      | ns | ↔ |
| <b>WELL-BEING</b>                               |                      |                          |    |   |
| Household has an improved house                 | 10%                  | 5%                       | *  | ↑ |
| Asset ownership (average number of assets)      | 2.9                  | 2.5                      | *  | ↑ |

<sup>141</sup> Smaller sample: n=180 of which 43 BMU households.

|   | <i>BMU household</i> | <i>Non-BMU household</i> |    |   |
|---|----------------------|--------------------------|----|---|
| Household has difficulty to meet daily needs                                      | 36%                  | 40%                      | ns | ↔ |
| Food Consumption Score (FCS) <sup>142</sup>                                       | 53.2                 | 51.7                     | ns | ↔ |
| Household categorised as having a low diet diversity <sup>143</sup>               | 30%                  | 41%                      | *  | ↑ |
| Households suffered (worries about) food shortages                                | 65%                  | 55%                      | *  | ↓ |
| Household participates in COCOBAs   | 20%                  | 8%                       | ** | ↑ |
| <b>EDUCATION</b>  |                      |                          |    |   |
| All children in the household between 7 and 13 attend school <sup>144</sup>       | 77%                  | 76%                      | ns | ↔ |
| <b>FAMILY PLANNING</b>  |                      |                          |    |   |
| Respondent believes population growth causes problems <sup>145</sup>              | 53%                  | 38%                      | ** | ↑ |
| Respondent's ideal number of children is five or more <sup>146</sup>              | 82%                  | 87%                      | ns | ↔ |
| Respondent is aware of family planning  | 75%                  | 56%                      | ** | ↑ |
| Respondent approves of family planning  | 82%                  | 74%                      | *  | ↑ |
| Respondent reproductive health section used or using birth control <sup>147</sup> | 33%                  | 28%                      | ns | ↔ |

ns: not statistically significant; \* significant at 5% level; \*\* significant at 1% level

### 4.3 COCOBA households

COCOBA households were identified in two ways. First, if the respondent indicated borrowing from a COCOBA, and second if COCOBAs were mentioned among the village organisations in which the households participated.<sup>148</sup> Not all the COCOBAs were initiated by the Tuungane project, so this comparison relates to COCOBAs in general and not specifically to Tuungane project COCOBAs.

Similar to BMU households, COCOBA households were more likely to live in an improved house (11 vs. 5%) and had a higher average number of assets (3.2 vs. 2.5). No difference was found in the stated ability to meet daily needs, but COCOBA households scored better on all three food security indicators: they had a higher Food Consumption Score (55.5 vs. 51.4), they were less often classified as having a low diet diversity (26 vs. 41%) and less often suffered from food shortages or worries thereof (46 vs. 57%).

Primary school age children of COCOBA households did not attend school significantly more often than children of non-COCOBA households. With regard to family planning, COCOBA households more often related population growth to problems (51 vs 38%), and were more likely to be aware of family planning (74 vs. 57%), but significant differences in approval rates of family planning or use of family planning were not found.

<sup>142</sup> Smaller sample: n=1008 of which 122 BMU households.

<sup>143</sup> Smaller sample: n=1008 of which 122 BMU households.

<sup>144</sup> Smaller sample: n=676 of which 94 BMU households.

<sup>145</sup> Smaller sample: n=751 of which 97 BMU households.

<sup>146</sup> Smaller sample: n=843 of which 105 BMU households.

<sup>147</sup> Smaller sample: n=714 of which 96 BMU households.

<sup>148</sup> These groupings only match on roughly half the households (half the households that borrowed from COCOBAs did not mention participating in a COCOBA, and half the households that said to participate in a COCOBA did not mention getting a COCOBA loan). This is not necessarily inconsistent, but does show that the participation answers were not complete.

Overall, COCOBA households scored better on 7 of the 12 compared indicators. As for the other comparisons, COCOBA households scored better on all remaining five indicators, but the differences were too small to be statistically significant with the relatively low number of COCOBA households in the sample (n=99). Again, we cannot say whether COCOBA households had higher scores due to their membership, or whether households with higher scores were more likely to join COCOBAs.

**Table 94 COCOBA household evaluation**

|   | <i>COCOBA households</i> | <i>Non-COCOBA households</i> |    |   |
|---|--------------------------|------------------------------|----|---|
| <b>WELL-BEING</b>   |                          |                              |    |   |
| Household has an improved house   | 11%                      | 5%                           | ** | ↑ |
| Asset ownership (average number of assets)  | 3.2                      | 2.5                          | ** | ↑ |
| Household has difficulty to meet daily needs                                      | 35%                      | 40%                          | ns | ↔ |
| Food Consumption Score (FCS)  | 55.5                     | 51.4                         | ** | ↑ |
| Household categorised as having a low diet diversity                              | 26%                      | 41%                          | ** | ↑ |
| Households suffered (worries about) food shortages                                | 46%                      | 57%                          | *  | ↑ |
| <b>EDUCATION</b>  |                          |                              |    |   |
| All children in the household between 7 and 13 attend school <sup>149</sup>       | 82%                      | 76%                          | ns | ↔ |
| <b>FAMILY PLANNING</b>  |                          |                              |    |   |
| Respondent believes population growth causes problems <sup>150</sup>              | 51%                      | 38%                          | *  | ↑ |
| Respondent's ideal number of children is five or more <sup>151</sup>              | 83%                      | 87%                          | ns | ↔ |
| Respondent is aware of family planning  | 74%                      | 57%                          | ** | ↑ |
| Respondent approves of family planning  | 79%                      | 74%                          | ns | ↔ |
| Respondent reproductive health section used or using birth control <sup>152</sup> | 27%                      | 29%                          | ns | ↔ |

ns: not statistically significant; \* significant at 5% level; \*\* significant at 1% level

<sup>149</sup> Smaller sample: n=676 of which 74 COCOBA households.

<sup>150</sup> Smaller sample: n=751 of which 80 COCOBA households.

<sup>151</sup> Smaller sample: n=843 of which 86 COCOBA households.

<sup>152</sup> Smaller sample: n=714 of which 70 COCOBA households.

## 5 Summary

This report measures the impact of the Tuungane project on various aspects of household well-being, with a focus on family planning, resilience, and the links between the two. Resilience is a multidimensional quality, and many factors contribute to household resilience. No attempt has been made here to classify households as either resilient or non-resilient. Instead, this report provides an analysis of changes in those factors that contribute to both household well-being and resilience.

It has done so by comparing indicators from two household surveys: a baseline survey in 2011 before the project started and a 2016 follow-on survey, three to four years into project implementation (depending on the activity). This report limited itself to a before-after comparison of the project area, as a comparison or control group was not available (see Methods Section). This makes it impossible to attribute changes to project efforts because we do not have a counterfactual of what would have happened had there not been a project.

The survey analysis provided input for and was supported by a qualitative assessment. The qualitative assessment corroborated current findings, established the local perceptions about project impacts, and further investigated the pathways between family planning and resilience.

Although every effort was made to make the follow-on survey as comparable to the baseline as possible, some differences could not be avoided. The most important of these was a change in the sampling strategy made due to an administrative restructuring of the villages in the project area in December 2014. Where ten villages existed in 2011, 17 did in 2016. Following the sampling strategy, both surveys sampled only two sub-villages within a project village because villages can have 5,000+ residents and creating up-to-date household lists for entire villages was beyond the resources of the survey team. This means the surveyed areas are not a perfect geographic match. A sensitivity analysis was conducted in which results from the sub-villages surveyed in both years were compared with the results using all data. This analysis identified 13 variables where the results differed in the restricted sample (as noted in the report where this occurred). These variables are also marked in the summary tables below. Another difference between the 2011 and 2016 surveys was that village samples were proportional to size in 2016, which they were not in 2011. This has been addressed by adding weights to the 2011 data in the analysis.

### Family planning and population

Looking at the results, we found most changes in the realms of family planning and reproductive health (Table 95). Familiarity with family planning was higher in 2016, but with 59%, familiarity was still low compared to national averages. However, there is some indication that the question was not always well understood.

In 2016, 75% of all respondents approved of family planning in general; older respondents were less likely to approve, but we found no difference between men and women. The main reasons to approve of family planning were the ability to choose the number of children that could be cared for well and the health of mother and child. The main reasons for disapproving were worries about health effects and religious prohibition. Most male respondents approved of their wife or partner using family planning (65%).

Contraception use among married women was 8% higher in the 2016 survey: 17% in 2011 and 25% in 2016. The difference is smaller if all women are included (17 vs. 23%). Injectables remained the most common birth control method, but implants were found more often in 2016. Reasons for not using contraception were different in both surveys. 'Not knowing any method' was the most commonly cited reason in 2011 but was hardly mentioned in 2016. Instead, worries about side effects were mentioned more often, as was breastfeeding and not having sex/not being married.

No significant difference was found in the proportion of women who were pregnant at the time of the surveys. The proportion of pregnancies that were not wanted or wanted later was lower in 2016 (48% in 2011 vs. 38% in 2016). The higher share of pregnancies that were desired, together with higher contraception use in 2016, indicate lower unmet need, although the information to properly calculate this indicator was only available in the 2016 survey. Fifty-one percent of married women in 2016 had an unmet need, which is higher than national and regional levels. Total demand for family planning stood at 76% of which a third was satisfied.

No difference was found in women's age at first birth between both surveys: median age at first birth was 18. No difference was found between the surveys in either the average total number of births respondents had over their whole life or in these children's average survival rate. When only looking at births during the six-year time period prior to the survey, we do find differences. Fewer births were reported, and survival rates for the children born in this period were higher in 2016. The higher child survival rates appear too good to be true. We believe child mortality most likely did go down, as this was also mentioned in the focus group discussions, but not to the extent shown in the survey data. This same data issue has a potential positive bias on changes in birth intervals and the total fertility rate (TFR). As the data stand, no difference in birth intervals between the surveys could be established, while the TFR appeared to be lower in 2016.

Professional health providers (doctors, nurses or midwives) were present at 9% more of the reported births in 2016 (40% in 2011 vs. 49% in 2016). No difference between the surveys was found for the proportion of births preceded by at least four antenatal care visits (>50% in both surveys). No differences in breastfeeding practices were found; almost all infants were breastfed, and less than 20% received other food during the first three days of life.

Based on the indicators described above, we can say that family planning practices show a general improvement, but the desire or need for large families did not decline and even increased: more respondents in 2016 wanted to have more children than they had at the time of the survey and the proportion of respondents who wanted at least five children was higher in 2016 as well. The same apparent contradiction between positive attitudes towards family planning and the desire to have a large family was found in the focus group discussions. The most likely explanation is that family planning is mainly appreciated for the birth spacing it allows and its positive health and other effects, while traditional ideas about the benefits of a large family so far persist.

The need for labour, a person's economic resources, and their culture, traditions or religion were most commonly identified by respondents as factors that influenced the number of children they wanted (only asked in 2016). Access to and quality of educational and health services were also said to be important as was access to farming land. However, no robust statistical relationship was found in the data between household well-being (e.g., measured through housing quality, access to land, self-

reported ability to meet daily needs, and food security) and the ideal number of children a respondent wanted. Nor were these factors related to current household size.

In line with the high desire for large families is the finding that relatively few respondents worried about population growth; most people were aware of this growth, but 60% in 2016 saw no related problems, and this proportion was higher than in 2011 (45%). Village feedback sessions and focus group discussions showed many people also believe there are benefits to having a larger population. While average household size was significantly lower in 2016, at 6.2 versus 6.7 in 2011, this does not seem to be caused by a reduction in births, as the proportion of under five year olds in the households remained stable. Migration out of the area could be an explanatory factor but was not explored in this study.

**Table 95 Summary of family planning indicators**

|   | 2011 | 2016    |   |
|---|------|---------|---|
| Familiarity with family planning  | 45%  | 59% **  | ↑ |
| Approval of family planning   | -    | 75% -   |   |
| Men approve of partner using family planning                            | -    | 65% -   |   |
| Ideal number of children is 5+  | 77%  | 86% **  | ↓ |
| Median age at first birth   | 18   | 18 ns   | ↔ |
| Contraception use married women - any method                            | 17%  | 25% *†  | ↑ |
| Pregnancy of latest birth wanted at the time of pregnancy               | 52%  | 62% **† | ↑ |
| Pregnant at the time of the interview                                   | 16%  | 11% ns  | ↔ |
| Unmet need family planning  | -    | 51% -   |   |
| Satisfied demand for family planning                                    | -    | 33% -   |   |
| Average total number of births  | 4.6  | 4.8 ns  | ↔ |
| Average rate of survival of all births in a respondent's lifetime       | 86%  | 89% ns  | ↔ |
| Average number of births in previous six years                          | 1.6  | 1.4 *   | ↓ |
| Births in last five years preceded by at least 4 antenatal care visits  | 56%  | 51% ns  | ↔ |
| Births in last five years assisted by professional health care provider | 40%  | 49% **† | ↑ |

ns: not statistically significant; \* significant at 5% level; \*\* significant at 1% level; † Result changes in restricted sample.

## Health

General health indicators mostly looked better in the 2016 survey (Table 96). With the exception of malaria, prevalence rates decreased significantly for all measured illnesses or symptoms (only the most common ones are shown in the summary table below). The use of mosquito nets was up for children under five in the 2016 survey but not for pregnant women. No difference was found in measles vaccination rates.

Village dispensaries remained the main source of medical assistance, followed at a distance by the Buhingu health centre. Both options were mentioned more often in 2016, and pharmacies were mentioned less often. Focus group participants mentioned the geographic expansion and improvements of medical facilities as one of the project's main achievements.

**Table 96 Summary of health indicators**

|   | 2011 | 2016 |     |   |
|---|------|------|-----|---|
| Prevalence rate malaria                         | 87%  | 83%  | ns  | ↔ |
| Prevalence rate intestinal worms                | 66%  | 58%  | **† | ↑ |
| Prevalence rate typhoid                         | 59%  | 44%  | **† | ↑ |
| Prevalence rate diarrhoea                       | 56%  | 49%  | *   | ↑ |
| Women of reproductive health using mosquito net | 85%  | 89%  | ns  | ↔ |
| Pregnant women using mosquito net               | 92%  | 83%  | ns  | ↔ |
| Children under five using mosquito net          | 83%  | 88%  | *   | ↑ |
| One year old children with measles vaccination  | 97%  | 90%  | ns  | ↔ |

ns: not statistically significant; \* significant at 5% level; \*\* significant at 1% level; † Result changes in restricted sample.

## Living conditions

Overall, we found no evidence for improvements in living conditions (A drop in the overall quality of housing was found, although this appears to be influenced by the different geographic focus of the surveys. The change in ownership of fuel-efficient stoves was not statistically significant, and use frequency also stayed the same. No change in overall asset ownership was found, but a big shift took place within asset ownership. Mobile phones and solar panels were owned more often in 2016 than in 2011, while radio and clock ownership went down sharply (replaced by mobile phones according to village feedback participants).

Table 97). Access to improved water sources did not change in the dry season but did increase in the wet season, mainly due to higher use of rainwater. Distance to sources of drinking water showed an increase. Overall, water treatment was down in the wet season, and the use of approved treatment was down in both seasons. Water treatment is applied more often to water from unimproved sources. Combining the water source and treatment indicators, we found an increase in the proportion of households that use water from an unimproved source without treatment (from 18 to 32% in the dry season).

The use of improved toilet facilities was down, but this appears to be due to a change in the questionnaire and is therefore not included in the summary table. According to participants in village feedback sessions, improved latrines were slightly more common than five years ago. More than half the households in 2016 did not have a handwashing place with water and soap, ash or sand ready (not asked in 2011). Focus group participants mentioned improved sanitation (toilets and hand washing) as one of the project's main achievements.

A drop in the overall quality of housing was found, although this appears to be influenced by the different geographic focus of the surveys. The change in ownership of fuel-efficient stoves was not statistically significant, and use frequency also stayed the same. No change in overall asset ownership was found, but a big shift took place within asset ownership. Mobile phones and solar panels were owned more often in 2016 than in 2011, while radio and clock ownership went down sharply (replaced by mobile phones according to village feedback participants).

**Table 97 Summary of living conditions indicators**

|             | 2011 | 2016 |
|-------------|------|------|
| <b>WASH</b> |      |      |

|  | 2011   | 2016   |       |
|--|--------|--------|-------|
| Access to an improved source of drinking water in both seasons               | 17%    | 14%    | ns† ↔ |
| Fetching drinking water takes at most one hour in both seasons               | 80%    | 72%    | ** ↓  |
| Use of unimproved water source without appropriate water treatment (dry/wet) | 18/17% | 32/28% | ** ↓  |
| Access to an unshared improved latrine                                       | 33%    | 19%    | ** ↓  |
| Household has water and soap/ash/sand ready for hand washing                 | -      | 46%    | -     |
| <b>HOUSING</b>   |        |        |       |
| Main household dwelling is an 'improved' house                               | 9%     | 5%     | **† ↓ |
| Household has a fuel-efficient stove   | 30%    | 23%    | ns ↔  |
| <b>HOUSEHOLD AND TRANSPORT ASSETS</b>  |        |        |       |
| Combined asset indicator (number of assets owned)                            | 2.6    | 2.6    | ns† ↔ |

ns: not statistically significant; \* significant at 5% level; \*\* significant at 1% level; † Result changes in restricted sample.

### Education, credit and livelihoods

Education as measured by school attendance for primary school-aged children did not change significantly (These metrics only show the situation in the week prior to the survey. When asked for the whole year, more than half said they had faced food shortages or worries thereof, often due to crop failure after bad weather or due to personal illness. December 2015 through February 2016 were the worst months for food insecurity in the year preceding the survey.

Table 98). The education level of household heads in the two surveys was also similar.

No differences were found in access to credit. Borrowing appeared as common in 2016 as it was in 2011. Unexpectedly, COCOBAs were mentioned less often as a source of loans in 2016 (16 vs. 25%). Familiarity with COCOBAs was high in both surveys. While attitudes toward COCOBAs were more often positive in 2016, this difference was not significant.

On livelihoods, we found fewer respondents in 2016 who indicated the household had difficulty to meet basic needs. This holds across all villages and there are some indications this might be linked to a better agricultural year. When asked about farming problems, more respondents said there were none, and there were also fewer references to drought. That fewer households had borrowed money to buy food also fits this picture. However, when presenting this result in village feedback sessions, general agreement with more households being able to meet their daily needs was found in only one village. It is not clear what explains the different results in the survey and feedback sessions.

Average land size increased and more households had access to at least three acres of land. While this could point to increased conversion of bush and forest land, overall there is no evidence that relatively more land was newly converted than in 2011. We did not find changes in tenure security as measured through the proportion of plots for which the household held ownership/leasehold documents. Nor were changes found in the dominant crops: as in 2011, cassava, maize and beans were most commonly grown. On average, households also grew the same number of crops.

The new farming questions in the survey showed that half of all farming households used erosion control measures—mostly ridging—and a third experienced erosion on their land. Erosion was more common on steep land, which makes up 15% of the total acreage in the survey. Almost 30% of all farm land (acreage) was within 30 metres of a stream or river, but only 2% within 60 metres of the lake.

Fertilizer and pest control measures were rare as was crop rotation, but fallowing the land was common. Quality certified seeds were hardly used, and farming records were kept by a very small minority. Crops were stored by around 60% of farming households, mostly in sacks, with or without pesticides. Most said crop storage losses were low in the last season and had decreased in the last two years. Project provided training on conservation agriculture techniques designed to improve yields and reduce erosion were praised in the focus group discussions.

Regarding livestock, we found fewer households in 2016 with goats and ducks. On the other hand, households that held chickens had more of these than in 2011, but the overall number of households with chickens did not change.

We found fewer fishing households overall. In the focus group discussions this was linked to the project's prevention of fishing with illegal gear (mainly cheap small-mesh mosquito nets) and the inability of some fishers to buy legal gear and therefore leaving fishing altogether. In both surveys, fishing was a secondary activity for most of the fishers, with farming being more important for most interviewed households. Changes in fishing practices were found, with large boats with engines more common in 2016, but especially the emergence of ring nets (pulse seine) is noteworthy (from 0% to 30%), as these can be used in shallower water. Lift nets were less common (from 44% to 24%), but long lines were used by the same proportion of fishers in both surveys (34-36%). No changes were found in the importance of subsistence versus sales of the catch.

Fishers who said they targeted more than one of the three fish types (*dagaa*, *migebuka* and non-pelagic species) were less common in 2016, which mainly resulted in fewer fishers reporting catching *migebuka* and the non-pelagic species. There is some indication that travel time to fishing grounds went down, especially for *dagaa*, but the changes were not statistically significant.

Most fishers in both 2011 and 2016 felt fish catches had declined in the last five years, although a third of *dagaa* fishers in 2016 reported higher catches (only 8% had reported this in 2011). Finally, in 2016, equal numbers of fishers felt there would/would not be sufficient fish in the future to feed a growing population. In 2011, the negative view had been clearly dominant.

In 2016, households were also asked about food consumption, diet diversity, and food insecurity. This provided mixed results. The area does well on the World Food Program's (WFP) standard metric for measuring dietary diversity and food frequency, the Food Consumption Score (FCS). This looks at diet diversity and nutritional content, and 92% of all households fell within the 'acceptable' range. Less than 1% was in the poor range. This is strongly influenced by the widespread consumption of fish. However, on another WFP metric, which only looks at diet diversity (the number of different food groups eaten) the survey area shows a high proportion of low diet diversity households relative to the national average.

These metrics only show the situation in the week prior to the survey. When asked for the whole year, more than half said they had faced food shortages or worries thereof, often due to crop failure after bad weather or due to personal illness. December 2015 through February 2016 were the worst months for food insecurity in the year preceding the survey.

**Table 98 Summary of indicators on education, credit and livelihoods**

|   | 2011   | 2016   |     |   |
|---|--------|--------|-----|---|
| <b>EDUCATION</b>  |        |        |     |   |
| Adjusted Net Enrolment Rate for primary school age                        | 82%    | 85%    | ns  | ↔ |
| <b>CREDIT</b>   |        |        |     |   |
| Households that borrowed money in the previous 12 months                  | 35%    | 39%    | ns  | ↔ |
| Average number of loans taken out in the previous 12 months               | 1.1    | 1.3    | ns† | ↔ |
| COCOBA as source of loan (% of those who borrowed)                        | 25%    | 16%    | **  | ↓ |
| Respondent has a positive perception of COCOBAs (% of those familiar)     | 49%    | 59%    | ns  | ↔ |
| <b>LIVELIHOODS</b>  |        |        |     |   |
| Households with difficulty to meet daily needs                            | 60%    | 39%    | **  | ↑ |
| Access to more than 3 acres of land (includes rented land)                | 37%    | 54%    | **  | ↑ |
| Plots with ownership/lease document                                       | 39%    | 39%    | ns  | ↔ |
| Average number of crops grown   | 3.6    | 3.7    | ns† | ↔ |
| Household has chickens  | 48%    | 49%    | ns  | ↔ |
| Household has ducks/goats   | 26/27% | 19/19% | **† | ↓ |
| Average number of chickens (of households with chickens)                  | 6.0    | 8.3    | **† | ↑ |
| Average time needed to get to <i>dagaa</i> fishing grounds (minutes)      | 98     | 76     | ns  | ↔ |
| Perceived a decrease in catch of <i>dagaa</i> compared to 5 years earlier | 76%    | 45%    | **  | ↑ |

ns: not statistically significant; \* significant at 5% level; \*\* significant at 1% level; † Result changes in restricted sample.

## Governance, social cohesion and participation

The governance, social cohesion, and participation results are mixed. We found a big upward shift in the satisfaction with village and district government services, but it is so large and uniform, that we checked the result in village feedback sessions and in all but one village large majorities denied there had been an improvement in services. It is not clear what caused the difference in survey responses as the question was the same in 2011 and 2016. The result is not included in the summary table. There was also a positive, but smaller shift in the belief that households could influence village government decisions, although this remains a minority opinion (36%). Relationships between villagers and TANAPA continued to be seen as good by more respondents than bad and this did not change significantly.

Between fellow villagers, village government, and people from other villages, the village government is trusted the most, and people from other villages the least (only asked in 2016). No statistically significant change was found in the frequency of disputes about land use, the use of forest products, or fishing between the two surveys. However, there was a shift in the mentioned topics of disputes: from being almost absent in 2011, 23% now mentioned fishing-related conflicts, often about illegal fishing and usually taking place between BMUs and fishers. Conflicts about private land and land boundaries were mentioned more often in 2016 and there is some indication that conflicts between pastoralist and farmers increased. The latter may be related to the increase in the average amount of household agricultural land found in the analysis.

No difference in household participation in village organisations was found between 2011 and 2016. In 2016, men and women participated in roughly equal proportions (46 vs. 54%). Participants in such organisations were more likely to have had some regular education than the general population (two thirds finished primary school). Twelve percent of all households indicated belonging to a BMU.

Highest proportions of BMU membership were found in Katumbi and Sibwesa. No significant change in attendance of public meetings about village land-use planning, health issues, lake management and/or forest management was found.

**Table 99 Summary of governance, social cohesion and participation indicators**

|   | 2011 | 2016   |   |  |
|---|------|--------|---|--|
| <b>GOVERNANCE</b>   |      |        |   |  |
| Perceived household influence on village government decisions | 25%  | 36% ** | ↑ |  |
| Perceived relationship between villagers and TANAPA is good   | 45%  | 40% ns | ↔ |  |
| <b>SOCIAL COHESION</b>  |      |        |   |  |
| Conflicts reported as occurring often                         | 29%  | 26% ns | ↔ |  |
| Conflicts perceived as being resolved fairly                  | 36%  | 42% ns | ↔ |  |
| <b>PARTICIPATION</b>  |      |        |   |  |
| Household member participates in village organisation         | 19%  | 16% ns | ↔ |  |
| Household member attended a public meeting in last year       | 69%  | 64% ns | ↔ |  |

ns: not statistically significant; \* significant at 5% level; \*\* significant at 1% level

### Knowledge and attitudes about the natural environment and climate change

More respondents had an opinion about the cause and effect of siltation in 2016. A large majority in 2016 agreed to the link between deforestation and siltation, while opinions were more varied on the harm siltation does to fish. More people in 2016 agreed there was enough forest around their village to meet their needs, but this is mainly due to a few villages.

Already high in 2011, agreement with statements about the need to continue conservation of village forests, wildlife, and the Mahale Mountains National Park increased in the 2016 survey, with now close to 90% agreeing to all three. Benefits from the national park were seen by fewer people, slightly more than half, and did not differ between the surveys.

Only a minority of respondents were familiar with the term 'climate change' (27%). Among those who had heard of climate change, half expected negative consequences for their household. Slightly more than half the respondents said they experienced changes in weather patterns, but questions about what exactly changed did not provide good data. The focus group discussions provided better results and the consensus opinion was that rainfall has decreased, the rainy season has become shorter, and temperatures have increased. Thirteen percent of survey respondents said they have changed the way they do things due to the perceived weather changes; a change in the timing of planting was most commonly mentioned. This was also found in the focus group discussions.

## 6 Outcomes assessment

The project and survey teams sought to answer several research questions with the follow-on survey. Here we look at these questions.

*Did the project improve the well-being of local people?*

Absent a counterfactual to show what would have happened anyway without the project, we can only say that the project contributed towards the observed improvements in human well-being rather than caused them to happen.

If we define changes in human well-being in conservation projects as changes in living standards, health, education, social cohesion, security, environment, and governance as per [12], and we look only at statistically significant changes from 2011 to 2016 and changes that are likely to result from project activities, then we find improvements in six health indicators, two living standards indicators, one environmental indicator, and one governance indicator (Table 100).

**Table 100 Improvements in human well-being indicators potentially linked to project activities**

| <i>Indicator</i>  | <i>Contributing Project Activity</i>                      |
|---|---|
| Familiarity with family planning (45% to 59% increase)  | Family planning education and outreach                    |
| Contraception use married women (17% to 25% increase)   | Increased access to family planning services              |
| Pregnancy of latest birth wanted at the time of pregnancy (52% to 62% increase)               | Increased access to family planning services              |
| Births in last five years assisted by professional health care provider (40% to 49% increase) | Basic labour and delivery training for health workers     |
| Prevalence rate typhoid (59% to 44% decrease)   | Sanitation improvements and Model Households              |
| Prevalence rate diarrhoea (56% to 49% decrease)   | Sanitation improvements and Model Households              |
| Households with difficulty to meet daily needs (60% to 39% decrease)                          | Better access to basic healthcare                         |
| Access to more than 3 acres of land (37% to 54% increase)                                     | Village Land-Use Planning                                 |
| Perceived a decrease in catch of dagaa compared to 5 years earlier (76% to 45% decrease)      | Beach Management Units enforcement of fishing regulations |
| Perceived household influence on village government decisions (25% to 36% increase)           | Training for village leaders                              |

*Were there negative outcomes from the project?*

Yes. Fishing-related conflicts increased. Respondents said these conflicts were often related to stopping illegal fishing by project-sponsored Beach Management Units. From focus group discussions, we also learned that this meant some people could no longer fish and others said the cost of fishing went up. The better protection of village forests, while generally praised also meant that firewood was less easily available for some.

Also there were negative changes unlikely to be related to the project: a decline in the number of COCOBA loans, more people want large families, longer times needed to fetch water.

**Table 101 Negative outcomes**

|  |
|--|
| COCOBA as source of loan (% of those who borrowed) (25% to 16% decline)                                  |
| Fetching drinking water takes at most one hour in both seasons (80% to 72% decline)                      |
| Use of unimproved water source without appropriate water treatment (dry/wet) (18/17% to 32/28% increase) |

*Did outcomes vary among different groups?*

Most likely yes. Model households had better indicators in the dataset than non-Model Households for hygiene, family planning, participation, and natural resource use and attitudes. Both households with BMU members and COCOBA members were better off on most assessed indicators than non-member households. It is, however, not possible to say if members were better because of the project activities or were already better before they joined the different initiatives.

#### *Are local people more resilient?*

If we define 'more resilience' as stronger social cohesion, better access to family planning, more sustainable use of nature resources, higher food security, and more reliable clean water and sanitation, then the villages in the survey are now more resilient to climate shocks in several of these areas but not all. Overall, local levels of resilience remain minimal.

Indications of stronger social cohesion and governance are present as local disputes are being addressed more now than at baseline, and more households feel they have an influence on village government decisions. There is good evidence that resilience improved through better access to family planning services. Knowledge and use of family planning has increased and birth assistance improved. Hints at a more sustainable use of natural resources can also be seen in the decrease in pessimism about fisheries and a decline in the use of charcoal. There are also elements of resilience where we could not find improvements. Within water, sanitation and hygiene (WASH), no improvements were found for the overall population, but it is hopeful that the Model Households show better conditions. While more households perceived they were able to meet their daily needs, no increase in the "wealth" indicators, such as housing materials and assets, could be found.

From FY11 to FY16 (roughly the same period as the baseline and follow-up surveys), the Tuungane project invested a total of US\$6,715,754, according to financial records. Investment levels were low in the first two years, as many activities started only in FY13 and FY14.

Spending thus far on project monitoring and evaluation activities is 6% of the total investment, but more than half of the M&E funding came from non-project sources such as TNC's Central Science and PRB.

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## Appendix 1: Sub-village sample 2016

**Table 102 Sample distribution 2016**

| <i>New Villages 2016</i>    | <i>Population</i> | <i>Total number of households</i> | <i>Assigned sample</i> | <i>Achieved sample</i> |
|-----------------------------|-------------------|-----------------------------------|------------------------|------------------------|
| <b>Igalula</b>              | <b>3967</b>       | <b>1127</b>                       | <b>69</b>              | <b>70</b>              |
| Igalula A (coastal)         |                   |                                   | 48                     | 48                     |
| Rukusu (inland)             |                   |                                   | 21                     | 22                     |
| <b>Ndele</b>                | <b>1357</b>       | <b>353</b>                        | <b>24</b>              | <b>24</b>              |
| Kilamehewa (inland)         |                   |                                   | 5                      | 6                      |
| Ndele B (coastal)           |                   |                                   | 19                     | 18                     |
| <b>Lagosa</b>               | <b>1813</b>       | <b>271</b>                        | <b>32</b>              | <b>33</b>              |
| Ilalomombo (coastal)        |                   |                                   | 20                     | 21                     |
| Kanyase (inland)            |                   |                                   | 12                     | 12                     |
| <b>Rukoma<sup>153</sup></b> | <b>8455</b>       | <b>1428</b>                       | <b>147</b>             | <b>145</b>             |
| Rugongoni (coastal)         |                   |                                   | 21                     | 21                     |
| Kanda ya ziwa (coastal)     |                   |                                   | 27                     | 27                     |
| Kapepe (inland)             |                   |                                   | 99                     | 97                     |
| <b>Ikubulu</b>              | <b>3260</b>       | <b>380</b>                        | <b>57</b>              | <b>57</b>              |
| Ikubulu (inland)            |                   |                                   | 30                     | 30                     |
| Kasumbagulu (inland)        |                   |                                   | 27                     | 27                     |
| <b>Buhingu</b>              | <b>6012</b>       | <b>728</b>                        | <b>105</b>             | <b>107</b>             |
| Vilongwa (coastal)          |                   |                                   | 64                     | 64                     |
| Mahale (coastal)            |                   |                                   | 41                     | 43                     |
| <b>Mgambo</b>               | <b>2024</b>       | <b>437</b>                        | <b>35</b>              | <b>35</b>              |
| Lebanoni (coastal)          |                   |                                   | 22                     | 22                     |
| Lubundui (coastal)          |                   |                                   | 13                     | 13                     |
| <b>Nkonkwa</b>              | <b>4007</b>       | <b>413</b>                        | <b>70</b>              | <b>71</b>              |
| Katembwe (coastal)          |                   |                                   | 32                     | 32                     |
| Keshala (inland)            |                   |                                   | 38                     | 39                     |
| <b>Katumbi</b>              | <b>3443</b>       | <b>697</b>                        | <b>60</b>              | <b>60</b>              |
| Kariakoo (coastal)          |                   |                                   | 44                     | 44                     |
| Mteme (inland)              |                   |                                   | 16                     | 16                     |
| <b>Kalilani</b>             | <b>2068</b>       | <b>417</b>                        | <b>36</b>              | <b>35</b>              |
| Stolo (coastal)             |                   |                                   | 14                     | 13                     |
| Kabukuyungu (coastal)       |                   |                                   | 22                     | 22                     |
| <b>Kalya</b>                | <b>5676</b>       | <b>742</b>                        | <b>99</b>              | <b>98</b>              |
| Katunka (inland)            |                   |                                   | 47                     | 48                     |
| Kankumba (coastal)          |                   |                                   | 52                     | 50                     |
| <b>Tambusha</b>             | <b>2931</b>       | <b>536</b>                        | <b>51</b>              | <b>52</b>              |
| Kagwila (coastal)           |                   |                                   | 34                     | 32                     |
| Kasunga (coastal)           |                   |                                   | 17                     | 20                     |
| <b>Kashagulu</b>            | <b>5992</b>       | <b>1172</b>                       | <b>70</b>              | <b>73</b>              |
| Kampisa (inland)            |                   |                                   | 57                     | 60                     |
| Mchangani (coastal)         |                   |                                   | 13                     | 13                     |
| <b>Ubanda</b>               | <b>2513</b>       | <b>342</b>                        | <b>44</b>              | <b>42</b>              |
| Kalalya (inland)            |                   |                                   | 19                     | 18                     |
| Mnyamasi (inland)           |                   |                                   | 25                     | 24                     |
| <b>Lufubu</b>               | <b>1137</b>       | <b>236</b>                        | <b>20</b>              | <b>20</b>              |

<sup>153</sup> In Rukoma, three instead of two sub-villages were interviewed. When household lists were drawn up for Rugongoni sub-village, there were fewer households than initially reported. To avoid interviewing too large a proportion of the sub-village, a second coastal sub-village was selected.

| <i>New Villages 2016</i> | <i>Population</i> | <i>Total<br/>number of<br/>households</i> | <i>Assigned<br/>sample</i> | <i>Achieved<br/>sample</i> |
|--------------------------|-------------------|---|----------------------------|----------------------------|
| Kalofya (inland)         |                   |   | 11                         | 13                         |
| Isonga (coastal)         |                   |   | 9                          | 7                          |
| <b>Sibwesa</b>           | <b>4815</b>       | <b>939</b>                                | <b>84</b>                  | <b>88</b>                  |
| Songambebe (coastal)     |                   |   | 62                         | 65                         |
| Tupendane (coastal)      |                   |   | 22                         | 23                         |
| <b>Total</b>             | <b>57,478</b>     | <b>10,218</b>                             | <b>1,003</b>               | <b>1,010</b>               |

## Appendix 2: Questionnaires

### English Household Survey Questionnaire

My name is \_\_\_\_\_ and I am conducting research on behalf of the Tuungane Project and would like to interview you today to better understand what has changed since the project began about 4 years ago. Your household was randomly selected for an interview.

**ASK TO SPEAK TO THE HOUSEHOLD HEAD, OR IF THE HOUSEHOLD HEAD IS NOT THERE OR BUSY, ASK TO SPEAK TO ANOTHER ADULT MEMBER OF THE HOUSEHOLD (18 OR OLDER)**

You are being asked to take part in a household survey to measure the impact of activities implemented by the Tuungane project over the last four years. We will be asking you about your household's economic wellbeing, health, relationship with the environment, and relationship with the community. The interview will take about 60 minutes to complete. We do not anticipate any risks to you participating in this study other than those encountered in day-to-day life. These risks include accidental release of information, lost time, and boredom. While there are no direct benefits to you, you will be aiding in the decision making regarding further programming conducted by the Tuungane project. Your answers will be recorded electronically. Please ask any questions you have now.

If you have questions later, you may contact the study co-leader Hellen Magige +255-222-700-726 or National Health Research Ethics Sub-Committee (NatHREC) +255-22-2121400.

Taking part in this study is completely voluntary. You may skip any questions that you do not want to answer. May we proceed with the interview?

|                                    |  |
|------------------------------------|--|
| FPIC STATEMENT (AGREED OR REFUSED) | REFUSED.0 AGREED.1                             |
| NAME OF THE INTERVIEWER            | SELECT FROM LIST                               |
| NAME OF THE SUPERVISOR             | SELECT FROM LIST                               |
| HOUSEHOLD ID CODE                  |  |
| VILLAGE                            | SELECT FROM LIST                               |
| SUB-VILLAGE                        | OPEN   |
| GPS COORDINATES                    |  |
| START TIME                         | USE 24 HOUR FORMAT, FOR EXAMPLE 13:15<br>__:__ |

There are no right or wrong answers to questions; we are just interested in getting the true information about your household and your views. I would like to start by asking about the people who live in this household.

The full paper version of the English survey instrument can be found here:

<https://tnc.box.com/s/0jgs544uiwb707lsgcsusi4i8yc5b23k>

The PDF version of the electronic English survey instrument can be found here:

<https://tnc.box.com/s/yfdqvrhljr4turj0s1m3l9s35f76w1e>

The electronic version of the survey instrument can be found on the TNC Survey Solutions account:

<https://solutions.worldbank.org/account/login> Login = TNC PW=1Conservancy

## Kiswahili Dodoso La Utafiti Katika Kaya

Jina langu ni \_\_\_\_\_ ninafanya utafiti kwa niaba ya mradi wa Tuungane na ningependa kukuhoji leo ili kufahamu zaidi ni kitu gani kimebadilika tangu mradi wa Tuungane uanzishwe miaka minne iliyopita. Kaya yako imechaguliwa bila mpangilio maalum kwa ajili ya mahojiano.

**OMBA KUONGEA NA MKUU WA KAYA, KAMA HAYUPO KARIBU AU ANA SHUGHULI OMBA KUONGEA NA MTU MZIMA MWINGINE YEYOTE (MIAKA 18 AU ZAIDI)**

Unaombwa kuwa sehemu ya utafiti wa kaya kupima matokeo yaliyoletwa na shughuli zilizotekelezwa na mradi wa Tuungane kwa miaka minne iliyopita. Tunakuuliza kuhusu uwezo wa kaya yako kiuchumi, afya, uhusiano na mazingira, na uhusiano na jamii. Mahojiano yatachukua muda wa dakika 60 kukamilika. Hatutarajii athari zozote kutokana na ushiriki wako katika utafiti huu zaidi ya zile unaokutana nazo kwenye maisha ya kila siku. Athari hizi ni kama utoaji wa taarifa kwa bahati mbaya, kupoteza muda na kukereka. Wakati hakuna faida za moja kwa moja kwako, utasaidia kwenye kutoa maamuzi kuhusu mipango ijayo itakayofanywa na mradi wa Tuungane. Majibu yako yatarekodiwa kielektroniki. Tafadhali uliza swali lolote ulilohala sasa. Kama utakuwa na maswali hapo baadaye unaweza kuwasiliana na kiongozi wa utafiti Hellen Magige +255-222-700-726 au kamati ndogo ya maadili ya utafiti wa afya kitaifa (NatHREC) +255-22-2121400.

Kuwa sehemu ya huu utafiti ni kujitolea kabisa. Unaweza kuruka swali lolote ambalo hutapenda kulijibu. Tunaweza kuendelea na mahojiano?

|                                  |  |
|----------------------------------|--|
| FPIC STATEMENT (KUBALI AU KATAA) | KATAA .0<br>KUBALI .1                                  |
| JINA LA MHOJAJI                  | KUTOKA KATIKA ORODHA                                   |
| JINA LA MSIMAMIZI                | KUTOKA KATIKA ORODHA                                   |
| NAMBA YA KAYA                    |  |
| JINA LA KIJIKI                   | KUTOKA KATIKA ORODHA                                   |
| JINA LA KITONGOJI                |  |
| POINTI ZA GPS                    |  |
| MUDA WA KUANZA USAHILI           | TUMIA MFUMO WA MASAA 24 , KWA MFANO 13:15<br>____:____ |

Katika maswali haya hakuna jibu sahihi au jibu lisilo sahihi; bali tuna nia tu ya kupata taarifa za kweli kuhusu kaya yako na maoni yako. Ningependa kuanza kwa kukuuliza kuhusu watu wanaoishi kwenye hii kaya.

The full paper version of the Kiswahili survey instrument can be found here:

<https://tnc.box.com/s/70t145pf3lv2envsc2whf3aed3egtgvq>

The PDF version of the electronic Kiswahili survey instrument can be found here:

<https://tnc.box.com/s/rknlovbgi0ld677aedq0mvuqb11ttz5d>

The electronic Kiswahili version of the survey instrument can be found on the TNC Survey Solutions account: <https://solutions.worldbank.org/account/login> Login = TNC PW=1Conservancy

## Appendix 3: Weighting information

Weights were applied to deal with the difference between sampling processes in 2011 and 2016. In 2011, equal numbers of interviews were planned in each village, while in 2016 the number of interviews in each village was proportional to the total number of households in a village (proportional to size). The applied weights ensure that the village level results carry the same weight in the overall results in both 2011 and 2016, i.e. they correct for over- and under-sampling at village level in 2011.

Weights in 2011 were calculated by taking the inverse of the number of interviews divided by the number of households in a village:  $1/(\#interviews/\#households)$ . Table 103 shows the sampling information and weights for 2011.

The weights for 2016 were calculated by taking the inverse of the overall number of interviews divided by the overall number of households:  $1/(1010/9568)$ . In 2016, weights are the same for all villages because interview numbers are already in proportion to the size of the village.<sup>154</sup> Table 104 shows the sampling information and weights for 2016.

In Stata, definition of the sampling structure was as follows:

```
svyset _n [pweight=weights], fpc(#households) strata(strata)155
```

where fpc stands for finite population correction, which should be entered if the sample covers more than five percent of the population.

In SPSS, to define the complex sampling structure the strata and weights variables were used, and the option "Equal WOR" was selected, with the "# households" variable used to reflect population sizes (equivalent to using fpc in Stata).

**Table 103 Sample weights 2011**

|           | Strata | # households | # interviews | weights |
|-----------|--------|--------------|--------------|---------|
| Igalula   | 1      | 1117         | 51           | 21.9    |
| Rukoma    | 2      | 901          | 53           | 17.0    |
| Ikubulu   | 3      | 200          | 49           | 4.1     |
| Buhingu   | 4      | 1225         | 55           | 22.3    |
| Nkonkwa   | 5      | 402          | 49           | 8.2     |
| Katumbi   | 6      | 396          | 50           | 7.9     |
| Kalilani  | 7      | 400          | 30           | 13.3    |
| Kalya     | 8      | 1102         | 50           | 22.0    |
| Kashagulu | 9      | 1356         | 50           | 27.3    |
| Sibwesa   | 10     | 601          | 50           | 12.0    |
| Overall   |        | 7700         | 487          |         |

<sup>154</sup> The only exception was Kashagulu, which was under-sampled because accurate population data were not available when the sample was drawn. We chose not to correct for this by weighting to simplify the analysis.

<sup>155</sup> Actual variable names were different but adapted here to match column headings.

**Table 104 Sample weights 2016**

| village   | Strata | # households* | # interviews | weights |
|-----------|--------|---------------|--------------|---------|
| Igalula   | 11     | 640           | 70           | 9.5     |
| Ndele     | 12     | 219           | 24           | 9.5     |
| Lagosa    | 13     | 292           | 33           | 9.5     |
| Rukoma    | 14     | 1,364         | 145          | 9.5     |
| Ikubulu   | 15     | 526           | 57           | 9.5     |
| Buhingu   | 16     | 970           | 107          | 9.5     |
| Mgambo    | 17     | 326           | 35           | 9.5     |
| Nkonkwa   | 18     | 646           | 71           | 9.5     |
| Katumbi   | 19     | 555           | 60           | 9.5     |
| Kalilani  | 20     | 334           | 35           | 9.5     |
| Kalya     | 21     | 915           | 98           | 9.5     |
| Tambusha  | 22     | 473           | 52           | 9.5     |
| Kashagulu | 23     | 967           | 73           | 9.5     |
| Ubanda    | 24     | 381           | 42           | 9.5     |
| Lufubu    | 25     | 183           | 20           | 9.5     |
| Sibwesa   | 26     | 777           | 88           | 9.5     |
| Overall   |        | 9,568         | 1,010        |         |

\* The number of households in 2016 were based on total population numbers divided by the average households size as found in the survey (6.2).

## Appendix 4: Focus Group Discussions and Village Feedback Session



# Qualitative Research and Community Feedback Report

Prepared for

**The Tuungane Project Partners**

By

Susan James

Savannas Forever Tanzania – Data for Development

January 16, 2017

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This report would not have been possible without Craig Leisher, Director of Monitoring and Evaluation Africa Region for The Nature Conservancy who designed this project and who, in partnership with the consultant, Sebastiaan Hess, developed, implemented and analysed the Tuungane Project baseline and endline surveys. We are grateful to the people in the Tuungane project area for their participation in the focus groups and community-feedback sessions. We especially thank the Tuungane Project Team who hosted us at the project headquarters including Clement Mabula, the Agriculture Strategic Leader who provided excellent feedback during the early stages of the project, Nelson Mmari, our main contact in the field who handled logistics and organized the community events, music and drama groups; Johnston Weston and Hizza Rajabu from Pathfinder headquarters in Dar es Salaam who accompanied the SFTZ team to the focus groups and village events, and Issa Fungameza, Village Executive Leader (VEO), who introduced our team to the villages and arranged the respondents and facilities for the focus-group discussions and other village leaders in facilitating discussions and feedback sessions in their villages. We also thank the SFTZ field team from Savannas Forever Tanzania: Jovit Felix (supervisor), Pendo Masunga, and Christian Nguluwi (facilitator/note takers and translators).

## Abbreviations

|        |                             |
|--------|-----------------------------|
| BMU    | Beach Management Unit       |
| CBD    | Community Based Distributor |
| COCOBA | Conservation Community Bank |
| FGD    | Focus Group Discussion      |
| MH     | Model Household             |
| SFTZ   | Savannas Forever Tanzania   |
| TANAPA | Tanzania National Parks     |
| TNC    | The Nature Conservancy      |
| VEO    | Village Executive Officer   |

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## Executive Summary

The Nature Conservancy and Pathfinder International designed the Tuungane Project to improve environmental health and the well-being of people who live in the greater Mahale ecosystem in western Tanzania. The project focuses on remote villages bordering the wildlands of Mahale Mountain National Park.

The project partners conducted a baseline household survey in 2011 and a follow-up survey in August 2016 to measure change and ask additional questions on family planning and climate change resilience and adaptation. TNC hired Savannas Forever Tanzania (SFTZ) with the twofold purpose of conducting qualitative research and communicating survey findings back to the communities. SFTZ sent a three-person field team to 14 villages (Igalula, Ndele, Lagosa, Rukoma, Buhingu, Mgambo, Nkonkwa, Katumbi, Kalilani, Kalya, Tambusha, Kashagulu, Lufubu and Sibwesa.) with Tuungane staff to present survey results and obtain reactions and clarifications from the community. The field team held additional meetings in the afternoon to ensure that a broad range of adults could attend. Additionally, the field team facilitated nine focus groups in three central locations with two representatives from each project village.

The focus group participant types included male elders, women of reproductive age, youth and fishermen. Discussions focused on positive and negative impacts of the Tuungane project. The groups also covered issues related to population growth, family size and their attitudes about family planning, as well as any changes in weather patterns and the villagers' adaptation strategies.

The major impacts described by respondents indicated that the Tuungane project had a primarily positive effect on the targeted communities. It has: 1) Improved access to healthcare and health services; 2) Increased the number, size and species of fish; 3) Improved environmental and forest conservation. Other positive impacts mentioned include increased crop yields from modern farming techniques and access to loans through microfinance groups.

Access to healthcare and services improved because of several related activities. The Tuungane staff rehabilitated and equipped health clinics and hospitals to better serve the community, especially pregnant women. Respondents mentioned the addition of a new delivery room at Buhingu Clinic and solar lights at another clinic, which provided a new local option for night-time births. Respondents also mentioned that Tuungane established Community Based Distributors (CBDs) who taught families about family planning and encouraged women to go to the clinic or hospital for safe delivery of their babies.

Access to care increased because of new transportation options for patients to travel to referral hospitals by boat or car. Moreover, new mobile clinics went to remote sub-villages. New staff came with the new facilities because Tuungane project trained youth to assist healthcare workers who also received additional training. Other health-related impacts cited included construction of toilets and tippy tap sinks for handwashing which helped reduce diarrhoea and cholera outbreaks.

The substantial reduction in illegal fishing practices combined with protection of fish breeding sites have resulted in some restoration of fish populations. Respondents in most focus groups said fish populations have increased and they can now catch more freshwater sardines (dagaa), as well as a greater diversity and larger individuals of the remaining fish species. Tuungane helped to eliminate poison and small-mesh nets so fish have a chance to mature. The number of fishers has decreased, respondents said, because some people were

unable to replace illegal gear and Tuungane regularly patrols the fishing areas to prevent fishing in designated breeding areas.

Tuungane has helped villages to reduce deforestation by activating environmental committees that elect guards to protect forest reserves. Firewood or timber gathering now requires a paid permit that brings revenue to the village. Other environmental conservation trainings involve model households with sanitary toilets, solar panels and other programs.

The one major negative impact raised by respondents resulted from unequal distribution of solar panels: only some household received panels, whereas others did not. Households that were not given panels complained or dropped out of the program. Similar concerns were raised about toilet-building projects that had not been completed and perceptions of unfairness over access to fishing opportunities.

Training on modern farming techniques included terracing plots with grass barriers that reduce erosion and loss of soil nutrients. Tuungane agricultural experts distributed bags of improved seeds and fertilizer, taught farmers to compost grass and manure to enrich the soil, and encouraged planting single crops rather than intercropping. Respondents reported large gains in yields.

Respondents reported their impressions of climate change. All focus groups said rainfall has decreased significantly since 2006 and temperatures increased during the same period. The rainy season begins later now compared to the early 2000s. Now the rainy season begins in November and may end in March, whereas it previously began in September and continued until June. Most respondents say the winds have become weaker and less predictable. In response, farmers have switched to more drought-resistant crops such as cassava, relied more on irrigation, and preparing their plots early while planting seeds in November. Some people have left the village to find other work and some have diversified their incomes with other activities.

In the focus groups, respondents say that the population has increased through immigration rather than a high birth rate. The negative aspects of population growth described by respondents include increased land disputes, inflated prices for rent, land and food, HIV, moral decay, crime and drugs. The positive aspects of population growth include economic development, more customers for businesses, new technology and new ideas. Opinions about family size vary. Roughly half mention that smaller families require fewer resources for food, school fees and household expenses. The other half feels that a family needs many children to cultivate large farms, complete household chores, and allow the family to diversify by having children work in different economic sectors.

Although respondents listed the benefits of large families, most reported that family planning, particularly birth spacing, is a good idea: If a family waits three years between children, maternal and child health improve, and women can work between pregnancies to stabilize family income and thereby feed and educate their children. Similarly, respondents recognized that family planning slows down population growth and most respondents said family planning at the community level reduces land conflicts, food scarcity and degradation of the environment.

## Introduction

### A. Background:

The purpose of this follow-up research and communication project is two-fold. 1) Communicate baseline and endline results to participating communities. The Tuungane project partners conducted an endline household survey in August 2016 to measure change from a baseline survey in July 2011 and to ask new questions about family planning, resilience, and climate change adaptation. The survey partners wanted to thank survey participants by showing how Tuungane used their data to compare their community with neighbouring communities and the overall average. 2) Conduct a qualitative assessment of the project's largest impacts as perceived by village elders, women, and fishers as well as learn about local knowledge and attitudes towards resilience and climate change. The partners also want to understand the stories behind large changes in several indicators and which of these changes were driven by project activities.

The project partners hired Savannas Forever Tanzania (SFTZ), a Tanzanian-based research and communication organization, to present survey results in village feedback sessions. The feedback sessions included afternoon presentations and community gatherings in village centres in the evenings. The evening assemblies began with entertainment from a drama and traditional dance troupe, which brought people to the village centre and, also attracted large numbers of children. The presentation could not begin until the sun had set so many adults had returned home to cook or perform other chores. After the first two evening assemblies, the field team suggested adding the indoor group so enough adults viewed the presentation of results.



Children gathered to watch the evening's entertainment

The team also facilitated nine focus group discussions with respondents from 13 villages. The communication and qualitative research work took place between December 1-17, 2016.

### B. Report Outline:

Section 1 includes the executive summary of the report followed by key findings. This introductory section, Section 2, provides an outline of the structure of the report, background information, methodology and an overview of who attended the focus groups and village and community feedback sections. Section 3, provides the detailed findings of the focus groups and questions asked during the feedback sessions. The first section of findings is organized by the positive and negative impacts described in the focus groups and by topics rated highly

by the focus groups. The second section includes a summary of responses about climate change and population growth.

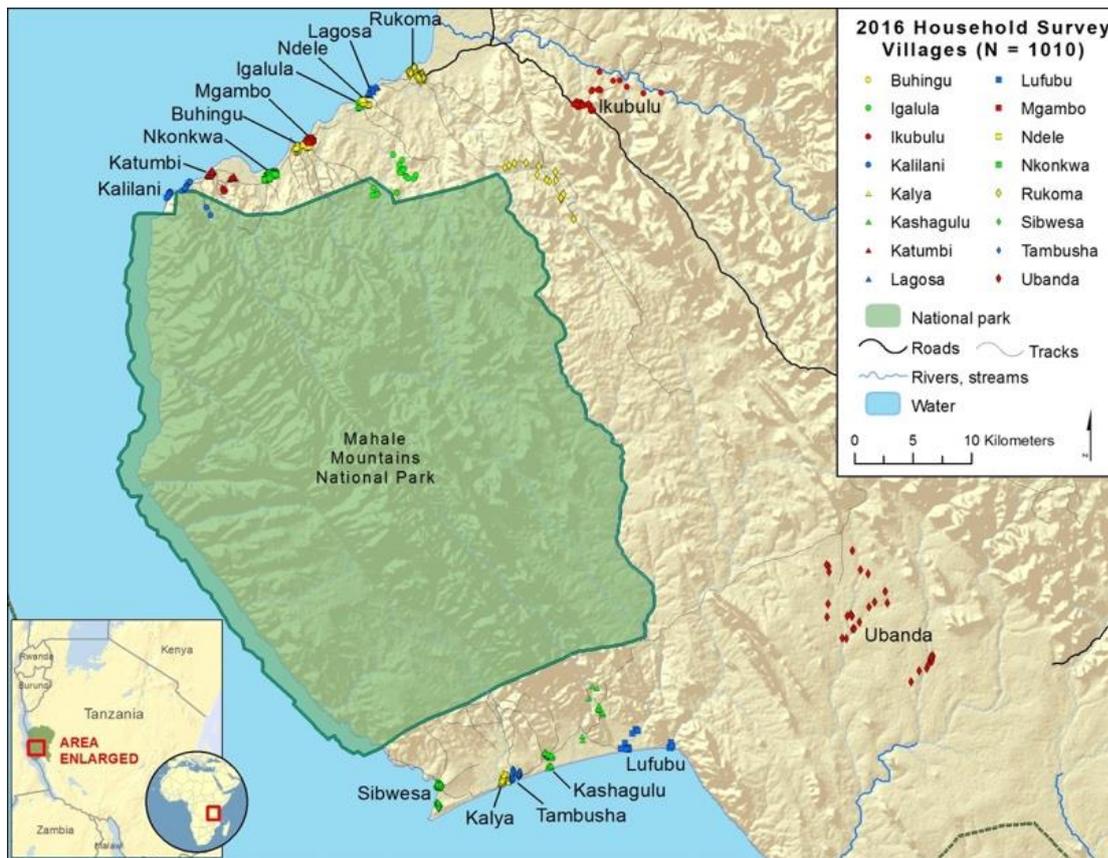
### C. Tuungane Project Overview:

The Tuungane project is a collaboration between The Nature Conservancy and Pathfinder International to protect the health and well-being of the natural environment and people living in the Greater Mahale Ecosystem in western Tanzania. Both the environment and the people are threatened by extreme poverty and rapid population growth. The project targets remote villages without access to health services, good education and modern contraception. As the human population grows, people slash and burn forests for agriculture, sediment and pollution degrades coastal areas and fish populations decline. The Tuungane project collaborates with multiple partners to meet its objectives, including the Jane Goodall Institute, Frankfurt Zoological Society, Tanzania National Parks and the Government of Tanzania.

The project objectives include

- **Strengthen forest management:** create, gain local and national government endorsement, and implement a comprehensive land and water protection plan.
- **Enhance Lake Tanganyika fisheries management:** catalyse co-operative fisheries management at the village level.
- **Improve access to health-care information and services including access to reproductive health services:** Strengthen local government capacity and train community health workers.
- **Diversify and improve livelihoods:** focus on food security and access to markets.
- **Build the capacity of village governments:** Design training programs that meet specific community needs; enhance participation and transparency; educate and engage local leaders in population, health, and environment strategies.: Enable long-term support for population, health and environment strategies.

(Sources: Pathfinder and The Nature Conservancy websites)

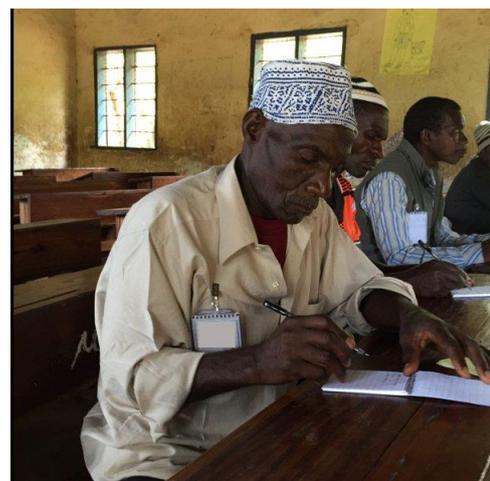


Map of Tuungane Project Village Location

#### D. Methodology

The collection of qualitative data on contextual information was achieved through a combination of 9 focus-group discussions (FGD) and 25 village feedback sessions (indoor and outdoor session were counted separately—see Table 2).

*Focus-Group Discussions:* The FGDs included three groups of elders with men ages 46 to 70 years (one elderly woman of 74 yrs joined the group as a replacement for her son); Three women’s groups whose participants’ ages ranged from 20 to 58 years old; two mixed sex youth groups with respondents aged between 18 to 30 years old, and one group of fishermen whose ages ranged from 20 to 62 years old. The groups were held in one of three villages: Rukoma, Kalya and Mgambo. The respondents came by motorcycle, boat or on foot from 13 villages with about two participants from each village.



Participants in elders’ focus group recording project impacts.

A village executive officer (VEO), worked with other village officials to recruit focus-group respondents. Most respondents met the participant criteria set by the project partners; however, several selected respondents asked others to go in their places. All respondents 18 years old or older were allowed into the groups because of

the distances travelled to participate. Several women were older than the specified age range and one reproductive-aged woman attended an elder’s group.

At least one respondent in each FGD belonged to one or more project units, which including a Beach Management Units (BMU); microfinance groups called Community Conservation Bank (COCOBA), a Model Household (MH), or Community Birth Distribution (CBD) group. Most respondents had attended a Tuungane training session or had heard about the project activities, although one or two people in the groups had never heard of the project. Respondents unaware of the activities only answered general questions unrelated to the project specifics.

*Focus Group Discussion by Category, Location, Sex and Age of Respondents*

| <b>Villages</b>  | <b>Rukoma FGDs:<br/>Igalula, Rukoma,<br/>Lagosa, and<br/>Ndele</b> | <b>Mgambo FGDs:<br/>Buhingu, Katumbi,<br/>Nkonkwa and<br/>Mgambo</b> | <b>Kalya FGDs:<br/>Kashagulu, Kalya,<br/>Lufubu, Sibwesa,<br/>Tambusha</b> |
|------------------|--|--|--|
| <b>FGD Type</b>  |  |  |  |
| <b>Elders</b>    | (8) Men: 55 to 70 yrs.   | (7) Men: 48 to 66 yrs.<br>(1) Woman: 74 yrs.                         | (10) Men: 46 to 67 yrs.  |
| <b>Women</b>     | (8) Women: 20 to 42 yrs.   | (8) Women: 23 to 42yrs   | (10) Women: 32 to 58 yrs.  |
| <b>Youth</b>     | (6) Men 21-30 yrs.<br>(2) women 18-20 yrs.                         | (5) Men 20 to 29 yrs.<br>(2) Women 23-24 yrs                         | X  |
| <b>Fishermen</b> | X  | X  | (9) Men: 20 to 62 yrs.   |

The Tuungane project partners collaborated on an FGD script that SFTZ translated from English to Swahili. The field team shortened the script under the guidance of the partners after the pilot to keep the discussions within the 2-hour time limit. The final English and Swahili scripts are included.

The major topics covered in the FGD included 1) respondent descriptions and prioritization of positive and negative project impacts; 2) changes in weather patterns; 3) attitudes towards population growth and family planning; and, 4) respondent adaptation and strategies to cope with climate change.

A female SFTZ researcher, Pendo Masunga, facilitated the women’s groups and one youth groups while a male SFTZ researcher, Christian Nguluwi, took notes. Mr. Nguluwi facilitated the elders’ groups, the fishermen and one of the youth groups while Ms. Masunga took notes. All FGD were recorded for future verification. The research team summarized and translated the findings into English.

## Community Feedback Assemblies:

### Community Feedback Timing and Attendance

| COMMUNITY FEEDBACK SESSIONS |           |                  |                             |   |
|-----------------------------|-----------|------------------|-----------------------------|---|
| Dates                       | Days      | Villages         | Estimated Indoor Attendance | Estimated Outdoor Attendance                      |
| 2-Dec-16                    | Friday    | Mgambo           | None                        | 80  |
| 3-Dec-16                    | Saturday  | Buhingu          | None                        | 50  |
| 5-Dec-16                    | Monday    | Nkonkwa          | 60-80                       | 60  |
| 6-Dec-16                    | Tuesday   | Katumbi          | 45-55                       | 60  |
| 7-Dec-16                    | Wednesday | Kalilani (No FG) | 40-50                       | Not conducted, because of evening sardine fishing |
| 8-Dec-16                    | Thursday  | Rukoma           | 55-60                       | 120+  |
| 9-Dec-16                    | Friday    | Lagosa           | 50-60                       | 100+  |
| 10-Dec-16                   | Saturday  | Ndele            | 50-60                       | 100+  |
| 12-Dec-16                   | Monday    | Igalula          | 50-60                       | 100+  |
| 13-Dec-16                   | Tuesday   | Sibwesa          | 45-50                       | 50-60   |
| 14-Dec-16                   | Wednesday | Kalya            | 30-40                       | 100   |
| 15-Dec-16                   | Thursday  | Tambusha         | 30-35                       | 200+  |
| 16-Dec-16                   | Friday    | Kashagulu        | 70                          | 200   |
| 17-Dec-16                   | Saturday  | Lufubu           | 35                          | 15  |

## Focus Group Detailed Findings

### A. Overall Impacts of the Tuungane Program:

The greatest impacts mentioned by the respondents closely followed the program's major objectives: the increase in fish populations due to reductions in illegal fishing and the decrease in maternal mortality due to improved access to healthcare. Almost all activity impacts mentioned fell into three categories: 1) health and family planning; 2) improved fishing; and 3) environmental or forest conservation-related issues. Answers did not differ greatly by group type or location except in Mgambo, where neither group mentioned fishing, and in the fishermen group in Kalya, where respondents emphasized fishing and did not mention health. Three groups selected sustainable agriculture training as having a major impact. Economic issues, such as microfinance made the "most" important list in one group (Rukoma women) as did Tuungane project's involvement of villagers in project design and the communication of results back to villages (Fishers).

Major impacts by focus group type and location

|         | Mgambo  | Rukoma   | Kalya  |
|---------|---|--|--|
| Elders  | Health<br>Agriculture<br>Environmental<br>Conservation  | Forest Conservation<br>Stop Illegal Fishing<br>Improved Health                 | Illegal fishing<br>Toilet Construction<br>Environmental<br>Conservation              |
| Women   | Provision of solar to<br>model houses<br>(negative)<br>Training on family<br>planning<br>Construction of village<br>offices | COCOBA<br>Good Farming<br>Improvement of health<br>centres and<br>dispensaries | Environmental<br>Conservation<br>Stop Illegal Fishing<br>Family Planning             |
| Youth   |   | Health improvement<br>Agriculture<br>Good Fishing                              | Family planning<br>education<br>Forest conservation<br>Health service<br>improvement |
| Fishers |   |  | Listen to villagers’<br>views<br>Fishing education<br>Fish breeding<br>conservation  |

B. Major Program Impacts:

1. Improved Health

Every FGD mentioned improved healthcare as one of the three major program impacts except the fishers, and they mentioned nearly all the same positive health-related impacts as in other discussions. Respondents emphasized improved access to higher-quality healthcare as the major health theme that crossed all age-sex groups and geographic areas. Access improved because of several related programs: Tuungane worked with the community to identify and understand problems and then worked with the government to address them.

a) **Health Facility Construction**

The building or rehabilitation of various clinics and dispensaries provided local care and access to more medications at a lower price per patient. Tuungane equipped these newly restored facilities with beds, mosquito nets, bedsheets, where needed, and more sophisticated equipment including a new delivery room at Buhingu Clinic and solar panels that enabled women to deliver their babies at night locally.

- A youth group respondent summed up the situation: *“I am grateful that we have all chosen health [as the most important impact]. In the past, health centres did not exist -- not even a dispensary.”*

- Another young man in the same group said: *“First Tuungane came to listen to community challenges and find solutions. In many places, there was a shortage of dispensaries, but Tuungane provided them. Due to the availability of those facilities, people are going to the dispensaries and health centres and it reduces the burden of purchasing medications.”*

#### **b) Transportation:**

Respondents in the three FGDs in Mgambo mentioned that people needing emergency care or a hospital referral now had access either through a boat service or car provided by Tuungane. In the past, boat trips to the Kigoma Hospital could take two days and some people died on route.

- *“We were given a boat to transport patients and pregnant women to referral hospitals if the patient needed the service. (Mgambo Elder)*

#### **c) Health Service and Education Coverage Improved:**

Respondents mentioned that Tuungane helped bring medical clinics to remote sub-villages and eased the shortage of healthcare staff by training local youth to assist them. The project also trained Community Birth Distributors (CDB) who sensitized the women and the community about giving birth at the clinic, hospital or dispensary. The combination of better access to well-equipped local birth facilities and training on safe deliveries through CBDs have decreased maternal and infant mortality. Improvement in health outcomes for women and children was frequently mentioned across groups by men and women, and young and old.

- *“Family planning education is provided through small groups known as Community Birth Distributor (CBD) to motivate families to use family planning methods and to give birth at the dispensary or hospital.” (Mgambo elder)*
- *“In the past, women were supposed to go far away for health services but now they are available here. They even send clinic services to remote sub-villages located far from the service centres.” (Mgambo elder)*
- *“There are clinics for babies, pregnant women and the whole aspect of family planning.”*

#### **d) Family Planning Services:**

FGD participants often mentioned family planning within the context of improvements to maternal and child health. Both men and women mentioned that birth spacing improved women’s health; spacing also allowed women to nurse their babies for two years and improved nutrition. Other family planning impacts included increased wealth because of fewer children to feed and more importantly, women could work and farm more productively if they did not always have young children. One participant also mentioned the importance of reducing teen pregnancy because girls could remain in secondary school and get a good education.

- *“We have realized that family planning has benefits to the community. Tuungane educated us that if we space having children then mothers become healthier and family income increases. If a woman gives birth every year, it affects her ability to participate in development activities. If this year you're*

*pregnant, then next year you will be rearing a child and fail to go to the farm”*  
(Kalya woman)

- *“Family planning education has reduced family conflicts. For example, men used to run away and abandon their families because it was hard to provide for them, especially when they had many children.”* (Mgambo youth)
- *“After the introduction of family planning 90% have changed and these changes have enabled us to educate our children and we are capable of dealing with livelihood issues”*  
(Kalya woman)

#### **e. Sanitation Practices Improved, and Reduced Diarrhoea and Cholera.**

Some aspect of sanitation was mentioned in each of the elder’s and women’s groups. Respondents mentioned toilet and hand washing at schools and at the dispensary. Others said Tuungane taught model households how to build sanitary toilets, to use a tip tap to wash hands and, also, educated people on the use of septic tanks so dirty water and waste do not run into Lake Tanganyika or streams. These sanitation measures have reduced cholera outbreaks, per respondents. Fewer people wash their dishes and clothes in the lake. Tuungane staff introduced a water guide (chlorine use) through village meetings and respondents reported that chlorine helped reduce the time and firewood used to boil water. The Kalya elder group voted toilet and sink construction as one of the three major project impacts in their community. Other groups mentioned sanitation as part of health or cited one factor as an individual project benefit.

- *“There have been frequent sensitizations on the issue of sanitation and building modern toilets. They have constructed toilets and installed simple tanks to wash hands after using the toilet at the school.”* (Mgambo elder)
- *“Through the model homes villagers have been motivated to build toilets and use tippy tap for washing their hands and to clean the area around their households.”* (Mgambo elder)
- *“Construction of toilets in schools has been helpful. It is one of the ways to combat outbreaks of disease like cholera if they are used in the right way.”* (Kalya elder)
- *“Women got a break from boiling water because now they are using the water guide. Tuungane arranged a public meeting to sensitize people to use the water guide.”*  
(Rukoma elder)

#### **f. Toilet construction needs more oversight and training in proper use.**

The Kalya elder group voted toilet construction as the activity with the greatest impact. Although the toilets have improved sanitation, particularly at the schools, some of the materials broke during construction, some of them broke after students used them and toilet projects in other villages had not yet been completed.

- *Toilets at Kashagulu primary school are not durable. They have just been built, they are not even in use but some pipes have already been ruined* (Kalya participant)
- *“After construction of toilets Tuungane should return to find out if toilets are being used properly to reduce problems related to the improper use of toilets.”* (Kalya participant)
- *“Tuungane should be monitoring these toilets during construction stages to make sure they constructed by required standards.”* (Kalya participant)

## *2. Environmental Conservation Improves Availability of Natural Resources*

All the elder groups and the Kalya groups (except fishers) rated environmental and forest conservation projects as high impact. The most frequent comments on improvements in forest management including regulation of firewood collection, prevention of charcoal production and the creation of tree nurseries. Some of the expectations such as a rapid increase in rainfall and soil fertility might need to be tempered. The participants mentioned many benefits of forest conservation and trees including:

- higher retention of nutrients and moisture in the soil
- protection of water sources including rivers and springs so clean water is available
- trees provide protection from high winds that can destroy houses as well as crops.
- protection of wildlife such as bushbuck
- potential food source (mushrooms) and forest product income from private forests and beekeeping.
- long-term benefits of forests, including clean air, increased rainfall and
- drought prevention.

Project activities mentioned by respondents include training and legal restrictions on harvesting wood from reserves and the prohibition of charcoal. Respondents said that trees have started to grow so results of forest restoration can be seen. The respondents express hope for future benefits from sustainable timber harvests, beekeeping and edible forest products.

- *“Planting trees in a trough block southern winds kusi winds, which used to blow and destroy houses.”* (Kalya elder)
- *“Forests have stabilized. No one is cutting down trees for charcoal, and if someone is caught, legal measures are taken. Careless setting of fire no longer happens. We thank Tuungane for environmental conservation. Even wild animals have a good place to settle. Setting fires caused bees to die or run away. We want forests so we can set up beehives and establish beekeeping groups.”* (Kalya woman)
- *[Tuungane’s] education has helped protect the forests surrounding the village and people totally stopped cutting down trees for making charcoal.”* (Fisherman)
- *“Keeping some trees in the farm is important because leaves add nutrients in the soil when they decay.”* (Kalya elder)
- *“Conservation of trees and forests has enabled reliable beekeeping. Beehives are safe there without human disturbances...later honey will be available. it will be used at homes, and some will be sold.”* (Rukoma elder)
- *“Rivers and other water sources like springs depend on trees together with the natural vegetation. When forests are properly conserved, water sources won’t dry up easily and springs also will increase and make getting safe water easier.”* (Rukoma elder)
- *“As the result of forest conservation, I have started to harvest forest product from my own forest and earn income.”* (Rukoma elder)

Respondents in the Rukoma youth groups said their village’s income has increased because the village government now sells permits for forest activities such as timber harvesting. For example, per respondents, someone can buy a permit and either use the wood to build a house or sell the it to make a profit. The village government in collaboration with the villagers elect forest guards to protect the forest because of committees set up by the Tuungane project.

- *“Natural resources have increased such as firewood, foods like mushrooms and herbs unlike in the past when there was high deforestation.”*
- *“The conservation committee makes sure there will be firewood available and it will be sustainable. For example, when it permits a person to collect firewood from a forest reserve, the person is not allowed to cut down trees or live branches.”*
- *“Tuungane’s training and mobilization has motivated individuals to preserve and conserve their own areas, which lead to the sustainable availability of forest products.”*

Some respondents mentioned the negative impact of forest conservation. Now, per respondents, firewood is less available and it is necessary to obtain a permit before cutting firewood. Also, restrictions of cutting down trees or using slash and burn methods to clear land makes farm expansion more difficult.

- *“Tuungane restricted burning piles of slashed trees and logs during farm preparation- In my side farm preparation became difficult. if I give a casual worker a plot to cultivate he/she will do only half of it because some parts will be occupied by slashed piles of trees and logs.” (Rukoma woman)*

### 3. Improved Fishing

Tuungane’s programs that prevented illegal fishing and the introduction of fish breeding programs drove a noticeable increase in fish populations and improved fishing incomes. All the groups mentioned that fish populations had increased in size and quantity. The program restrictions caused controversy in the villages because they confiscated illegal fishing gear and some people did not have the means to replace it. Fishers who had access to legal nets and gear said the number of fishermen dropped noticeably and contributed to gains in the fish population.

- *“Through fishing education we received, we learned not to use illegal fishing tools. Now fish are highly available even different varieties and in large size.” (Fisherman)*
- *“Accessibility of fish and sardines has been reliable and easy. During the prior three years, sardines were totally unavailable.” (Kalya participant)*
- *“Income has increased for fishermen, fish dealers and, also the government can collect enough tariffs from fishing.” (Kalya participant)*
- *“Fishing income has increased because of the increase in the number of fish and sardines especially in July and August.” (Rukoma participant)*
- *“For sure, Tuungane has improved our fishing environment. Now there are sardine drying racks along the beach. Now we get good food because sardines are dried on the drying racks. Personally, I request Tuungane staff not to give up on providing education to the community about fishing. (Kalya woman).*

Several strategies used by the Tuungane project resulted in noticeable increases in fish populations, per respondents. The BMUs worked with villages to maintain fish breeding locations. Fish breeding sites are protected. Villagers no longer wash dishes and clothes and fewer people bathe in Lake Tanganyika They banned the use of poisoned and fine-mesh nets once used to catch immature fish.

- *“Tuungane have insisted on the use of new and improved fishing nets with large mesh size so fish have a chance to grow.” (Kalya elder)*

- *“Sardines used to be harvested by beach seine or mosquito nets but now we use nets with big holes, eight inches or above so immature fish are no longer being fished”* (Rukoma elder)
- *“By setting up fish breeding site zones, the future generation will find all types of fish, and they will harvest them, even though now we are also harvesting them.”* (Fisherman)
- *“The presence of BMU offices has helped beach conservation and protection of fish breeding sites. Also, we have made sure that fishermen are following good fishing rules and regulations.”* (Fisherman in a BMU)
- *“Fish have been reproducing at a high rate, so there is enough food and income has increased for those who are doing that business”* (Fisherman).
- *Fish have found safe places to breed and preserve their eggs and grow well and now, finding fish has been very easy.”* (Fisherman).

The Kayla elders mentioned the success of Tuungane’s fishing patrol program in reducing overcrowding of fishers and suggested it increase the number of patrols.

- *“Patrols around the lake have reduced the number of fishermen. Most fishermen were using illegal gear but after Tuungane fought against illegal fishing, the number of fishermen decreased.* (Kalya elder)
- *“Patrols should be conducted frequently because there are so many illegal fishermen from neighbouring countries who come to fish in our lake”* (Kalya elder).

Despite the growth in fish populations, people complained about the unfairness of Tuungane fishing programs and that it had not delivered on some of its promises. Some men and women complained that there has been a reduction in the number of small fish that could be purchased at a lower cost.

- *“When Tuungane prohibited the use of beach seine and poisoned nets they should have given the fishermen proper fishing tools such as large mesh size fishing net with eight-inch mesh size.”* (Fisherman)
- *“Currently, we don’t consume as many fish as in the past because they have prevented us from catching small fish and from fishing in some areas.”* (Mgambo woman)
- *“Villagers complain about the introduction of new fishing methods and fishing restrictions. For example, they are not allowed to fish in areas earmarked for breeding and are prohibited to fish juvenile fishes.”* (Rukoma youth)
- *“Tuungane does not care about fishermen. Fishermen die every day because of strong winds during fishing activities. They were supposed to provide weather forecast equipment to help predict high winds.”*
- *“Tuungane changed rules and by-laws frequently without having agreement from the fishermen. This is causing conflicts between them and fishermen.”* (Fisherman)
- *“Tuungane promised to provide buoys for demarcating fish breeding sites, but until now they haven't fulfilled the promise. This is causing fishermen to be arrested for fishing in the fish breeding sites unknowingly because there are no fishing zone demarcations.”* (Fisherman)
- *“Seminars and training for fishermen have been provided rarely. They are supposed to give seminars more frequently to educate and remind people about proper fishing and, listen to the challenges facing them.”* (Fisherman)

#### 4. Education on Modern, Sustainable Agriculture Practices Has Increased Yields

Tuongane trained villagers on conservation agriculture techniques designed to improve yields, reduce erosion, advanced livestock keeping that promote conservation. The women's and youth groups in Rukoma and the Mgambo elder group voted agricultural productivity as one of the major project impacts. Tuongane brought agricultural experts to give seminars to villagers. The respondents mentioned several new techniques that they now use regularly because of the improved yields of maize, rice and cassava. The experts distributed one bag of fertilizer and one bag of improved seeds to each attendee. Lessons taught included:

- Farmers need to grow one crop on a plot rather than intercropping to increase yield
  - Improve soil with organic fertilizer made from composting grasses and manure
  - Terrace plots on slopes to reduce erosion and use water barriers with weeds and grasses on the terraces to preserve moisture and nutrients.
  - Eliminate slashing and burning to clear land
  - Planting trees as a wind break to protect crops
  - Use improved seeds and plant them correctly (i.e. one seed per hole).
- *“The year before last year I planted maize only and harvested 35 bags. In the past I mixed maize, cassava and beans and I harvested 3 to 4 bags”.* (Mgambo elder)
  - *“When you cultivate on a slope you must construct water barriers so flowing water doesn't wash away soil fertility. We learned how to do farm in less fertile land, when you plant beans it has ability to increase soil fertility so the soil will become fertile.”* (Mgambo elder).
  - *“Burning the farm burns bacteria that are in the soil hence less/no nutrients in the soil and less harvests. Currently the following is being done: We do not cut down trees or burn them during preparation of farms”.* (Rukoma youth)
  - *“They trained us on the use of organic fertilizers. We get compost manure by gathering dry grass into a pile or bin and letting it rot. Harvest (production) has increased.”* (Rukoma youth)
  - *“Harvests/production has increased because of the training/sensitization provided. If one follows the experts' advice, he/she can get 20-25 bags of maize per acre while previously he/she used to get 5-8 bags per acre”* (Rukoma elder)

#### 5. Community Conservation Bank (COCOBA):

Rukoma women's group respondents voted COCOBA as having a major positive impact for them even though only one woman was a COCOBA member. Most of the comments related to the ability to take out loans to pay for emergency health issues or school fees.

- *“COCOBA has changed our lives because it didn't exist in the past.”* (Rukoma woman)
- *“COCOBA has helped to get loans for educating children and money for general home life.”* (Rukoma woman)
- *“I haven't joined COCOBA but for those who joined there is difference between the past and now. Some had no house but now they have constructed one and they educated their children. I was afraid to join a COCOBA and I have failed to educate my children.”* (Rukoma woman)
- *“The training we got from COCOBA about saving helps us in hardship times, we take loan for small business so we can meet our daily needs.”* (Rukoma elder).

One respondent mentioned that he thought that Tuongane should provide the loans and that COCOBA had difficult conditions for the loan recipient.

- *“Tuungane doesn’t give loans. COCOBAs have tough and tight conditions. For example, every week you must increase your shares. Now the economic situation so it is difficult if you need to have money every week to buy shares. Tuungane was supposed to give loans to fishermen with simple conditions.” (Fisherman)*

#### 6. *Uneven Distribution of Benefits to Model Households:*

Tuungane provided solar equipment to only some of the Model Households, which created jealousy and resentment in the communities. Although the Rukoma Women’s group voted this problem as one of the most important project impacts, it also was mentioned in the Mgambo elders group. The solar equipment distribution issue was the only negative mentioned in the three prioritized impacts in any group.

- *“Some of the project activities are not implemented because of misunderstandings between some households that received solar power and those who didn’t.” (Rukoma woman)*

#### 7. *Improved Communication with the Community*

Participants in two FGD mentioned that Tuungane did an excellent job of listening to the community and communicating back the results of the studies and the monitoring information to the village. Moreover, Tuungane also worked closely with people in the community to implement the project. Unfortunately, in a women’s FGD, one woman said that the project failed to communicate its work plan to the community and one fisherman mentioned that by-laws and policies changed frequently and fishermen were not notified.

### **Climate Change and Adaptation Strategies**

#### 1. *Changes in Weather: Rainfall, Temperature and Wind*

##### **a) Rainfall**

The FDG in all groups agreed that the rainfall has decreased since around 2002 to 2006. The elder respondents were better able to describe the long-term changes in all weather patterns. In the 1960s through the 1990’s high rainfall sometimes led to severe flooding. One respondent said the water levels of Lake Tanganyika was up to 40 meters higher in the 1970s than it is today. Others said the water levels rose and fell with the amount of rainfall but have declined steadily after 2006. One respondent mentioned that some of the streams and springs that use to run into Lake Tanganyika have decreased in volume or have dried up.

All respondents also said the length of rainy season has changed. The elder group respondents said the rains used to start in September and last until June and during the rainy season it rained most days and was often foggy and misty. Now, the rainy season begins in November and can end in late March.

- *“In the 1990s to 2000s the rainy season began in September and stopped for a while in February. Then it continued again from March to June. But nowadays weather is unpredictable. It can rain for a short time and stop and we go for a long time without rain.” (Rukoma youth)*

- *“For the past ten years, rice was planted abundantly in the lowlands. Rice was planted in October and by December it was already germinated. Now it has changed and it needs to be planted in December.”* (Mgambo Youth)

## b) Temperature

All respondents agreed that temperatures have increased as the rains decreased. In the 1980s and earlier, temperatures were much lower, per respondents.

- *“In 1975 and earlier, the cold season lasted for a long time with low temperatures, but from the 2000s, the temperature has been increasing and rainfall has been decreasing.”* (Rukoma elders)

## c) Wind

Opinions about wind variation differed by group and some groups disagreed among themselves. Most people said the wind had decreased over the last 30 years while others said it has become less predictable. In two of the elder groups, respondents said that winds had been much stronger. Stronger winds, some respondents said, resulted in more plentiful fish.

- *“The Southern wind (Kusi wind) and Northern wind (Kaskazi wind) were very strong compared to nowadays. The wind was blowing in April, nowadays it is no longer predictable.”* (Kalya elder)
- *“In the 1940s and 1950s the wind was so strong. The wind called Lukuga could last up to seven days. That wind was so strong that travel by boat and canoe was not possible. Now the Lukuga wind is no longer there and even when the wind blows it is not as strong as in past years.”* (Rukoma elder)
- *“Due to strong winds, fish and sardines were easily found but in recent years, winds don’t blow and the number of fish has gone down compared to previous years.”* (Mgambo youth)

## 2. Strategies Used to Adapt to Changes in Weather:

Many of the agricultural strategies discussed by respondents were introduced by Tuungane staff or by government extension offices. Respondents now start to prepare their fields in September, as in the past, but now they delay planting seeds until November or December. Others said they had moved to more fertile land that is closer to the water and many have started to irrigate their crops. Tuungane experts advised them to use improved seeds; plant one crop per plot rather than intercrop and use composted grass and manure to fertilize crops. Some said they have changed the crops they plant to more drought resistant crops such as cassava or they plant gardens closer to their house so they are more easily watered.

- *“We are conserving our water sources by prohibiting cutting down trees. The rainfall has been lower so if we don’t conserve forests, rain will disappear.”* (Mgambo elder)

## Population Growth and Family Planning

### 1. Problems and Benefits of Population Growth

Respondents usually interpreted the question about population growth due

to immigration rather than from the birth rate within the village. Population growth problems included land conflicts, food and natural resources that lead to environmental degradation and land, food and rent price inflation. Respondents linked population expansion from immigration to moral decay, drug and alcohol use, HIV, and crime.

- *“The land becomes insufficient; the amount of farmland remains constant while the number of people increases there is an increase inland conflicts. Food becomes scarce because the amount of productive land is too small compared with the population.”* (Mgambo elder)
- *“When the population increases, activities like charcoal making also increases to increase household income. Also, people must cut down trees for agricultural activities.”* (Kalya elder)

Immigration yielded benefits such as the exchange in new business and farming ideas, the introduction of livestock for ploughing fields, and new housing styles. The new residents added to the customer base for businesses, accelerated the local economy and increased the labour force. Respondents also said that the government may be more willing to build roads, schools and dispensaries to accommodate the larger number of residents.

- *“Trade improves because there are many buyers. Also, newcomers arrive with goods that we can buy for a low price and then re-sell at a profit.”* (Rukoma woman)
- *“Through immigration; normally we don't keep cattle in our villages, but Sukuma have immigrated with their cows, now we can get milk”* (Kalya elder)

## 2. Family Size, Family Planning and Impact on Income and Natural Resources

The answers to the question on family size compared to those about the impact of family planning seems to contradict each other. Some of the respondents already have large families and offer the benefits of many children but some younger respondents espouse similar opinions. The same group of respondents then offer detailed descriptions of the economic and maternal health benefits of smaller families and birth spacing. Only half of the Rukoma elder group participants expressed a strong dislike of family planning. Possibly, some participants interpret family planning as birth spacing only and not necessarily a large reduction in the number of children they have. Another interpretation is that respondents are repeating what they learned about family planning seminars, but may still opt for having many children. The awareness of family planning benefits was well established in all the groups but on-going training may be needed to change behaviour throughout the community.

The opinions about how family size will help them cope with climate change fell into three general categories:

- a) Large families provide a labour force for farming and can help diversify the family income, and provide a social safety net for parents as they age and older children can help pay for younger children's expenses.
  - *“People with many children can cultivate larger farms.”*
  - *“Having many children helps as each child has its talent and lives according to their talents. One child fishes, others farm, another is a carpenter, so together they can do a lot of things.”*

- *“The one with 8 children, as an example, their ages will be varying, therefore, those who are older will help on bringing household needs. So, both the one with many kids and few kids will be having relief.”*
- *“Parents with many children have huge advantages because children have different thoughts, therefore they give development ideas to their parents, children help on works and old ones help their young ones”*

b) Religiosity influences views on procreation: God determines family size and God will provide the family with what they need.

- *“God will provide: He gives children and income”* (Rukoma elder)
- *“I gave birth to 10 children, and 9 are alive. You can't just argue that if you have a lot of children then you would fail to sustain them. Only God plans for you. I grow cassava and I have managed to take all of them to primary school, though I have failed to take them to secondary school.”* (Mgambo woman)
- *“Giving birth to few children is poverty and having many children is fame and wealth, as religion says. God is the giver and he gives everyone according to his or her needs.”* (Rukoma elder)

c) Families with fewer children will require fewer resources to feed them and send them to school.

- *“Fewer children means a family will consume less, so food lasts longer.”* (Rukoma elder)
- *“With few children it is easy to sustain their needs, if you have few children it is easy to meet their needs compared to the one with many, for instance being able to pay expenses for their education and daily needs.”* (Fisherman)
- *“The one who has few children is better off than the one with a lot of kids. The one with few kids will be healthier and capable of taking care of his/her kids.”*

Most participants in all the groups mentioned positive impact of family planning on household income and maternal and child nutrition. Participants also mentioned that birth spacing helped ease marital tensions that arise when there are children born every year.

- *“Family planning is good, though we are not cursing those who have many kids. If you use family planning methods, life becomes good with enough food for the household. Buying sugar in small amount is not enough for many kids. Nowadays women are the workers; therefore, children have problems if they are so many. If you bear children with a plan, then things go well”* (Kalya woman).
- *“Family planning makes a woman healthy and strong. Because she keeps space between one child and another, a woman can engage in other economic activities like business and increase household income.”* (Kalya elder)
- *“If you have so many little children, your husband will abandon you and go to other women, and for you it will become difficult to save your kids.”* (Kalya woman)
- *“Family planning methods have side effects. It can destroy female reproductive system and in some cases, it can destroy a woman's menstrual cycle. Instead of menstruating once a month, a woman can have it twice or three times a month.”* (Rukoma elder)
- *“Family planning is not good compared to its side effects.”* (Rukoma elder)

Most respondents also recognized that family planning resulted in smaller families and if all families in a community were to use family planning then they would have less impact on the availability of natural resources.

- *“If there is small population, obviously, the land will be enough and environmental conservation will be easier.”* (Fisherman).
- *“We will not exhaust our land through careless cultivation.”* (Mgambo woman)
- *If there are too many people, natural resource destruction will be high. People will fish day and night and the forests will be destroyed.* (Rukoma woman)

## Village Feedback Sessions

### A. Background on Indoor and Outdoor Feedback Sessions

The SFTZ field team partnered with the Tuungane project staff to organize community discussions about the research findings in every village except Kalilani. The facilitators presented a short summary that highlighted village differences, general trends and unexpected changes. Then the facilitators asked if the participants agreed or disagreed with the findings and what caused the changes. The responses were consistent with the focus-group findings.

Initially, the field team planned to hold one community-wide event per village. The Tuungane staff arranged for performances by dance and theatre groups to attract people to the village centre and presented the results at twilight to ensure visibility of the projected slides. The entertainment brought more children and fewer adults than planned, so the team changed strategies and arranged afternoon meetings for adults. About 60 to 80 people attended each of the 12 meetings.

### B. Questions

#### 1. *Is population growth a problem in your village?*

In most feedback sessions and focus groups, people disagreed on population growth. Most assumed that growth came from immigration. A few felt that local population growth was not a problem and often cited religious beliefs for not using family planning methods. Other positive benefits included: larger populations drive economic expansion, more opportunities for development, more customers and an influx of new ideas and technology.

Others said population growth creates inflation, land conflicts, environmental degradation and increases deforestation. Moreover, people feared immigrants would bring HIV, other infectious diseases, crime and moral decay.

Slightly more people did not consider population growth to be a problem, but voting margins between the two camps were small. The team asked this question in every session.

#### 2. *There was a large increase in the capture and use of rainwater in the wet season in this village compared to 5 years ago. Is this true? If so, why?*

Everyone seemed to agree that more people had started to collect rainwater. The two main reasons given were 1) more people now have metal roofs so it is easier to collect rainwater themselves or from a neighbour with a metal roof, and 2) government officials held village assemblies to encourage people to stop drinking contaminated water and collect rainwater.

3. *Why did we find a large drop in households that own radios and clocks compared to 5 years ago?*

Everyone agreed that people have switched from clocks and radios to mobile phones. Older people used radios and younger people use their phones or even television.

4. *Is there a reason why fewer people are borrowing money from COCOBAs?*

Most people said that more education is needed about COCOBAs. Some people fear they could lose their house or other critical assets if they default on a COCOBA loan. Many borrowers had initially used the funds to buy goods and were subsequently unable to repay the loans, so they were unwilling to risk another. Others mentioned that a COCOBA member must buy shares every week, a tough schedule to maintain, and they wanted the flexibility to follow other opportunities.

5. *The survey found there are fewer households involved with fishing (not fish trading) than 5 years ago. Is this true? If so, why?*

Everyone agreed with this result, too. Tuungane and the government had taken away all the illegal nets, and many people stopped fishing when they could not afford to purchase new nets. Other people said that the fish populations have declined so it no longer provided a good income. In Kalya, people said many people have died on the lake because the winds have become unpredictable.

6. *The survey found there are fewer households in the village with latrines that have a concrete slab than five years ago. Is this true? If so, why?*

Most people said that the number of latrines have increased but the number has never been very high. Poor people rarely have them because of the high cost of concrete. In some sessions, 75 to 80 percent of the participants said that the answer must be wrong, as they felt there must be more latrines now.

7. *The survey found that there is more satisfaction with services provided by village and district governments than 5 years ago. Is this true?*

In most sessions, people strongly disagreed with this statement. When votes were taken, 75 to 80 percent disagreed in most villages except Mgambo where the vote was about 50/50 percent. The main complaint is the lack of schools, healthcare dispensaries and other necessities. Others mentioned that the government had failed to complete village projects like a new marketplace.

8. *The survey data show more households can meet their daily needs now compared to 5 years ago. Is this true?*

The reactions to this question varied widely by village. In one village, Sibwesa, 80% agreed that more people can meet their needs. They said that Sibwesa is the best for education. People can both fish and cultivate crops. One person mentioned that people are also in COCOBAs. In Lufubu and Katumbi half of the audience agreed with the result and the other half did not. In Lagosa, 60 percent disagreed and 40 percent agreed. In Ndele (70 percent) and Kashagulu (90 percent) disagreed. The main reason included 1) inflation on food and

clothing; 2) agricultural techniques now required inputs and drought resistant crops; 3) income from fishing has declined; 4) no formal employment available; and 5) it's harder to get food.

9. *The survey found people in the village have more influence over village government decisions than 5 years ago. Is this true?*

In Igalula 70 percent of the attendees disagreed that they now have more influence. One person said the government did not have meetings. Another said that government usually acts if asked. A third said that you must participate to have influence. Nkonkwa participants were divided 50/50 but did not have any comments and Kashagulu attendees did not answer the question.

10. *Why was there a decrease in protected public wells and the increase in open public wells compared to 5 years ago?*

Sibwesa residents explained that the number of public wells has not increased and most people use the open well. In the past, more protected wells existed. Now these wells have either dried up or no longer function.