BASELINE STUDY FOR THE TUUNGANE HEALTH AND CONSERVATION PROJECT

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SUMMARY OF INDICATORS AND PROJECT DESIGN IMPLICATIONS

A baseline socioeconomic assessment in the 10 villages within 20 km of Mahale Mountains National Park was performed in June and July 2011. It used a qualitative-quantitative approach with key informant interviews, focus group discussions, and a survey of 487 households. The margin of error for the aggregate results is + or – 5% and for the village-level results + or – 14%. The World Bank poverty framework was used to assess opportunities, empowerment and security indicators. The 10 Mahale villages are home to an estimated 54,000 people and 8,100 households. Demographically, the area is characterized by:

- 49% of the population under the age of 15, equal to the overall rural Tanzania average but on par with the highest in the world.
- An average household size of 6.7 or 29% higher than the 2010 Tanzania average of 5.2 and among the highest in the world.
- 60% of household heads were not born in the village where they live but have lived there for an average of 22 years, suggesting that there are not currently high levels of in-migration except in the interior village of Lubalisi.

Livelihoods

- 95% of households earn income from farming (subsistence and/or cash).
- 27% of households earn income from farming only.
- 38% get some income from household businesses.
- 27% get some income from fishing.
- 34% of households have at least one person who fishes full or part-time.
- In 69% of households with a fisher, farming is more important than fishing for household income.
- 71% of fishers use a canoe or small boat.
- 16% of fishers use a boat with an engine.
- 25% of fishers own the boat themselves.

- 31% of fishers say inshore species are the most important.
- 80% of fishers say the average catch per trip has declined compared to five years ago.
- 68% of households say they eat less fish than five years ago.
- Only one household said it could save money. The rest have difficulty meeting their daily needs or have just enough.
- 89% of households own or lease land.
- 9% of private land is forest land.
- 39% of people have documents to prove land ownership or leasing.
- A lack of equipment (55%), droughts (41%), a lack of farm inputs (33%), and crop damage by wildlife (29%) are the most frequently mentioned farming problems.

Assets

- Radios are the most commonly owned item (75% of households) but were not always in working order according to the focus group discussions, followed by a paraffin lamp, bed/mattress, clock, mobile phone, iron, solar panel sofa, kerosene cooker, TV, generator and refrigerator.
- 36% of households own bicycles, the most commonly owned mode of transport.
- 49% of households own chickens, 29% own goats, and 24% own ducks.
- 80% of households use an unimproved water source (surface water or open well) during the dry season.
- 33 minutes is the average trip to collect water during the dry season and this is done mostly by women and children.
- 25% of households do not treat their water in any way.
- 71% of households use an unimproved latrine (no concrete slab and/or shared with another household).
- 27% of households own a fuel-efficient stove but 22% of those use it once a week or less.

Education

- 19% of people have no formal education.
- 36% of people have completed primary school.
- School attendance is similar for boys and girls up to the age of 13 when boys become predominant.

Credit

- 35% of households borrowed money at least once in the past year.
- 8% took out a loan to buy food.
- 24% of loans came from Community Conservation Banks (COCOBA) or Savings and Credit Societies (SACCOS).

Housing

- 91% of houses have earth or sand floors.
- 11% of houses have walls made out of poles and mud (the least-expensive option).
- 77% of houses have grass roofs.
- The average household has 2.8 rooms for sleeping.

Empowerment

Governance mechanisms

- 66% of respondents say they cannot influence village government decisions.
- 67% are unsatisfied with the services provided by village and district governments.
- 43% say the relationship between the national park authority (TANAPA) and their village is good (22% say it is bad).

Community participation

- 50% of respondents say their village has an environmental committee.
- 20% have an idea of how often the committee meets.
- 19% of households have a member who participates in a village committee or organization.
- 33% of respondents had attended a village public meeting about land-use planning, a health issue, lake management or forestry management.
- 3% of households said they had participated in a Beach Management Unit.

Security

Natural environment

- 56% of respondents say forest resources are insufficient to meet day-to-day needs.
- 42% of respondents do not know that deforestation can cause siltation.
- 49% do not know that siltation from rivers is harmful to fish in the lake.
- 79% of respondents agree that village forests should be protected.
- 81% agree that Mahale Mountains National Park should continue to be protected.
- 77% agree that wildlife such as chimpanzees should be protected.
- 53% agree that the national park provides benefits for their community.
- 65% of households collect firewood from bush or open lands.
- 27% collect firewood from their own land.
- 8% collect firewood from community forests.
- 75% of households collect firewood at least once a week.
- 6% collect firewood daily.
- 3:28 is the average duration of a firewood collecting trip.
- It's mostly women (not girls) who collect firewood due to the distances.
- 79% of respondents perceive an increase in the village population over the past 5 years.
- 46% do not see this increase as a problem.
- 31% say the increase comes from "many births", and 31% say it comes from migration.

Social cohesion

- 40% or more of respondents in Kalilani, Lubalisi and Sibwesa say disputes about land, forest products or fishing occur "often".
- 48% of respondents mentioned disputes related to land boundaries.
- 40% of respondents mentioned disputes related to trespassing or fishing in the national park.
- Conflicts are resolved by doing nothing (46%), appealing to the local government (36%), and direct negotiations (16%).

Health

- 86% of households had at least one member who suffered from malaria in the past 12 months.
- 67% of households had at least one member who suffered from intestinal worms in the past 12 months.
- 57% of households had at least one member who suffered from typhoid in the past 12 months.
- 54% of households had at least one member who suffered from diarrhea in the past 12 months.
- 52% of households had at least one member who suffered from an eye infection in the past 12 months.
- 42% of respondents perceive that access to medical care is worse than five years ago and 27% perceive it is better.
- 46% of households eat fish “almost every day”.
- 43% eat fish “at least once a week”.
- 10% eat meat or poultry “at least once a week”.
- 42% of the respondents were familiar with the concept of family planning.
- 8.0 was the ideal number of children on average for men.
- 7.2 was the ideal number of children on average for women compared to the rural average in Tanzania of 5.2 (2010 DHS data).
- 17% of the 364 women of reproductive age included in the sub-sample of the survey used contraceptives compared to the rural average in Tanzania of 31% in 2010.
- Not knowing a method of birth control was the most common reason for not using contraception (17%).
- 130/1000 of the children born locally between July and December 2006 did not survive to their 5th birthday, giving Mahale an under-5 mortality that is among the 20 worst in the world. For comparison, the US had an under-5 mortality rate of 8/1000 in 2010.
- 6.7 is the average number of births per Mahale woman.
- 33% of births were wanted later compared to 22% for rural Tanzania in 2010.
- 26 months was the median birth interval compared to 33 months for rural Tanzania in 2010.
- 14% of women aged 15 in the survey (n = 22) had already had their first birth.
- 18 is the median age for first birth in the Mahale area compared to the rural Tanzania average of 19.
- 53% of women reported at least four antenatal visits during their most recent pregnancy compared to 39% for rural Tanzania in 2010.
- 40% of births were attended by a trained nurse, midwife or doctor.
- 98% of mothers reported that their child had been vaccinated for measles.
- 90% of pregnant women and 83% of children under 5 slept under a mosquito net the previous night.
- 17% of infants were given something else to drink besides breast milk during the first three days after delivery.

Implication for the Tuungane project design

The project design team should consider several factors when developing the conservation and health project activities.

The road. The project design team should plan that the long-delayed road connecting the Mahale villages to the rest of Tanzania is likely to happen sooner rather than later, and this will open the area to much greater resource extraction. Having community-based natural resource management mechanisms and land-use plans in place before new migrants follow the road to Mahale will greatly enhance the sustainability of future natural resource use.

Health. Getting basic health care and reproductive health in place will reduce local birth rates, reduce the burden of disease, and boost the local economy. The design team should ensure that this very tangible benefit is clearly linked to the overall project to aid the more challenging project elements such as organizing community co-management of fisheries resources which are likely to take more time.

Education and outreach. Given the young age of the Mahale population, education on environmental issues and reproductive health will be vital. Outreach could include themed radio dramas such as those provided by www.mediaimpact.org and a Rare Pride social marketing campaign (www.rareconservation.org). Remember that outreach is first about building trust and then about changing knowledge, attitudes and practices. In the medium term, integrating environmental education and reproductive health into the local school curriculum would help with long-term sustainability but in the near-term simply having teachers at area schools would be a clear improvement. As one woman noted in the focus group discussions, "most children end up playing under the trees because there is no use to go to class with no teachers around."

Formal property rights. Only 39% of households have documents to prove land ownership or leasing rights. Formal property rights are important for long-term investment of land improvements such as irrigation. Facilitating government efforts to register land holdings may be challenging but is a long-term way to ensure land-use plans are actually implemented.

Formal near-shore fisheries management. Establishing community-based co-management of near-shore fisheries, especially for fish spawning areas, is a proven way to increase fish catches and improve fisheries management. Consider taking local leaders on a study trip to the community-based fisheries project in coastal Tanzania (BALANCED project).

Village community organizers in each village. There is a growing number of studies showing that having a paid local person in each community to organize and facilitate the development of community organizations is catalytic.

Build on local traditions of resource management. Several village leaders in the focus group discussions noted that there are existing traditions forbidding the cutting of certain kinds of trees. Understanding how these traditions work could provide the basis for expanding or reinforcing the traditions as a resource management strategy. It is a good investment to bring in a local researcher to study the traditions and see if they can be scaled up. Building on what already exists is generally more sustainable than building something new.

Telecommunications. Encourage more mobile phone service providers to extend their coverage to the Mahale villages. There are 50,000 people in the area, and even with no coverage until just after the survey ended, 17% of households own mobile phones already. Share these results with mobile phone service providers and note that the new project will be working in the area as a way of encouraging interest. Consider a cause-related marketing campaign that would link the national park with a phone service provider.

Success factors. Able local leadership, a low level of community conflict, and conflict resolution mechanisms are known factors for the successful community management of natural resources. We measured these factors in the survey and explored them in the focus group discussions. Starting project activities in villages with better leadership, lower levels of conflict, and better conflict resolution mechanisms will increase our chances of long-term success. Based on the data for these three factors, greater project success is likely in three villages (Buhingu, Katumbi and Nkongkwa), modest success in four villages (Rukoma, Kalya, Kashagulu and Kalilani), and little success in three villages (Sibwesa, Igalula and Lubalisi). Also consider letting groups from different villages share experiences, and later on, let successful groups teach others.

Establish community wood lots and agroforestry. This is likely to have greater long-term benefits for reducing deforestation than fuel-efficient stoves. Tanzania has several community forestry initiatives, and there are good trainers available in community forestry and agroforestry. Some villages already have village forests.

Development by Design. Actively engage on the siting of the road to link Mahale with the rest of Tanzania and consider using some of the GIS tools and expertise developed by the Conservancy's Development by Design team to minimize the ecological impact of the road.

Provide agriculture extension. This is probably mission drift for the project, but agriculture is the single biggest way to improve lives in Mahale given that 95% of households earn income from agriculture, and there is much that could be done to improve crop yields.

One project. All project staff should be under one administrative structure, with one budget and one project leader who is located in Mahale or nearby. The Integrated Conservation and Development literature is rife with examples where the development and conservation activities were done in parallel with the best of intentions but where the separate implementation structures for development and conservation activities resulted in synergies being zero or even negative. It's a common pitfall to say we'll do our work and you can do yours. The synergies come from having a meeting with women about a community woodlot that also covers the new reproductive health services available at the local clinic. Try to link the benefits to the presence of the natural environment (fish, chimpanzees, forest).

Map of assessment villages

1 INTRODUCTION

1.1 BACKGROUND OF THE STUDY

In the far west of Tanzania along the shores of Lake Tanganyika lies the greater Mahale ecosystem. The 1,613 km² Mahale Mountains National Park anchors the ecosystem and is the traditional homeland of the Tongwe and Waholoholo tribes. In June 2011, an estimated 54,000 people lived in the 10 villages to the north, south and east of the park. The western boundary of the park includes a 1.6-km wide strip of coastal waters along Lake Tanganyika where fishing is prohibited.

Farming is the dominant livelihood strategy, 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*. Access to major markets is poor due to a lack of roads, and the nearest major market (Kigoma) is 20 to 30 hours away by ferry boat, depending on weather conditions on the lake.

A diversity of ethnic groups live in the 10 villages but largely share the lingua franca of Kiswahili.

This assessment was designed to cover the expected components of a new Mahale population, health and environment (PHE) project that addresses fisheries, forestry and primary and reproductive health.

Within 20 km of the park boundary, there are six villages to the north of the park, three to the south, and one to the east. Villages in Tanzania are large administrative units, divided into sub-villages which can have several thousand inhabitants each. This is a baseline assessment of the socioeconomic conditions for these 10 villages, and is intended as a reference point to measure changes over time and changes in villages affected by the new PHE project compared with those that are not.

In designing this study, the Nature Conservancy drew on work done through PHE projects in Tanzania, Madagascar and the Philippines. The team also benefited from project-partner Pathfinder International's expertise in calculating the sample size and identifying questions from the Tanzania Demographic and Health Survey of 2010, and from project-partners Frankfurt Zoological Society's and the Tanzanian National Park Authority's advice and support for the fieldwork. The study team benefited considerably from a previous socioeconomic study in the project area. In 2006, an EU-funded team assessed a range of socioeconomic indicators using a sustainable livelihoods framework and 477 individual interviews across 11 villages and sub-villages (Harrison, 2007).

1.2 METHODOLOGY

Household welfare in the area was assessed following the World Bank's multi-dimensional definition of poverty (World Bank, 2001). This framework is more intuitive than the sustainable livelihoods framework used in the 2006 survey, has a specific poverty focus, and includes empowerment. The three dimensions of the World Bank poverty definition, opportunities, empowerment and security were subdivided into a set of focal areas that are presented in Table 1. The focal areas were taken from van Beukering et al. (2007) and adapted to fit the local circumstances. Income is often used an Opportunities indicator, but due to the high seasonal fluctuations of income in the area and the general difficulty of obtaining reliable income estimations from recall data, income data were not collected, and a wealth index was created as a proxy instead.

Table 1 Poverty focal areas

OPPORTUNITIES	EMPOWERMENT	SECURITY
Livelihoods	Governance mechanisms	Natural environment
Assets	Community participation	Social cohesion
Housing		Health
Education		
Access to credit		

The 10 focal areas were assessed using both qualitative and quantitative tools for a "mixed methods" approach. This offers the benefits of the deeper, contextualized information that one-on-one interviews and focus group discussions provide, and the ability to compare community attributes and response through statistical analysis.

A household survey provides data for the quantitative analysis. The questionnaire for the survey was developed in the spring of 2011 in partnership with several PHE experts, after which it was translated in Kiswahili, discussed with the team of enumerators, and finalized after two rounds of pre-testing in the village of Buhingu (34 and 18 interviews in the first and second pre-test, respectively). The survey team consisted of 12 Tanzanian college graduates, some of whom were experienced interviewers, and some of whom were from the area. The team was led by an experienced supervisor. The enumerators were trained during a two-day session, prior to the pre-tests, and further instructed during and after the pre-test. The survey fieldwork took place from 14 June to 9 July 2011 (26 days).

Villages were selected for inclusion in the study based on proximity to Mahale Mountains National Park (20 km or less) and field knowledge of villages dependent upon the natural resources provided by the park, including fish spillover from the no-take zone, clean water, and bush meat. Ten villages were: Rukoma, Lubalisi, Igalula, Buhingu, Nkonkwa, Katumbi, Kalilani, Sibwesa, Kalya and Kashagulu.

The total sample size was calculated based on the anticipated prevalence rate of key indicators as per Mangani (1997). Prevalence rates were determined from the 2006 household survey in the project area (Harrison, 2007). For indicators where the prevalence rate was unknown, an estimate of 50 percent was used. The minimum sample size for a 5 percent margin of error with a design effect of 1 was 348 households. To enable village-level comparisons, the sample size was increased to a target of 500 households with the goal of 50 in each of the ten villages.[1]

A sample frame for the survey was drawn up by collecting population data on village and sub-village levels. This process was completed 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 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. Table 1 shows the distribution of sub-villages.

[1] These village sample sizes allow distinction at statistically significant levels of the most divergent villages on a particular variable, but smaller differences between the villages are generally not statistically significant.

Kalya, Buhingu and Kalilani only have coastal sub-villages. In Kalya, two coastal sub-villages were selected to obtain more geographical spread. In Buhingu, only one sub-village was included because pre-testing had already been conducted in two others. In Kalilani, only one sub-village was willing to participate in the survey, and only 30 interviews were carried out due to its small population. Only one sub-village was included in Lubalisi due to the logistical challenges of reaching this isolated inland village.

After the selection of the sub-villages, lists were drawn up of all sub-village households with the help of the sub-village chairman, and the target sample for each sub-village was randomly drawn from these lists. Five to ten extra households were selected for each sub-village to serve as replacements in case households were unavailable. A check was made with the chairman that the selected households were indeed all still present. Maps of the sub-villages were sketched marking the rough position of each household so enumerators could be assigned a cluster of households to survey. Depending on the geographical distribution of the village and the selected households, the survey team divided into two or more groups.

The questionnaire itself covered the household situation, access to services, household assets, farming, forest products, livelihoods, credit, governance, community participation, health, medical care, population and environment linkages, and included separate sub-sections on fishing for those who self-identified as fishers and reproductive health for women between the ages of 15 to 49. The health and reproductive health sections used the same questions as the 2010 Tanzania Demographic and Health Survey (DHS) administered by the national government wherever possible to allow for national and regional comparisons. The English and Kiswahili questionnaires can be found in the appendices.

In the sub-section of the questionnaire on fishing, respondents were given 10 small stones and asked to show proportionally the importance of each identified livelihood activity they were involved in. The 10 stones were also used for questions about fish catch sales versus consumption, and the importance of different fish species in the total catch.

During the survey, each evening the field supervisor randomly checked a sample of the interview data sheets to ensure they were done correctly. A dedicated data-entry person input the interview data into a pre-structured Excel database using data validation functions to minimize entry errors. The Excel database was in turn converted into a SPSS database for data cleaning and analysis.

The data analysis included propositional comparisons and statistical significance using Chi2.

On the qualitative side, semi-structured key informant interviews were conducted with school teachers, school teachers' spouses, fishers, and village elders. These interviews were used to fine-tune the focus group discussion protocols that were developed with local partners.

Six semi-structured focus group discussions were held with village leaders, women and fishers from the four main villages in the north (Buhingu, Katumbi, Igalula and Nkongkwa) and the three villages in the south (Sibwesa, Kalya and Kashagulu) of Mahale Mountains National Park. The participants were identified by Frankfurt Zoological Society local staff and local leaders and invited to participate several days in advance of the discussions. Participants were given a 4000 TSHS lunch allowance to cover the cost of a meal away from home.

The discussions lasted about two hours on average and were led by a trained Tanzanian facilitator. For the focus groups involving women, a female facilitator was used to encourage discussion. Two translators took English-language notes of the Kiswahili discussions. A helper assisted the facilitator by writing the points raised by participants on poster paper in Kiswahili. The number of participants ranged from 6 to 11. Focus group participants were asked about a range of 10 to 15 issues including the biggest problems in their villages.

Table 2 Sampling design			
Villages	**Number of households**	**Planned sample**	**Number of interviewed households**
Rukoma[2]	901		
Kapepe (inland)	329	29	30
Lugongoni (coastal)	151	21	23
Lubalisi (guestimated)	600		
Ikubulu (inland)	200	50	49
Igalula	1117		
Igalula (inland)	157	21	20
Ndele (coastal)	321	29	31
Buhingu	1225		
Lubundui (coastal)	356	50	55
Nkonkwa	402		
Keshala (inland)	222	28	29
Katembwe (coastal)	180	22	20
Katumbi (coastal)[3]	396	50	50
Kalilani	475		
Katumba Stolo (coastal)	100	50	30
Sibwesa	601		
Tupendane (inland)	142	14	20
Songambele (coastal)	206	36	30
Kalya	1102		
Kagwila (coastal)	213	30	30
Kankumba (coastal)	157	20	20
Kashagula	1356		
Mji Mwema (coastal)	216	29	29
Kisinsa (inland)	151	21	21
Totals	8175	500	487

[2] The number of households was estimated using the known total population in Rukoma divided by the average household size in Rukoma village as per the survey (7.5).

[3] Katumbi is officially is still a sub-village of Nkonkwa, but it applied for separate village status which has already been approved. For this reason, it was treated as a separate village. Katumbi has no sub-villages.

2 QUALITATIVE ANALYSIS

2.1 VILLAGE LEADERS

Focus group discussions were held with 11 male village leaders in the north representing four villages and 10 village leaders in the south of Mahale representing three villages. After a list of all the major issues in the villages was compiled, participants were given three sticky dots each to vote for the three most important issues.

Three top issues of the leaders from northern villages were:

1. No infrastructure especially roads (12 votes)
2. Education is inadequate (10)
3. Health services are inadequate (10)

Three top issues of the leaders from southern villages were:

1. Health services don't meet demand (7 votes)
2. No telephone communications (6)
3. No roads (5)

All the village leaders felt life was harder than five years ago. Declining income from agriculture was a major reason for this. Participants noted the declining soil fertility, drought, the lack of irrigation for farmland, and the high prices for inputs as drivers for the decline.

In both the north and the south, village leaders said land use disputes are the most common source of local conflicts. Leaders said there were conflict resolution mechanisms in their community for addressing such issues with several levels of appeal possible.

In the north, village leaders said they have the power to exclude outsiders from fishing and cutting trees in their areas. In the south, the leaders said they did not have the right to exclude outsiders from fishing or tree cutting.

In both the north and the south, there are resource management traditions in forestry that prohibit the cutting, for example, of Mlumba, Mparamsi and Mzungu-pori trees. There may be scope for the new project to build on these traditions.

The village leaders felt the District Government was not helpful and that village leaders were the ones best placed to address local issues.

2.2 WOMEN

Focus group discussions were held with 6 women in the north representing two villages and 11 women in the south of Mahale representing three villages. The three challenges faced by their communities ranked highest by women from northern villages were:

1. Shortage of teachers (6 votes)
2. Inadequate nurses (4)
3. No means of communications (4)

The three top issues of the women from southern villages were:

1. Health problems for women (8 votes)
2. No sure means of transport (6)
3. Bad economic situation (6)

The women said that their families are eating less fish now than five years ago because there is less fish to catch. They explained that eating poultry is also uncommon because it is expensive, and chickens often die of disease before they can be eaten.

Several other noteworthy points were made by the women. The first is that women and a few men are the ones who mostly collect firewood. Children rarely go because the distances are so far. The second is that the women said they almost never listen to the radio because they do not have one that works or have no time. This has implications for using radio programs for community outreach and education.

Women felt they could not influence village decision making. In the south, the women were outspoken about the poor quality of the male village leaders in Kalya and Kashagulu.

2.3 FISHERS

Focus group discussions were held with 10 fishers in the north representing four villages and 9 fishers in the south of Mahale representing three villages. Fishers from northern villages identified the three most pressing problems in their community as:

1. No telephone communications and infrastructure like roads (7 votes)
2. Weak fishing equipment (6)
3. Pirates (5)

The three top issues of the fishers from southern villages were:

1. Pirates (9 votes)
2. No sure/steady market for fish (9)
3. Conflict between fishers and Mahale Mountains National Park people (6)

Pirates from the Congo were seen as one of the biggest issues for fishers. Fishers explained that pirates come haphazardly but often near public holidays or festivals when people in Congo need money. Village fishers said they need escorts from the government and a means of communication when fishing such as cell phones to combat the pirates.

The fishers said that more than half the fishers they know fish just for dagaa and migabuka (offshore) and about 20 percent fish just for kuhe and ndudu (near shore).

When asked the best ways to ensure their children could still catch the fish they need, the fishers put forth a number of suggestions, including avoiding breeding areas and using non-destructive fishing equipment that does not destroy small fish and fish eggs.

The local government and the fishers themselves were seen as the best people to manage the local fisheries. Among fishers, there were established local conflict resolution mechanisms.

3 QUANTITATIVE ANALYSIS

3.1 SAMPLE

The quantitative analysis is based on a sample of 487 households. The distribution of the sample over the ten villages is shown in Table 3. The average interview lasted 57 minutes.

Table 3 Sample overview

Village	Total number of households	Sampled Households	Proportion of the sample	Confidence interval	Number of fisher interviews	Number of women interviews
Rukoma	901	53	11%	86.9%	12	41
Lubalisi	600	49	10%	86.6%	0	40
Igalula	1117	51	10%	86.6%	9	33
Buhingu	1225	55	11%	87.1%	16	39
Nkonkwa	402	49	10%	86.9%	11	37
Katumbi	396	50	10%	87.0%	14	39
Kalilani	475	30	6%	82.8%	17	23
Sibwesa	601	50	10%	86.7%	19	36
Kalya	1102	50	10%	86.5%	14	37
Kashagulu	1356	50	10%	86.4%	24	37
Total	8175	487		95.7%	136	362

3.2 RESPONDENT CHARACTERISTICS

Household questionnaires were largely completed by the household head (58%), or his or her spouse (28%). The average age of the respondents for this section was 37, with a range of 15 to 97, roughly split between male and female.

The 136 fishers who participated in the survey were almost exclusively male (98%), and usually the head of the household (73%). The average age of the fisher respondents was 34 with a range of 15 to 76.

The respondent to the reproductive health section was usually the wife of the household head (68%) and had an average age of 30.

Table 4 General respondent characteristics			
	Household section	**Fisher section**	**Reproductive health section**
Household role			
Household head	58%	73%	8%
Spouse	28%	4%	68%
Son/daughter	7%	16%	10%
Other	6%	7%	14%
Total	100%	100%	100%
n	487	135	362
Sex			
Male	53%	98%	-
Female	47%	2%	-
Total	100%	100%	-
n	487	136	-
Age			
Average age	37	34	30
15-19	4%	7%	6%
20-24	10%	11%	20%
25-29	17%	20%	25%
30-34	16%	18%	21%
35-39	13%	13%	11%
40-44	7%	6%	7%
45-49	9%	10%	7%
50-54	8%	4%	-
55-59	5%	4%	-
60-64	2%	0%	-
65-69	1%	1%	-
70+	3%	0.7%	-
Don't know	4%	5%	3%
Total	100%	100%	100%
n	487	136	362

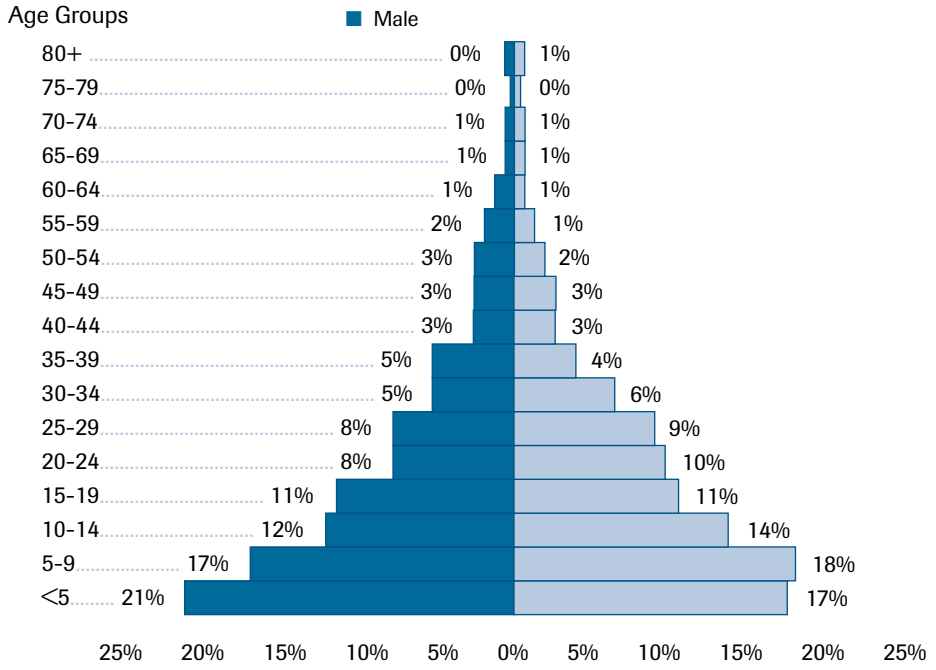
3.3 GENERAL HOUSEHOLD INFORMATION

This study uses a common definition of what constitutes a household: a group of people who live and usually share their food together. In Mahale, the survey found that almost all household members were related, either through blood or marriage, to the household head. Just 0.3 percent of the members were not; they were friends or worked for the household. Nearly half the population of the surveyed households was under the age of 15 (Figure 1). The same was found in the 2010 DHS survey for rural Tanzania (NBS & ICF Macro, 2011). Most of the other half of the Mahale population is between 15 and 64; people aged 65 and older only make up 2 percent.

There is a notable and statistically significant difference in the proportion of girls and boys between 0 and 5. It is not clear what caused this.

Age was unknown for roughly 5% of household members.

Figure 1 Population pyramid



The average household size in this survey was 6.7. This is larger than the 5.2 members found in the 2010 DHS survey for rural Tanzania (NBS & ICF Macro, 2011) but similar to the household size of 6.6 found in the 2006 survey of the area (Harrison, 2007). Female household heads make up 16 percent of the sample, which is lower than the national rural average, but similar to findings from the 2006 survey (Table 5).

Table 5 Mean household size and female household heads

	Current survey	2006 Mahale survey	2010 DHS
Mean household size	6.7	6.6	5.2
Proportion of female headed households	16%	12%	25%

Only 18 percent of female household heads are married, compared to 82 percent for all heads. The majority of female heads are either widowed (52%) or divorced or separated (26%) (Table 6).

Farming is the typical main activity among household heads, and trading is more common among female than male heads. Fishing is the main activity of only 6 percent of all household heads.

Table 6 Marital status and main activity of the household head (%)

	All household heads	Female household heads
Marital status		
Married/living together	82	18
Divorced/separated	7	26
Widowed	9	52
Never married	2	4
Total (%)	100	100
n	487	77
Main activity		
Farmer/livestock keeper	80	79
Trader	6	12
Fisher	6	0
Own business	2	1
Other	5	8
Total (%)	100	100
n	487	77

The most common tribal affiliations of the household head are Ha and Tongwe (Table 7). There are no Tongwe in Kalilani, however, where Bembe form the biggest group.

Table 7 Tribal affiliation (%)

	Ha	Tongwe	Bembe	Fipa	Goma	Other	Total	*n*
Rukoma	57	34	2	0	8	0	100	53
Lubalisi	57	18	8	10	0	6	100	49
Igalula	61	31	2	2	0	4	100	51
Buhingu	58	20	2	11	5	4	100	55
Nkonkwa	65	29	2	0	0	4	100	50
Katumbi	36	34	14	4	2	10	100	50
Kalilani	27	0	43	0	20	10	100	30
Sibwesa	40	16	10	28	0	6	100	50
Kalya	32	52	2	4	2	8	100	50
Kashagulu	26	36	14	16	0	8	100	50
Overall survey	47	28	8	8	3	6	100	487

Overall, 40 percent of the household heads were born in the village where they lived at the time of the survey (Table 8). Lubalisi, the only completely inland village included in the survey, stands out with only 2 percent of household heads born there. Moreover, people not born there have lived there for a relatively short number of years. Excluding Lubalisi, there was no statistically significant difference between the six inland sub-villages and the nine coastal sub-villages sampled for the number born elsewhere. This suggests that there has not been a high level of recent migration to the inland sub-villages sampled in recent years.

Table 8 Proportion of household heads born in the village

	Yes	No	Ave. years spent if not born
Rukoma	51%	49%	23
Lubalisi	2%	98%	9
Igalula	51%	49%	28
Buhingu	47%	53%	26
Nkonkwa	47%	53%	28
Katumbi	31%	69%	21
Kalilani	52%	48%	18
Sibwesa	20%	80%	26
Kalya	40%	60%	30
Kashagulu	44%	56%	24
Overall survey	40%	60%	22

4 OPPORTUNITIES

4.1 LIVELIHOODS

Income sources

Ninety-five percent of households are involved in farming, and 27% identify it as the sole source of household income. Except for coastal Kalilani, which is highly dependent on fishing, all villages show proportions of more than 90 percent farmers, with respondents in Lubalisi and Sibwesa comprising entirely farming households.

Household businesses form the second most common source of income. Some specific trades mentioned were carpentry and serving as a traditional healer, but most respondents only indicated business in general.

Fishing is the third most prevalent source of income but is absent in inland Lubalisi and most important in Kalilani.

Rearing livestock is mentioned by 22 percent of the households and fish trading by 13 percent.

Respondents were also asked about the two main activities that provided cash income. Agriculture is mentioned most often. For 27 percent of the households it is the only source, and 67 percent mentioned it in combination with another source (31% with business and 19% with fishing). Fishing, in combination with other sources, was mentioned by 21 percent as one of the two most important sources of cash income.

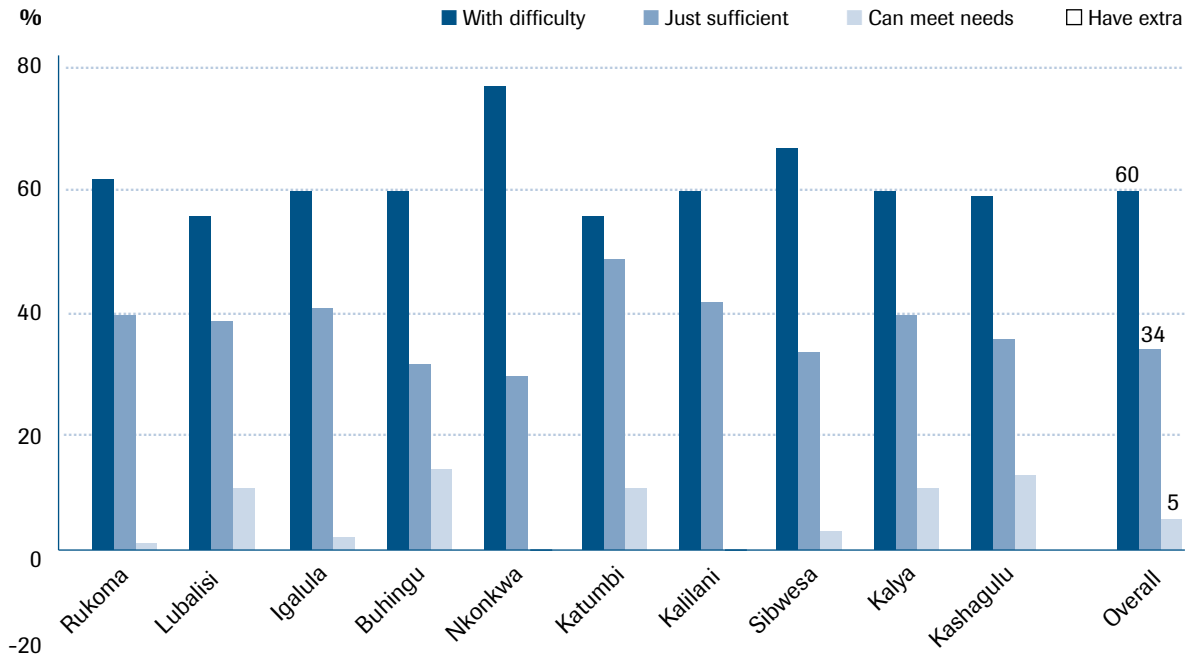
Table 9 Income sources at village level (% of households mentioning a source)

	Agriculture	(Household) Business	Fishing	Livestock	Fish trading	Employed	Temporary work	*n*
Rukoma	96	32	19	26	13	0	2	53
Lubalisi	100	18	0	14	2	0	4	49
Igalula	92	45	22	24	10	2	4	51
Buhingu	98	55	25	18	11	4	0	55
Nkonkwa	98	31	16	12	10	2	4	49
Katumbi	92	50	30	22	12	4	4	50
Kalilani	73	37	60	17	33	3	3	30
Sibwesa	100	36	42	34	20	0	2	50
Kalya	96	42	26	22	8	8	2	50
Kashagulu	98	36	46	26	16	4	0	50
Overall	95	38	27	22	13	3	2	487

Household welfare self-assessment

Nearly 95 percent of households indicated that they either have difficulty meeting their daily needs or have just enough (Figure 2), and only one household in Sibwesa said it could save money. Even though there are some differences, this general picture roughly applies to all villages.

Figure 2 Self-assessment of the ability to meet daily needs at village level



Farming and livestock

Considering the importance of agriculture for households' income, it is not surprising to find that a large majority (89%) either own or lease land (Table 10). This figure is higher in villages more dependent on farming, such as Lubalisi, where all households have land, than in those more dependent on other income sources, such as Kalilani, where 60 percent of respondents own land.

The average size of a household's landholding is 5.3 acres, but this is skewed by a number of very large landholdings; the median value is 3.0 acres. It is common to have more than one plot of land, with the average being 1.6 plots per household.

Most of the land is used for farming, but 9 percent is forest land. In some villages, the percentage of forest land is more than double this, but because the number of households with forest land is low, these data are imprecise (Table 11).

Plots were acquired through purchase (37%), allocation by the village (25%) or inheritance (24%) (Figure 3). Nine percent of the plots are rented. In some occasions open land was simply taken over, but from the data this does not appear to have happened very often (3%).

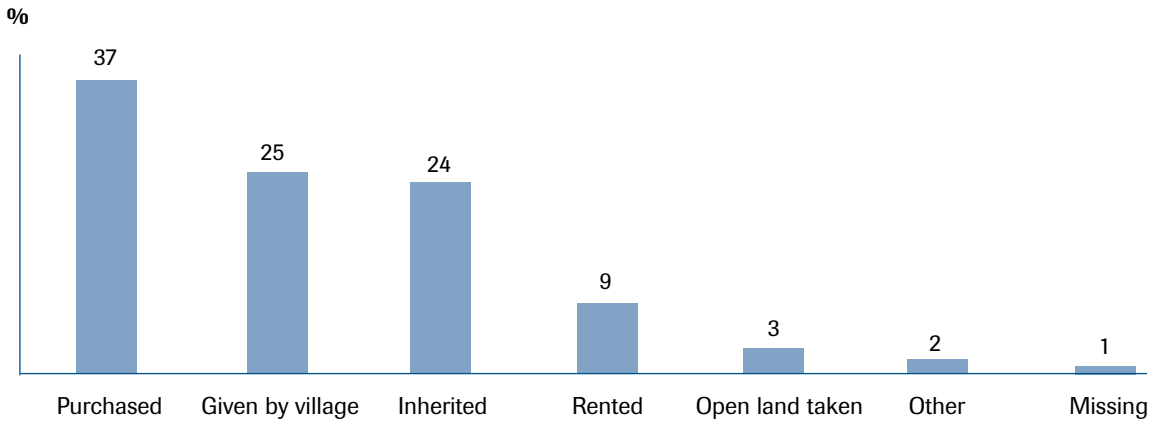
At village level, Lubalisi has the lowest proportion of inherited land, which corresponds to the low proportion of household heads that were born in the village (Table 12). In Kalilani it is less common for the village to give out land than in the other villages.

Households have documents to prove the ownership or lease for 39 percent of the plots. Corresponding to the acquisition method, the majority (70%) of these documents are sales agreements, while 23 percent are village documents, and 7 percent are lease agreements.

Table 10 Landholdings

	Proportion of HHs with land	Mean land size (acres)	Median land size (acres)	Mean no. of plots	Proportion of forest land
Rukoma	91%	9.1	4.0	1.5	19%
Lubalisi	100%	11.0	7.0	1.7	5%
Igalula	86%	5.0	3.0	1.8	7%
Buhingu	89%	3.5	2.0	1.6	19%
Nkonkwa	88%	3.8	3.0	1.6	5%
Katumbi	86%	3.3	2.4	1.8	4%
Kalilani	60%	2.2	1.5	1.2	15%
Sibwesa	94%	4.0	3.0	1.5	6%
Kalya	94%	4.8	2.5	1.6	0.4%
Kashagulu	90%	3.9	3.0	1.8	11%
Overall	89%	5.3	3.0	1.6	9%

Figure 3 Land acquisition method in percentage of all plots



The most commonly grown crops are cassava and maize (Figure 4). Beans are another important crop in the region, and in Lubalisi they are grown more than cassava. Rice is most commonly grown in Kalya and Kashagulu. Besides the main crops shown below, fruits, such as oranges and pineapples, and sugar cane were mentioned by one or two respondents.

The crops grown depend on a number of factors, including the suitability of the land for specific crops, and these factors may differ between sub-villages within the same village.

Table 11 Land acquisition method at village level (% of plots)									
	Inherited	**Purchased**	**Given by village**	**Rented**	**Open land taken**	**Other**	**Missing**	**Total**	***n* (plots)**
Rukoma	30	27	29	8	3	3	-	100	73
Lubalisi	12	37	34	5	10	2	-	100	82
Igalula	32	33	33	1	-	1	-	100	79
Buhingu	20	35	33	9	3	1	-	100	80
Nkonkwa	14	39	34	9	1	3	-	100	70
Katumbi	24	53	14	7	-	1	1	100	76
Kalilani	29	43	10	14	-	5	-	100	21
Sibwesa	35	30	17	8	8	1	-	100	71
Kalya	28	33	16	20	-	3	-	100	75
Kashagulu	19	43	16	12	5	-	5	100	83
Overall	37	25	24	9	3	2	1	100	710

Table 12 Crops grown at village level (proportions of household with land growing the crop)									
	Cassava	**Maize**	**Beans**	**Sweet potato**	**Rice**	**Ground-nuts**	**Palm crop**	**Banana**	**Vegetables**
Rukoma	94	79	67	40	35	31	42	35	29
Lubalisi	67	88	84	20	2	8	0	16	6
Igalula	95	86	75	32	5	18	34	27	23
Buhingu	96	73	49	35	35	14	14	12	12
Nkonkwa	98	91	67	42	19	28	19	19	16
Katumbi	91	84	51	35	14	19	35	12	19
Kalilani	94	83	61	22	0	28	11	22	11
Sibwesa	91	91	9	17	9	55	6	0	4
Kalya	79	72	28	30	51	21	11	17	11
Kashagulu	89	87	49	20	51	13	13	13	16
Overall	89	83	53	30	24	23	19	17	15

The most commonly mentioned farming-related challenges were a lack of equipment, droughts, a lack of farming inputs, and crop damage by wildlife (Figure 5). The village-level results are presented in Table A1 in the appendices, and the most pressing challenges differ between villages. Droughts are mentioned especially often in Katumbi and Kashagulu, while damage by wildlife is mentioned far more often in Kalilani.

Figure 4 Crops grown

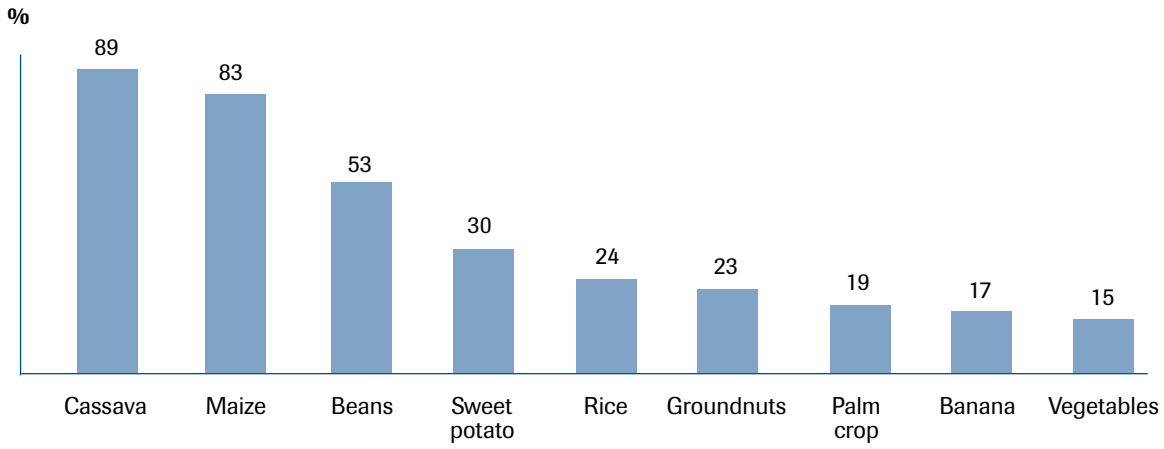
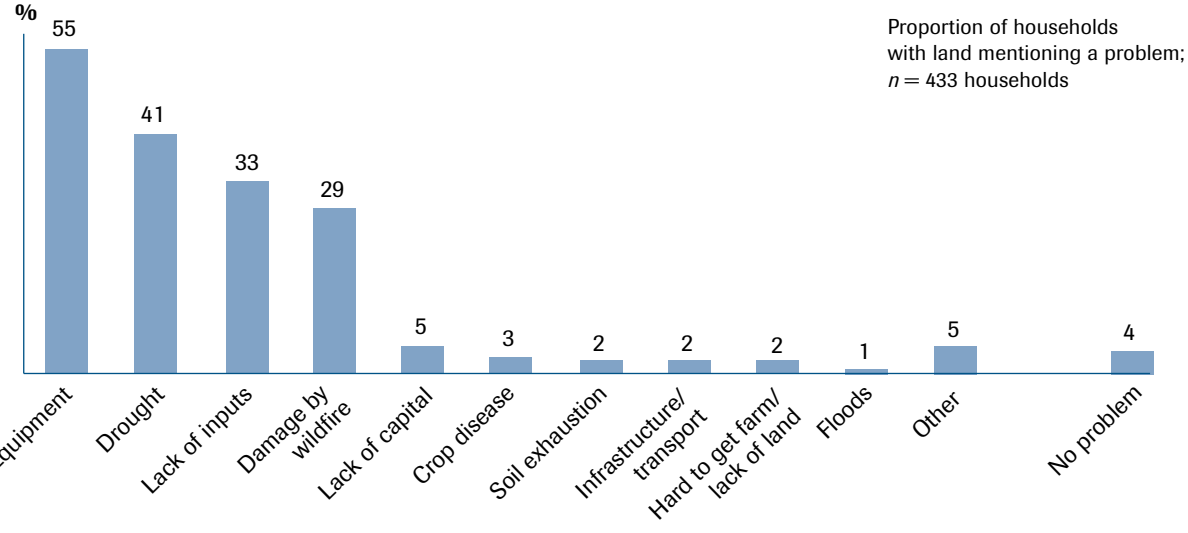


Figure 5 Farming problems



Chickens were the most commonly reported type of livestock, held by 49% of households, followed by goats (29%) and ducks (24%). In Lubalisi, ducks are rarely held and goats are scarce in Kalya. Two respondents kept pigs.

	Chickens		Goats		Ducks	
	Households that have chickens (%)	Mean no. of animals	Households that have goats (%)	Mean no. of animals	Households that have ducks (%)	Mean no. of animals
Rukoma	49	6.3	32	5.5	32	7.2
Lubalisi	61	7.5	33	3.9	4	7.0
Igalula	35	3.3	45	3.9	25	7.2
Buhingu	35	4.0	16	5.0	27	5.7
Nkonkwa	31	3.7	39	4.3	35	5.5
Katumbi	46	6.9	32	4.8	24	6.8
Kalilani	50	5.5	20	3.2	27	3.8
Sibwesa	68	8.9	40	5.3	22	7.4
Kalya	54	6.8	8	3.0	12	7.3
Kashagulu	60	6.0	24	4.5	36	5.9
Overall	49	6.3	29	4.5	24	6.3

Fishing

Fishers, including those engaged both full and part time, are found in 34 percent of the households, and in 25 percent of households the household head is a fisher.

Kalilani has the highest proportion of fishing households (70%), followed by Sibwesa and Kashagulu, which both have 54% fishing households. Unsurprisingly, in inland Lubalisi there are none. In most fishing households there is only one fisher, though 19% have two or more. Fishers are almost exclusively male (96%).

The vast majority of households engaging in fishing participate in other economic activities as well. Even for those who identify fishing as the most important economic activity (58% of fishing households), four out of five identify other activities.

In the ranking exercise for sources of income among fisher households, farming was still rated the highest (4.7 stones on average) while fishing followed closely (4.0 stones), and all other activities received less than one stone on average. In 69 percent of the households with a fisher, farming was more important than fishing for household income. The opposite is true in the other 31 percent,

Fishing was ranked very highly as an important activity in coastal Kalilani. Interestingly fishing is also ranked as very important in Igalula, where only 22% of households contain fishers. For the fishers of Rukoma, Buhingu and Sibwesa fishing is relatively less important than the other economic activities they engage in. Some caution should be applied when interpreting inter-village differences, because of the relatively low number of fishers interviewed in each village.

Almost all respondents use a boat (Table 13). Fishing from the shore in this area is also common, but mostly done by children. It could also be that, although explicitly included in the question, “stick fishing”, as fishing from the shore using a pole and line is known, was not considered “real” fishing by most respondents and therefore largely missed in the survey.

Figure 6 Proportion of households with at least one fisher at village level

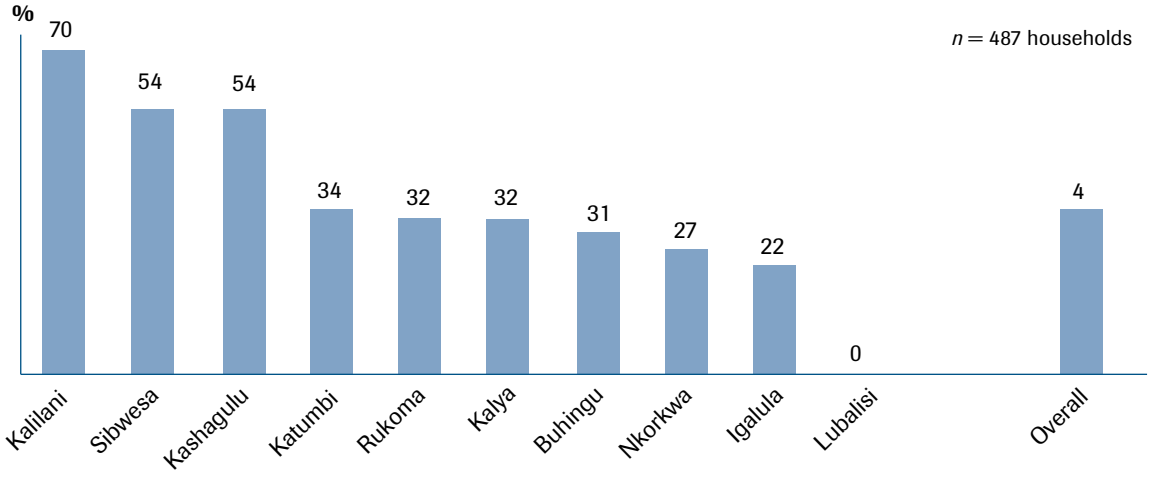
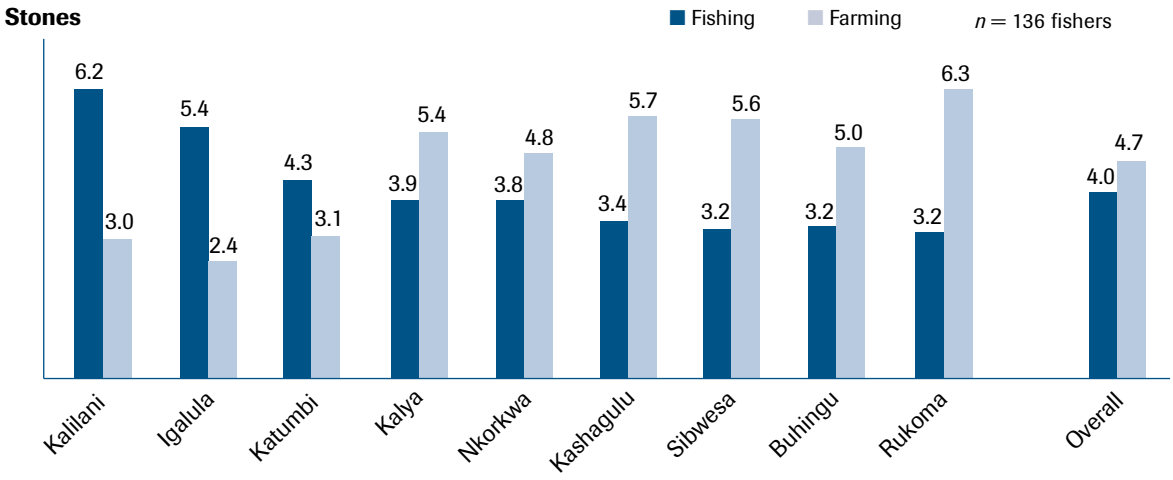


Figure 7 The importance of fishing and agriculture for fishers' income



Most fishers use a canoe or small boat (71%), with the remainder fishing from large boats, a little over half of which have engines. Canoes or small boats are the most common type in all villages except Sibwesa where 42 percent of fishers use large, engine-powered boats (Figure 8). In Kalilani, the village most dependent on fishing, no engine-powered boats were reported.

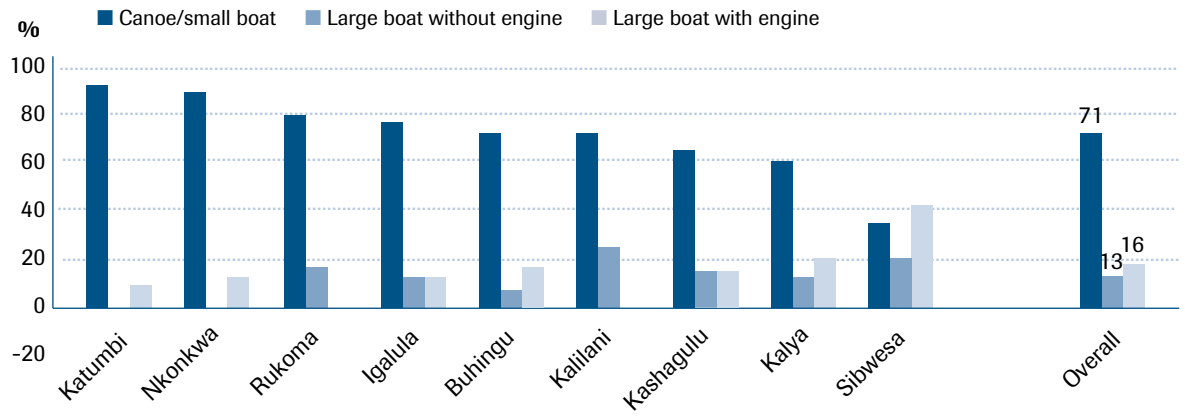
While almost all fishers use boats for fishing, only about a quarter of fishers own a boat themselves. Small boats and canoes are owned only slightly more often than larger boats: 28 percent of those who fish from a small boat or canoe own their vessel, while 24 and 17 percent own boats with and without engines, respectively. Boat ownership is least common in Kalya (7%) and most common in Katumbi (50%).

Overall, 65 percent of fishers work for themselves, rather than being employed. The proportion is larger for those fishing from small boats (71%).

Table 13 Boat use and ownership, and employment status (%)

	Proportion who use a boat	Canoe/ small boat	Large boat without engine	Large boat with engine	Proportion who own their boat	Proportion who work for themselves
Rukoma	92	82	18	-	45	83
Igalula	100	78	11	11	22	67
Buhingu	100	75	6	19	19	69
Nkonkwa	100	91	-	9	18	55
Katumbi	100	93	-	7	50	86
Kalilani	94	75	25	-	19	53
Sibwesa	100	37	21	42	21	53
Kalya	100	64	14	21	7	57
Kashagulu	100	67	17	17	33	71
Overall	99	71	13	16	26	65

Figure 8 Type of fishing boats used at village level



Lift nets are the most commonly used piece of fishing equipment, followed by long lines, gill nets, and beach seine (Figure 9). Beach seine is illegal, so perhaps under reported. It was mentioned in Rukoma, Nkonkwa, Kalya and Sibwesa.

Fishing is done both for subsistence and for market. On average, fishers eat nearly half their catch, and 14 percent of fishers eat all the fish they catch. Kalilani is the village where the greatest percentage of the catch is sold; in Igalula most is eaten (Figure 10).

For the 10-stone ranking exercises in the fisheries sub-section of the questionnaire, fish types were divided in three groups: Dagaa, a type of freshwater sardine, Migebuka, a perch-like fish, and other, near-shore fish, such as Kungura or Ngege. Dagaa is the most important fish in the region, caught by 64 percent of fishers, and ranked the most highly, receiving an average of 4.8 stones (Table 14). Migebuka was caught by more than half of the fishers responding, and received an average of 2.1 stones, while near-shore fish received 3.1 stones on average. There are some clear differences between the

villages with respect to the importance the fishers assign to the different species (Figure 11).

The fishing grounds for near-shore fish are the most accessible: on average, 1 hour and 20 minutes is needed to get to the fishing grounds (one-way trip) (Table 14). Of the pelagic species, Migebuka apparently require the bigger effort to catch: it takes almost 3.5 hours on average to get to the fishing grounds. For Dagaa, the most important species, it takes almost 2 hours.

For the most part, fishers feel that fishing conditions have changed for the worse (Table 14). The majority say they have to go further (travel for a longer period of time) to reach their fishing grounds, and an even larger group feels the catch of an average trip is smaller today than it was five years ago. In some cases, even fishers who did not report these negative changes still noted worsened conditions, so fishers' perceptions may be more negative than responses indicate. Most negative responses relate to the increase in the number of fishers, overfishing, and diminished fish numbers. Some specifically mention illegal techniques or gear, especially related to near-shore fish. Many fishers also blame the weather, such as lack of rain, and the low water level in the lake. Some said breeding grounds had been destroyed.

The few responses indicating positive change mostly related to improved equipment.

Figure 9 Fishing gear

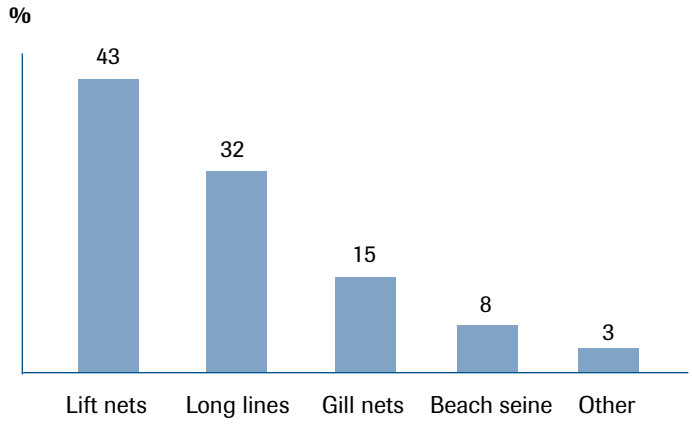


Figure 10 Percent of the catch that is eaten

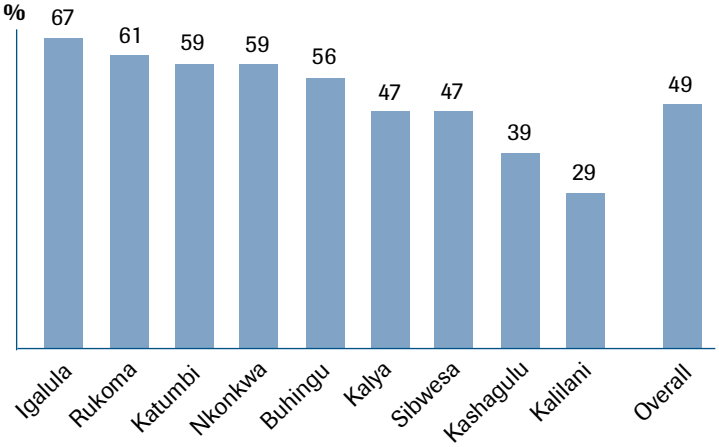


Figure 11 Relative importance of different species at village level

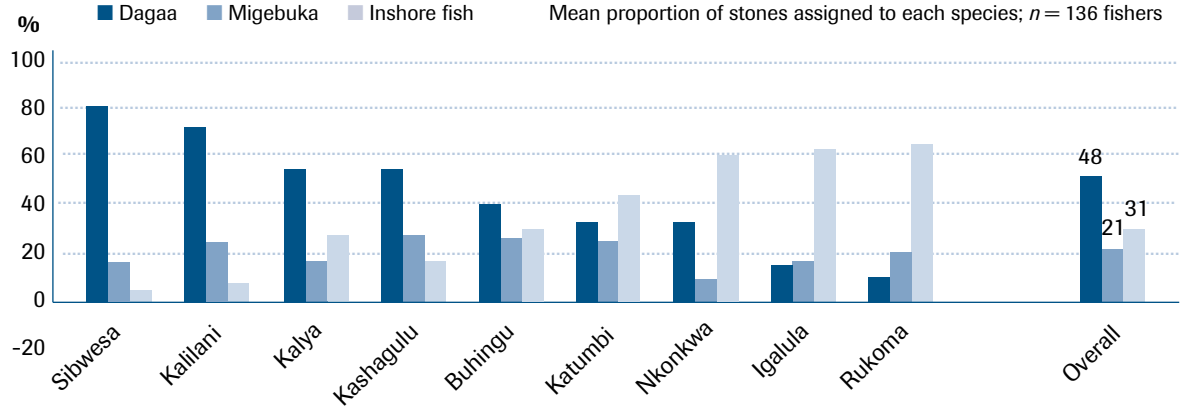
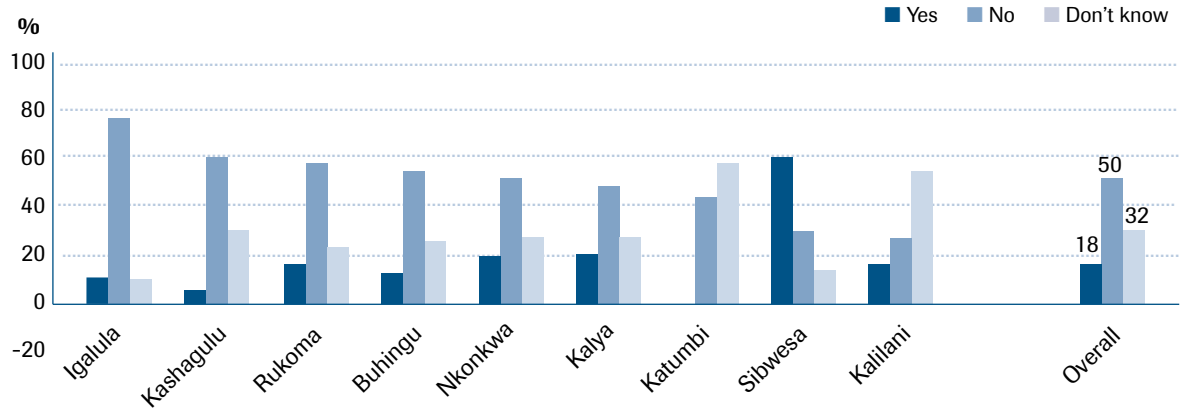


Table 14 Relative importance, distance to fishing grounds and change in catch			
	Dagaa	**Migebuka**	**Near-shore fish**
Average importance in the total catch (%)	48	21	31
Proportion of fishers who fish a species (%)	64	53	51
Average time to get to fishing grounds	01:51	03:24	01:22
Change in time needed to get to grounds compared to 5 years ago (%)			
Increased	53	57	45
No change	36	28	42
Decreased	11	15	13
Change in average catch per trip compared to 5 years ago (%)			
Increased	9	6	4
No change	14	14	16
Decreased	77	80	79

Half the fishers think there will not be sufficient fish to feed future populations, and only 18 percent think there will. Sibwesa is the only village where a positive outlook dominates.

Figure 12 "Will there be sufficient fish in the future?"



All households (not just fishers) were asked how often they eat fish, and how this had changed compared to five years ago. Dagaa is consumed most commonly and most often. More than four out of five households eat it at least once a week. Almost all households eat fish at least sometimes (Figure 13). Fish consumption has decreased widely for all fish types over the past five years (Figure 14). While change in the consumption can be caused by a number of factors, when viewed against responses on decline of fish catch it seems, at least partly, to reflect declining fish stocks.

Figure 13 Frequency of fish consumption

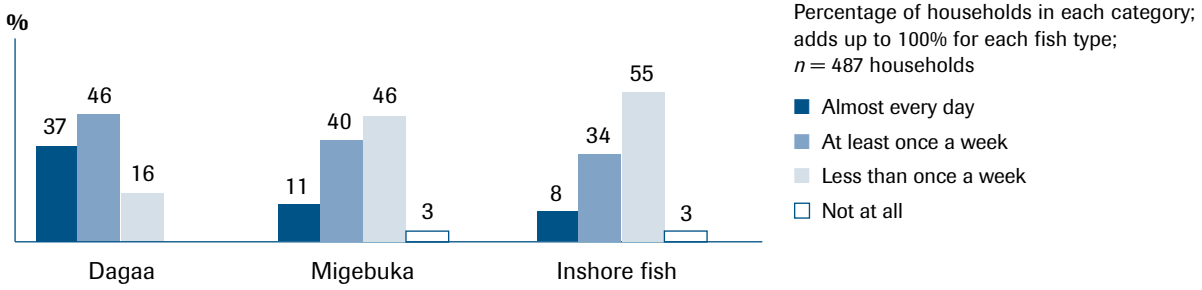
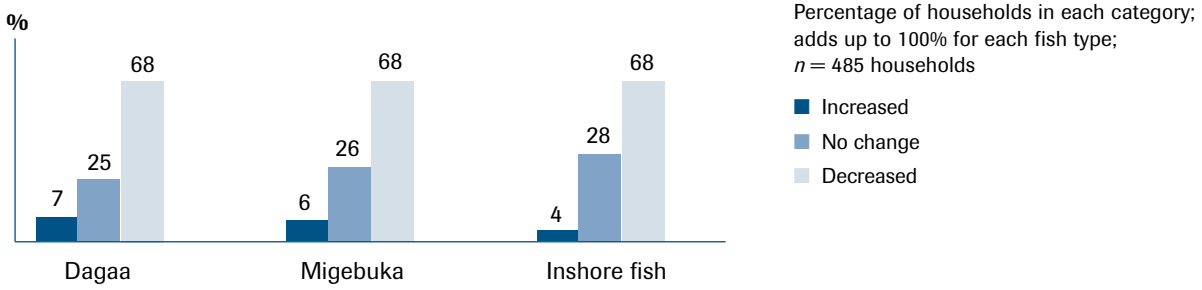


Figure 14 Change in the consumption of fish compared to 5 years ago

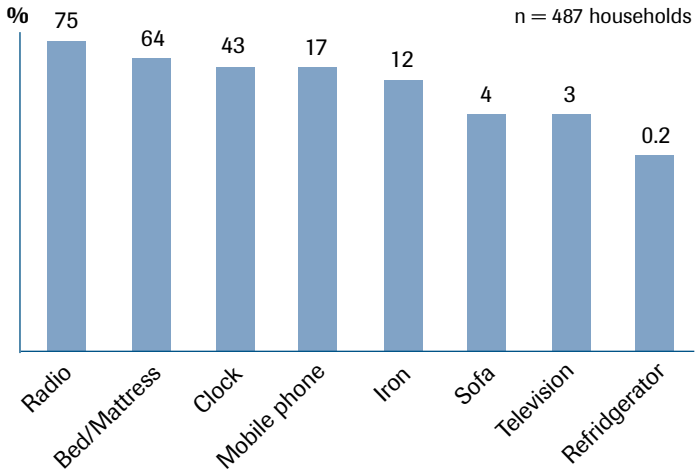


4.2 ASSETS

Household items

Radios are most commonly owned of the listed household goods (75%; Figure 15, Table 15), which is higher than the 55 percent reported for the national rural population (NBS & ICF Macro, 2011). Ownership of mobile phones, televisions and refrigerators are all lower than the national values.[6] Until August 2011, mobile phone coverage in the survey area was limited to a few remote spots at higher elevations. Mobile phones are scarcest in Igulalu (6%) and most common in Kashagulu (28%). No clear explanation can be given for the high television ownership in Katumbi (12%).

Figure 15 Asset ownership



[6] The national rural averages for mobile phones, televisions and refrigerators are 34.0, 3.0 and 0.7%, respectively (NBS & ICF Macro, 2011).

Table 15 Asset ownership at village level (%)

	Radio	Bed/ Mattress	Clock	Mobile phone	Iron	Sofa	Television	Refrigerator	*n*
Rukoma	77	62	40	19	13	-	-	-	53
Lubalisi	76	29	37	18	-	2	-	-	49
Igalula	76	69	39	6	6	4	2	-	51
Buhingu	69	73	44	22	15	5	4	-	55
Nkonkwa	65	55	39	12	6	-	-	-	49
Katumbi	84	82	64	18	20	4	12	-	50
Kalilani	73	53	37	10	-	-	-	-	30
Sibwesa	82	66	36	18	20	2	-	-	50
Kalya	66	58	32	12	12	4	4	2	50
Kashagulu	76	84	56	28	24	16	4	-	50
Overall	75	64	43	17	12	4	3	0.2	487

Transport

Bicycles are the most commonly owned mode of transport, owned by a little over a third of surveyed households (Figure 16). Less than 10 percent own a canoe or un-motorized boat, while motorized transport either on water or land is restricted to very low proportions of the households. These numbers differ strongly between the villages (Table 16). In Kalilani, bicycles seem to be completely absent, but boat ownership is more common than in the other villages. The opposite is true for inland Lubalisi.

Figure 16 Transport ownership

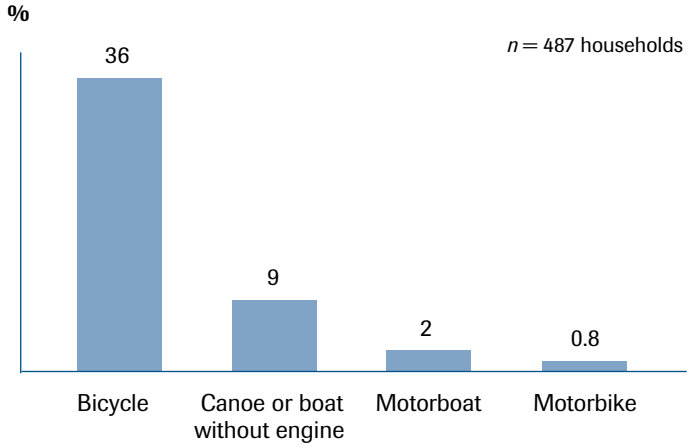


Table 16 Transport ownership at village level (%)					
	Bicycle	**Canoe or boat without engine**	**Motorboat**	**Motorbike**	***n***
Rukoma	49	8	2	-	53
Lubalisi	73	-	-	-	49
Igalula	45	10	-	2	51
Buhingu	22	7	2	-	55
Nkonkwa	35	8	-	-	49
Katumbi	30	18	-	-	50
Kalilani	-	13	3	-	30
Sibwesa	24	4	4	-	50
Kalya	18	2	-	2	50
Kashagulu	46	18	10	4	50
Overall	36	9	2	0.8	487

4.3 LIVING CONDITIONS, HOUSING AND ENERGY USE

Water use

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. In this survey, responses were split between dry and rainy seasons, as water sources can change depending on the season.

Water sources were categorized as improved or unimproved following WHO and UNICEF standards (NBS & ICF Macro, 2011) (Figure 17). Improved sources include public taps, protected private or public wells, and rainwater. Unimproved sources include open wells and surface water.

In the dry season, 80 percent of the households use an unimproved source, mainly river and lake water, while in the rainy season the use of rainwater reduces this to 75 percent. This is higher than the national average for unimproved sources in rural areas of 52% (NBS & ICF Macro, 2011).[7]

Use of the lake water is more common in the dry season when there are fewer alternatives, and most common in Buhingu, Kalilani and Nkonkwa (Table 17).[8]

The most common improved source is a protected public well, but with the exception of a few respondents in Lubalisi and Kalilani, this source was only mentioned in the southern villages of Kashagulu, Sibwesa and Kalya.

[7] No distinction between dry and wet season is made in the national data.

[8] At village level, only the information for the dry season is given, as that is the season when options are more restricted.

Figure 17 Main water source in the dry and wet season: % of households using a source

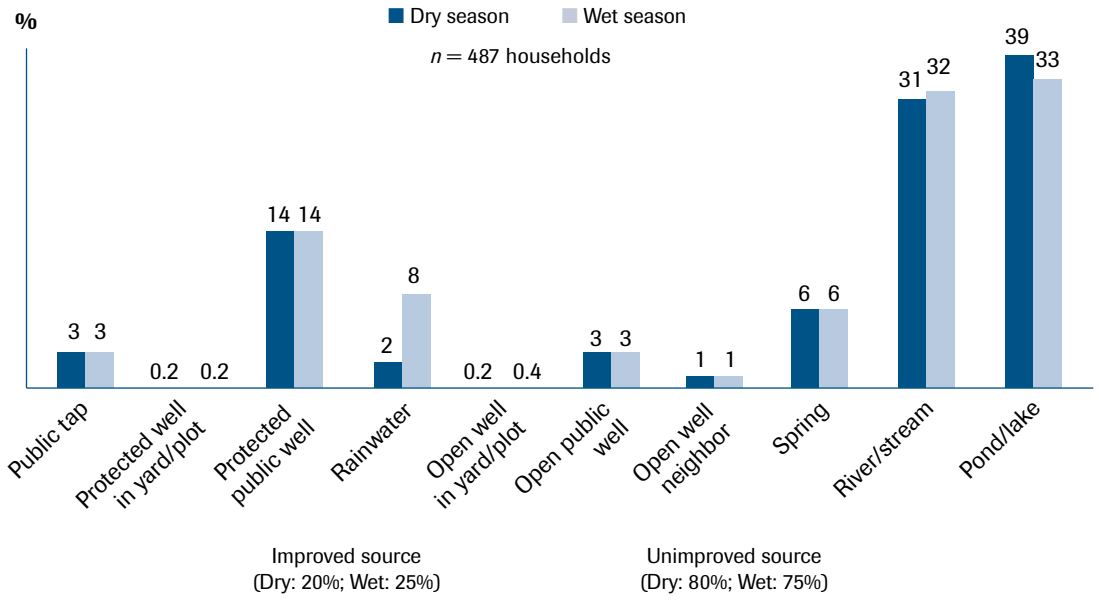


Table 17 Main water source in the dry season at village level (%)

	Unimproved source							
	Open well in yard/plot	**Open public well**	**Open well neighbor**	**Spring**	**River/ stream**	**Pond/ lake**	**Total**	***n***
Rukoma	-	-	-	-	96	4	100	53
Lubalisi	-	12	-	31	49	-	92	49
Igalula	-	-	-	20	71	-	90	51
Buhingu	-	-	-	-	4	96	100	55
Nkonkwa	-	2	-	-	10	78	90	49
Katumbi	-	-	-	-	92	8	100	50
Kalilani	-	-	-	-	10	87	97	30
Sibwesa	2	16	6	8	-	14	46	50
Kalya	-	2	-	12	20	28	62	50
Kashagulu	-	-	-	8	2	18	28	50
Overall	0.2	3	0.6	6	31	39	80	487

Table 17 Main water source in the dry season at village level (%) *(continued)*

	Improved source							
	Public tap	**Protected well in yard/plot**	**Protected public well**	**Rainwater**			**Total**	***n***
Rukoma	-	-	-	-			0	53
Lubalisi	-	2	6	-			8	49
Igalula	-	-	-	10			10	51
Buhingu	-	-	-	-			0	55
Nkonkwa	-	2	-	8			10	49
Katumbi	-	-	-	-			0	50
Kalilani	-	-	3	-			3	30
Sibwesa	8	-	46	-			54	50
Kalya	18	-	14	6			38	50
Kashagulu	2	-	70	-			72	50
Overall	3	0.2	14	2			20	487

On average, a return trip to fetch water takes 33 minutes in the dry season and a little less in the wet, with variation between villages (Table 18). Kalilani and Buhingu have the most accessible water sources, with average trips between 12 and 17 minutes depending on the season. Interestingly, more time is needed in Kalilani during the wet season. Most households in Kalilani get water from the lake during the dry season, while in the wet season streams and rivers become more available, and may be worth the additional travel time for higher-quality water.

Table 18 Time necessary to fetch water in the dry and wet season at village level							
Dry season							
	At the house (%)	**<30 minutes (%)**	**30-60 minutes (%)**	**>60 minutes (%)**	**Total**	**Mean time**	***n***
Rukoma	-	28	45	26	100	45	53
Lubalisi	-	63	20	16	100	27	49
Igalula	-	49	39	12	100	27	51
Buhingu	-	71	25	4	100	17	55
Nkonkwa	-	43	39	18	100	33	49
Katumbi	-	20	32	48	100	45	50
Kalilani	-	90	3	7	100	12	30
Sibwesa	-	32	34	34	100	41	50
Kalya	-	30	44	26	100	45	50
Kashagulu	-	58	24	18	100	29	50
Overall	-	47	32	21	100	33	487
Wet season							
	At the house (%)	**<30 minutes (%)**	**30-60 minutes (%)**	**>60 minutes (%)**	**Total**	**Mean time**	***n***
Rukoma	6	30	40	25	100	40	53
Lubalisi	-	67	22	10	100	21	49
Igalula	8	45	35	12	100	26	51
Buhingu	11	64	22	4	100	16	55
Nkonkwa	4	47	43	6	100	26	49
Katumbi	6	18	30	46	100	42	50
Kalilani	13	70	3	13	100	17	30
Sibwesa	4	34	34	28	100	36	50
Kalya	-	24	48	28	100	48	50
Kashagulu	2	62	26	10	100	22	50
Overall	5	45	31	18	100	30	487

In both the dry and the wet season, around three quarters of the households treat water prior to use, though only about two thirds use an appropriate method (as per NBS & ICF MACRO, 2011), such as boiling, adding chlorine, or using a filter.[9] This figure is markedly higher than the national rural average of 31 percent (NBS & ICF MACRO, 2011). Ineffective methods

[9] Households could mention more than one treatment method. In 5% of the households boiling and straining through a cloth was mentioned. In those cases only boiling was included in the calculations for the results presented here. It is not clear if both methods are generally used together or they are used separately on different occasions.

include straining water through a cloth prior to drinking (Figure 18). There are no great differences between dry and wet season, so only the information for the dry season is presented here.

A large amount of variation exists between the villages, ranging from fewer than a third to more than 80 percent of respondents using appropriate treatment methods. Except for Igalulu, the villages in which most households use an appropriate treatment method are those that are most dependent on lake water.

Figure 18 Main type of water treatment in the dry season

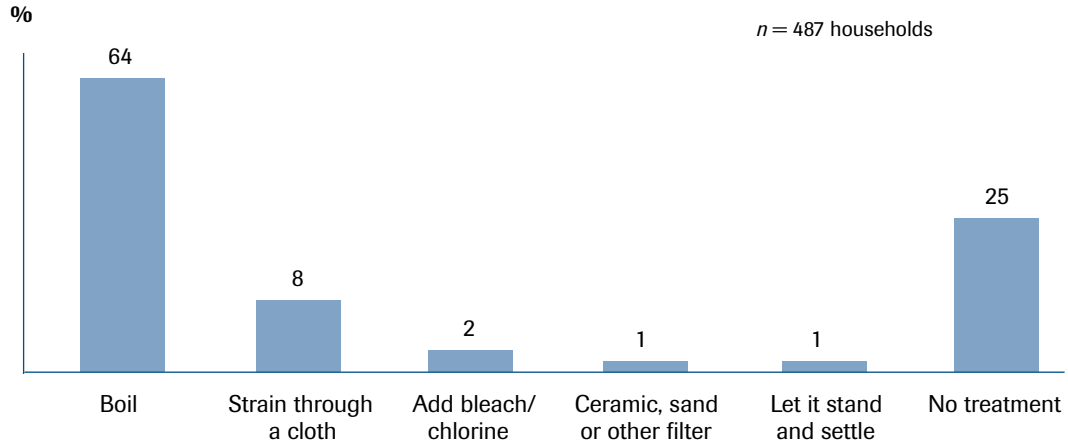


Table 19 Water treatment in the dry season at village level (%)

	Appropriate treatment	No treatment	Boil	Strain through a cloth	Add bleach/ chlorine	Ceramic, sand or other filter	Let it stand and settle	Total	*n*
Rukoma	62	34	60	4	2	-	-	100	53
Lubalisi	31	61	29	8	2	-	-	100	49
Igalula	88	10	88	2	-	-	-	100	51
Buhingu	96	4	96	-	-	-	-	100	55
Nkonkwa	92	4	92	2	-	-	2	100	49
Katumbi	66	16	62	16	-	4	2	100	50
Kalilani	83	7	77	10	3	3	-	100	30
Sibwesa	36	46	32	18	2	2	-	100	50
Kalya	58	36	56	6	2	-	-	100	50
Kashagulu	54	24	48	20	6	-	2	100	50
Overall	66	25	64	8	2	0.8	0.6	100	487

Sanitation

A household's toilet facility and whether or not it has to be shared with other households is an important welfare and health indicator. In the Mahale area, there are two common types of latrines that are use by 95 percent of the households. The first, and most common, is the open pit or pit latrine without slab, and this type is used by 62 percent of the households. The other common type is a latrine with a concrete slab that is used by 33 percent of households. Of the households using the first type, 14 percent share the latrine with other households. Of households using the second type, 5 percent of the households share it with other households (Table 20). An unshared latrine with a slab is categorized by the WHO and UNICEF as an improved facility (NBS & ICF MACRO, 2011). In Tanzania, on average, only 6 percent of rural households have an unshared latrine with a slab, which makes the Mahale area stand out in a positive way with its 29 percent.

Kalilani and Lubalisi are the two villages with the lowest proportion of improved facilities, while Nkonkwa and Kashagulu have the highest.

Table 20 Sanitation facilities at village level (%)

	Latrine with slab		Latrine without slab				
	not shared	shared	not shared	shared	Other	Total	*n*
Rukoma	19	4	60	13	4	100	53
Lubalisi	14	2	73	10	0	100	49
Igalula	33	6	45	12	4	100	51
Buhingu	33	4	40	16	7	100	55
Nkonkwa	45	2	39	14	0	100	49
Katumbi	34	8	36	16	6	100	50
Kalilani	13	13	40	27	7	100	30
Sibwesa	24	2	62	8	4	100	50
Kalya	30	0	48	16	6	100	50
Kashagulu	38	8	38	10	6	100	50
Overall	29	5	48	14	4	100	487

Housing

No households in the survey indicated that their home had access to an electrical grid. In Kalya, some households with generators sell electricity to others, but apparently none of these "receiving" households were included in the sample.

Only two percent have a generator, most of which are found in Katumbi. Five percent have a solar panel.

The large majority of the houses in the Mahale area had sand or earth floors (91%) (Table 21). The remainder had cement floors. Kashagulu has the most cement floors, while in Lubalisi and Nkonkwa none were found.

House walls are predominantly made of baked and sundried bricks (46% and 41%, respectively). Some houses have walls constructed out of poles and mud (11%). Lubalisi is the only village where most houses are made from the latter materials. Cement bricks are only found in the southern villages, but even there in only a few households. Igalula has the highest proportion of houses with baked bricks (84%).

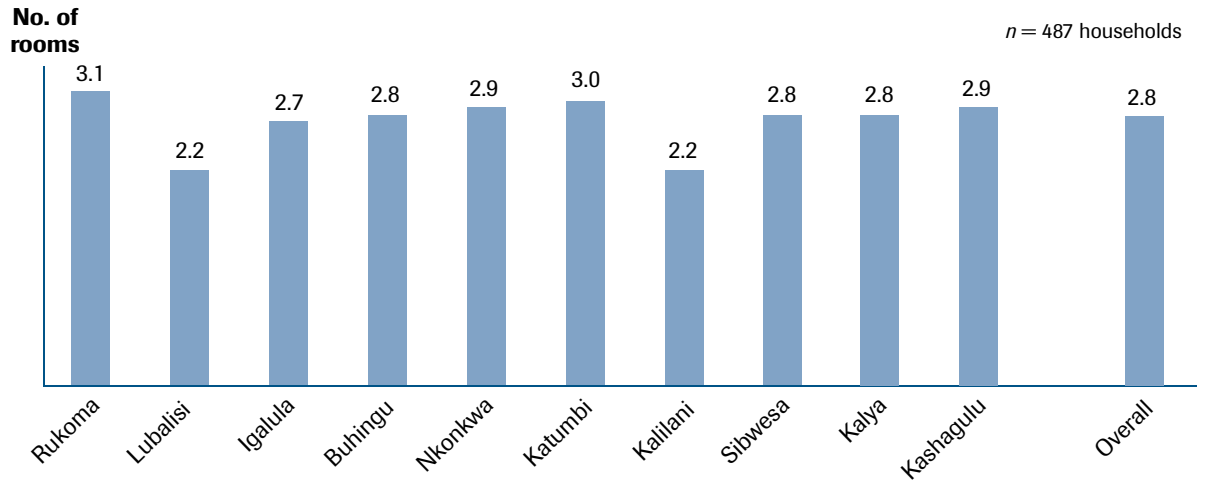
Grass is the predominant roofing material, used by 77 percent of households, while the remaining households use iron sheets. Lubalisi again stands out because it has only grass roofs, likely due to its inaccessibility and the difficulty of transporting iron sheeting. At the national rural level, 51 percent of homes utilize iron sheet roofing.

The average household in the Mahale area has 2.8 rooms available for sleeping (Figure 19).

Table 21 Materials of the house at village level

	Floor		Walls					Roof	
	Earth/ sand	Cement	Grass	Poles and mud	Sundried bricks	Baked bricks	Cement bricks	Grass/ leaves/ mud	Iron sheets
Rukoma	91	9	-	-	57	43	-	74	26
Lubalisi	100	-	-	61	6	33	-	100	-
Igalula	88	12	-	2	14	84	-	63	37
Buhingu	93	7	4	2	29	65	-	64	36
Nkonkwa	100	-	-	8	33	59	-	76	24
Katumbi	86	14	4	4	38	54	-	66	34
Kalilani	90	10	-	-	73	27	-	90	10
Sibwesa	90	10	-	4	84	10	2	90	10
Kalya	94	6	2	14	50	30	4	88	12
Kashagulu	78	22	2	12	42	42	2	64	36
Overall	91	9	1	11	41	46	1	77	23

Figure 19 Number of rooms used for sleeping



Energy use

Firewood is the most commonly used fuel for cooking, with charcoal the only real alternative (one household mentioned burning crop residues). There is some variation in fuel use among the different villages (Table 22).

Only 3 percent of the households own a kerosene cooker, and even those who own one do not use it as the primary cooking implement. Fuel-efficient stoves are owned by 27 percent of respondents, which is higher than the 16 percent

found by the 2006 survey (Harrison, 2007). Of the households that own a fuel-efficient stove, 55 percent use it every day, and 22 percent use it less than once a week or never. Three quarters of the households have a paraffin lamp.

Table 22 Energy at village level (%)

	Fuel use		Own a kerosene cooker	Own a fuel-efficient stove	Own a paraffin lamp
	Charcoal	Firewood			
Rukoma	6	94	-	19	77
Lubalisi	2	98	-	-	59
Igalula	16	84	2	22	61
Buhingu	25	75	4	35	78
Nkonkwa	14	84	2	20	65
Katumbi	26	74	8	38	72
Kalilani	20	80	-	37	70
Sibwesa	28	72	4	22	90
Kalya	48	52	4	38	74
Kashagulu	48	52	-	40	84
Overall	23	76	3	27	73

4.4 EDUCATION

Approximately 19 percent of respondents have no formal education while 23 percent have completed primary school. A slightly smaller percentage of women than men have attended and completed primary school, and women are less likely to attend secondary school. Both genders are more likely to have some education than indicated by the national average for rural areas (NBS & ICF Macro, 2011).[10]

In Sibwesa, Nkonkwa and Katumbi relatively more people have gone to school, while the proportion of people without any education is highest in Lubalisi and Rukoma.[11]

School attendance by all household members between 6 and 25 indicates that attendance is roughly similar for boys and girls up to age 13, while in older age groups boys are more likely to attend school (Figure 20).

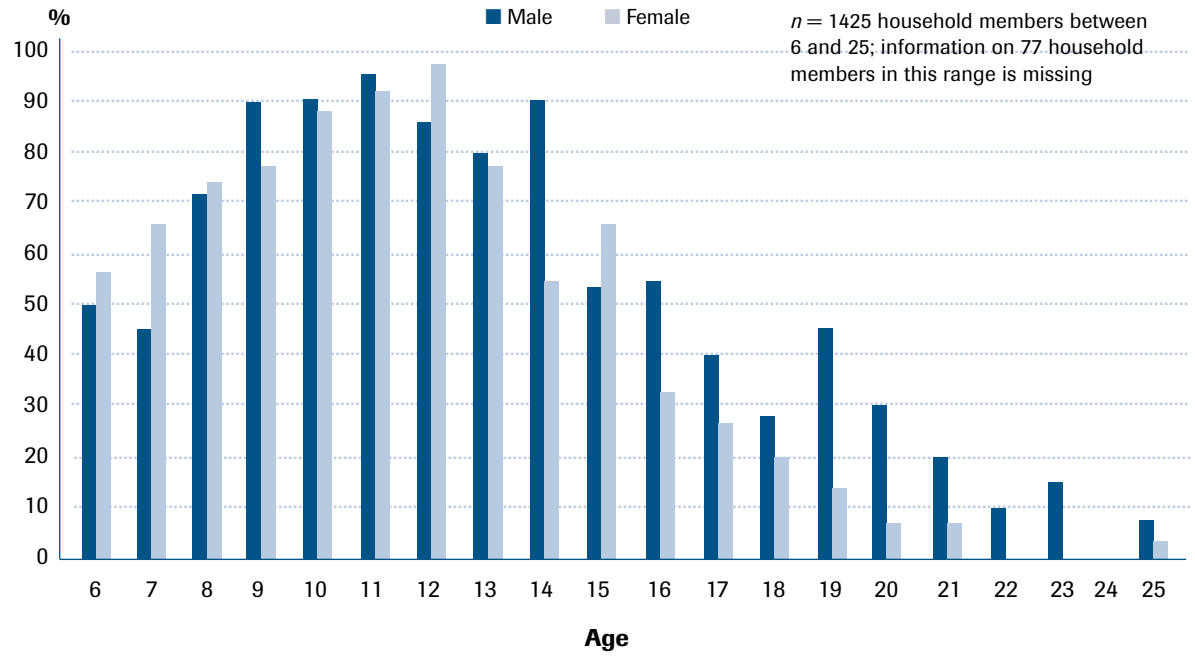
[10] For both men and women the difference with the national rural average is statistically significant at the 1% level: for men and women the respective results are: Chi2=32.230,df=1, p<0.01; Chi2=25.382,df=1, p<0.01.

[11] The proportions in these villages are all significantly different from the overall proportion at the 1% level (for Sibwesa, Nkonkwa, Katumbi, Lubalisi and Rukoma the respective results are: Chi2=10.010,df=1, p<0.01; Chi2=8.219,df=1, p<0.01; Chi2=7.474df=1, p<0.01; Chi2=16.835,df=1, p<0.01; Chi2=14.074,df=1, p<0.01).

Table 23 Educational attainment: percent distribution of the highest level of education[12]									
	None or pre-primary	Some primary	Completed primary	Some secondary	Completed secondary	More than secondary	Missing/ Don't know	Total	*n*
Age									
6-9	39	55	-	-	-	-	6	100	407
10-14	5	85	9	1	-	-	0	100	401
15-19	5	28	50	15	-	1	1	100	333
20-24	12	16	56	14	0.4	1	1	100	273
25-29	15	16	59	6	-	1	3	100	256
30-34	16	12	66	2	-	-	4	100	179
35-39	17	8	68	3	-	-	3	100	143
40-44	20	13	60	3	1	1	1	100	86
45-49	30	12	51	1	-	-	5	100	82
50-54	28	29	31	7	-	-	6	100	72
55-59	40	28	30	-	2	-	-	100	50
60-64	28	47	22	-	-	-	3	100	32
>=65	61	23	10	2	2	-	3	100	62
Sex									
Men	15	37	39	7	0.3	0.5	2	100	1232
Women	23	34	34	3	-	0.2	4	100	1323
Village									
Rukoma	28	34	34	2	0.3	0.3	1	100	322
Lubalisi	30	34	33	2	-	-	1	100	228
Igalula	24	41	27	7	-	-	2	100	257
Buhingu	17	35	35	10	0.3	-	3	100	303
Nkonkwa	12	37	42	4	-	0.4	5	100	241
Katumbi	12	32	41	8	-	0.4	6	100	285
Kalilani	24	28	38	10	-	1	-	100	136
Sibwesa	8	42	39	4	-	-	8	100	248
Kalya	24	31	36	4	0.4	1	2	100	247
Kashagulu	15	36	40	3	0.3	0.3	5	100	288
Overall survey	19	35	36	5	0.2	0.3	3	100	2555

[12] In the age distinguished data observations with missing age are excluded. There are 179 such cases. In the overall and village specific data these observations were included.

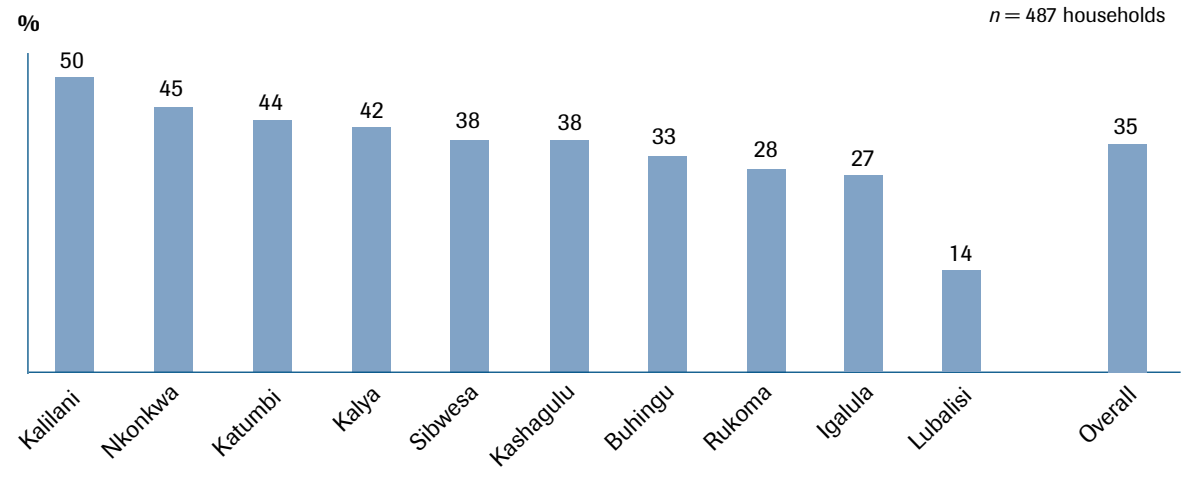
Figure 20 Age-specific school attendance rates



4.5 ACCESS TO CREDIT

Overall, 35 percent of the households had borrowed money at least once in the previous year (Figure 21). Most of these households borrowed only once, but some did so up to 20 times. The proportion of households that took out credit is highest in Kalilani and lowest in Lubalisi.

Figure 21 Proportion of households that borrowed money in the last year at village level



The majority of amounts borrowed in the previous year fall between 10,000 and 500,000 Tanzanian shillings (TSHS) (Figure 22).[13]

Medical expenses and household expenses other than food are the most common reasons for taking out a loan (Figure 23). Around a quarter of the borrowing households (8% of all households) took out a loan to buy food.

More than half the borrowing households receive their loans from friends (Figure 24). A quarter of the loans were given by Community Conservation Banks (COCOBA) and Savings and Credit Societies (SACCOS), while family and traders are other relatively common sources. COCOBA and SACCOS provide savings and loan schemes to groups of villagers and were most frequently mentioned in Buhingu and Katumbi and least frequently mentioned in Lubalisi.

Most households are familiar with COCOBA and SACCOS; 93 percent of the respondents have heard of COCOBA and 59 percent of SACCOS (Table 24). In line with the previous results, familiarity is lowest in Lubalisi. Those who have heard about COCOBA are generally positive. Only about 15 percent (14% of the total population) have a negative perception. The results for SACCOS indicate the relative unfamiliarity with the organization: of the people who have heard about it, 67 percent have neither a positive nor negative opinion about it. Of those households that indicated COCOBA/SACCOS as a source of their loans (n=42), 95 percent held positive views on the organization.

Finally, of the households that had not taken out any loans in the previous year, 31 percent had no need for one, while the rest were not able to get a loan or were afraid they would not be able to make payments (Figure 25). Some people mentioned they feared having to go to jail if the latter happened. Kalilani is the only village where the most commonly mentioned reason was the unavailability of a source for a loan.

[13] At the time of the survey 1 US dollar was worth 1,590 Tanzanian Shillings, so in rounded off dollar terms the categories would be 0 - 6; 6 - 32; 32 - 63; 63 - 316; >316 USD.

Figure 22 Distribution of borrowed amounts

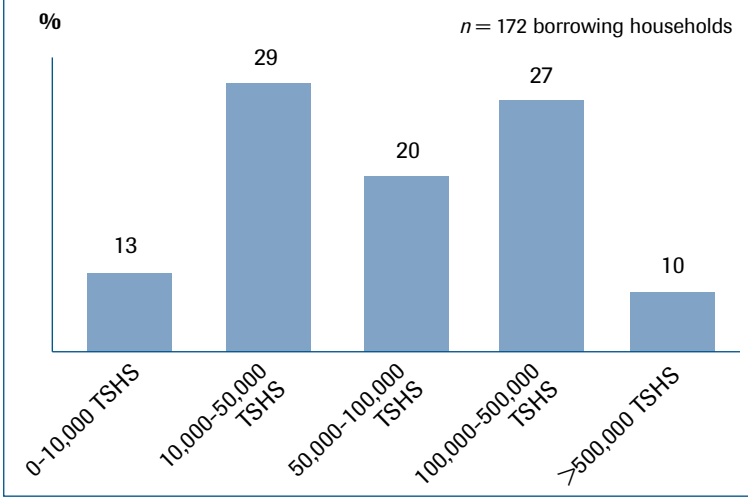


Figure 23 Purpose of the loan

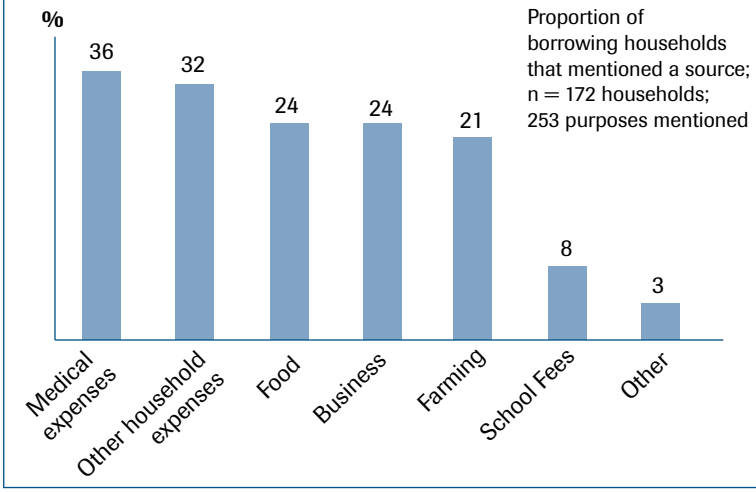


Figure 24 Source of loans

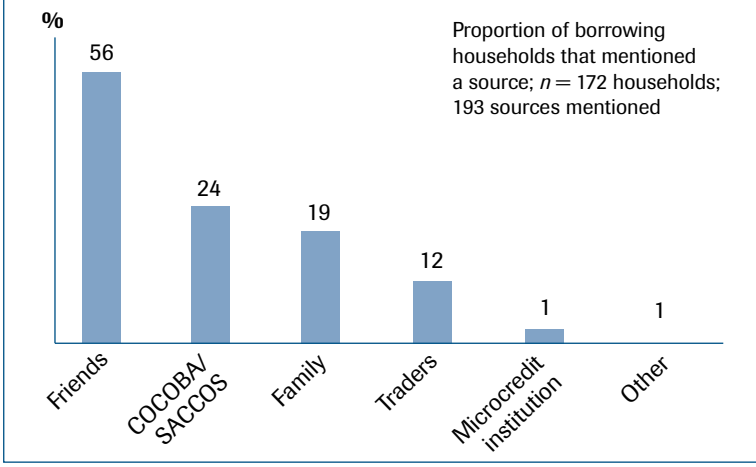
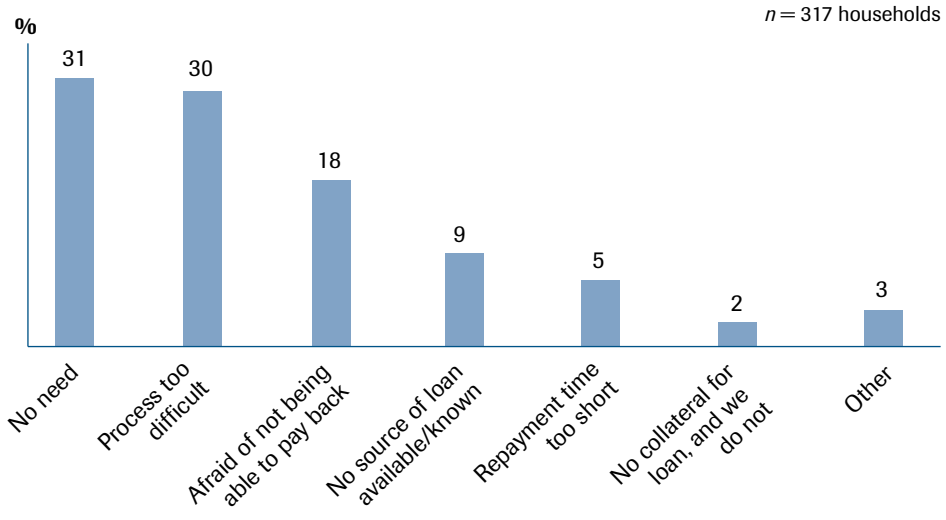


Table 24 Familiarity with COCOBA and SACCOS at village level (%)

	COCOBA				SACCOS				*n*
	Haven't heard	Positive	Negative	Neutral/ don't know	Haven't heard	Positive	Negative	Neutral/ don't know	
Rukoma	11	40	8	42	47	8	6	40	53
Lubalisi	31	31	4	35	63	2	0	35	49
Igalula	4	41	24	31	53	4	8	35	51
Buhingu	2	44	22	33	47	7	0	45	55
Nkonkwa	2	41	29	29	45	4	10	41	49
Katumbi	2	62	4	32	38	12	6	44	50
Kalilani	0	50	10	40	30	27	3	40	30
Sibwesa	8	28	18	46	14	16	28	42	50
Kalya	8	46	16	30	32	24	8	36	50
Kashagulu	4	62	4	30	36	22	4	38	50
Overall	7	44	14	34	41	12	7	40	487

Figure 25 Reason for not having borrowed any money in the previous year



4.6 COMPOSITE WELLBEING INDICATOR

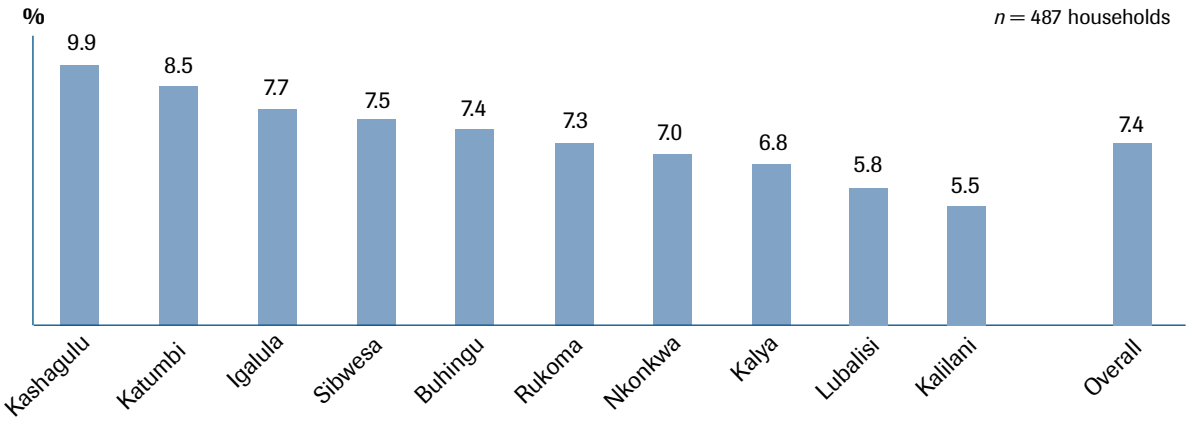
To condense the many variables that make up the Opportunities section, a simple additive composite indicator was created using household goods, water supply, sanitation, housing characteristics, land and livestock (Table 25). While the resulting weight of each individual variable may not reflect the "true" contribution of the elements to a household's wellbeing, this method avoids the subjectivity involved in weighting the elements.

Table 25 Composition of the wellbeing indicator

Element	Method of inclusion	Number of variables in the group
All household items	Owned=1; Not owned=0	8
All transport vehicles except car	Owned=1; Not owned=0	4
All energy-related possessions	Owned=1; Not owned=0	5
Water source in the dry season	Improved source=1; unimproved source=0	1
Sanitation	Unshared latrine with slab=1; shared facility, pit latrine or bush=0	1
Floor	Cement floor=1; sand/dirt floor=0	1
Walls	Baked brick or cement brick=1; Other=0	1
Roof	Iron sheet roof=1; Grass roof=0	1
Number of sleeping rooms	>2 rooms=1; <2 rooms=0	1
Own land	Owned=1; Not owned=0	1
Own chickens	Owned=1; Not owned=0	1
Own ducks	Owned=1; Not owned=0	1
Own goats	Owned=1; Not owned=0	1
Welfare indicator	Sum of the above	Max = 27

One household had a score of zero, and the highest score of any household was 20 out of a possible 27. The mean overall score was 7.4 (Figure 26). Kashagulu has the highest mean score of almost 10, while Kalilani had the lowest with 5.5.

Figure 26 Composite wellbeing indicator: mean scores



The composite wellbeing indicator was correlated with a number of other household variables (Table 26). Education, money borrowed, and ability to meet daily needs are positively correlated with composite wellbeing, while female-headed households are negatively correlated. There was no relationship between having been born in the village and the composite indicator.

Table 26 Correlations between the wellbeing indicator and other Opportunities indicators (* = significant correlation).

	Education of the household head	Sex of the household head	Born in the village	Borrowed amount	Self-assessment meeting daily needs
Wellbeing	0.2*	-0.2*	0.1	0.3*	0.2*
n	476	487	487	172	487

5 EMPOWERMENT

The empowerment dimension of poverty relates to the influence that communities, and different groups within communities, have on the way they are governed, and how satisfied they are with the services provided by those governing them. It also includes community participation, which relates both to internal participation within communities, for example, through membership of community organizations or attending community meetings as well as to involvement in (local) government, through consultations, collaboration and partnerships. One specific element of empowerment is women's participation in all facets of community life. The household survey included several questions aimed at elements of empowerment that can be captured with such an instrument. Other elements were investigated in the focus group discussions.

5.1 GOVERNANCE

Household perception of governance mechanisms is affected by cultural factors, such as inclinations to stress the positive and avoid the negative, and political factors, including the freedom respondents feel they have to criticize government policies. Interestingly, the survey had a low proportion of "neutral" or "do not know" answers to governance questions. This answer option can be an easy escape for respondents unwilling to speak their mind, but this does not seem to be the case in this area.

Respondents are relatively critical about both the influence they have on village government decisions and the services provided by local leaders. Overall, 66 percent do not think they can influence decisions and about the same proportion is unsatisfied with the services provided (Table 27).

Looking at village level, Lubalisi stands out once again. It has the lowest rates of satisfaction and perceptions of influence. People in Igalula are also relatively pessimistic about their level of influence. Buhingu seems to provide the best services and more people there feel they have influence on the way they are governed.[14]

Table 27 Influence on and satisfaction with local government at village level (%)

	Influence on village government decisions					Satisfied with services provided by village and district leadership				
	Yes	**No**	**Do not know**	**Total**	***n***	**Satisfied**	**Unsatisfied**	**Neutral/ do not know**	**Total**	***n***
Rukoma	23	62	15	100	53	38	55	8	100	53
Lubalisi	10	84	6	100	49	12	82	6	100	49
Igalula	14	76	10	100	51	20	73	8	100	51
Buhingu	35	51	15	100	55	44	49	7	100	55
Nkonkwa	20	57	22	100	49	33	63	4	100	49
Katumbi	29	65	6	100	49	36	60	4	100	50
Kalilani	33	63	3	100	30	37	63	0	100	30
Sibwesa	26	72	2	100	50	20	78	2	100	50
Kalya	24	62	14	100	50	22	72	6	100	50
Kashagulu	28	64	8	100	50	18	80	2	100	50
Overall	24	66	10	100	486	28	67	5	100	487

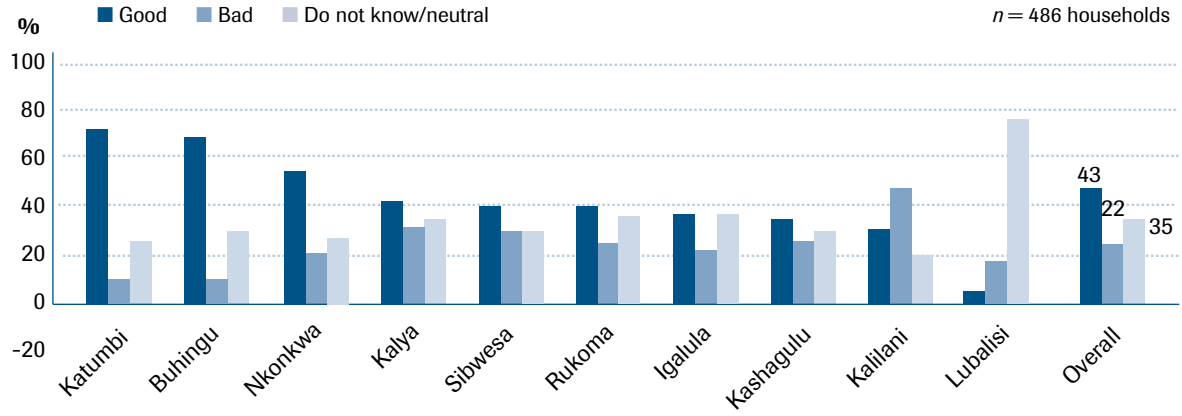
[14] Influence is statistically different from the overall results in Lubalisi, Buhingu and Igalulu at the 10% level or less: for Lubalisi the Chi2 results are: Chi2=5.054;df=1;p=0.03; for Buhingu: Chi2=3.427;df=1;p=0.06; for Igalula: Chi2=2.903;df=1;p=0.09. Satisfaction is statistically different from the overall results in both villages: at the 5% level in Lubalisi (Chi2=5.844;df=1;p=0.02), and the 1% level in Buhingu (Chi2=6.975;df=1;p<0.01).

Although not part of the local government, the parastatal TANAPA that manages all national parks in Tanzania has substantial influence on the lives and livelihoods of the population around Mahale Mountains National Park. Overall, more people are positive than negative about the relationship between TANAPA and their village, but there is substantial variation between villages (Figure 27). Katumbi, Buhingu and Nkonwa are relatively positive, with around 60 percent of the people perceiving the relationship as good. In many of the other villages, the people with a positive view also outnumber those with negative ones, but the proportion is not as marked. Only in Kalilani clearly more people think negatively about the relationship with TANAPA. This is not surprising, as TANAPA would like to relocate the village because it is inside the park boundaries. In Lubalisi, 80 percent are neutral or do not know.

Of the people who had positive views of the relationship with TANAPA, the most common reason was TANAPA's assistance with local infrastructure projects such as schools, bridges or other buildings in the village (36%). The only villages where this was not mentioned were Kalilani and Lubalisi, where there were a large proportion of neutral opinions about TANAPA. Others simply referred to the absence of any conflicts or problems (28%), or gave a general answer that they were good, and they helped each other when needed (18%). Some people also said that TANAPA provides work or buys local products and that they give environmental education.

Many of the negative views seem to stem from an absence of the kind of help mentioned above. Some respondents said TANAPA does not help or communicate with them (35%), and others specifically mentioned that TANAPA did help others but not them (9%). However, these negative sentiments are not prevalent in any village except Kalilani. The second most common reason for a bad relationship was conflict over land or borders. This was mentioned by 28 percent of those with a negative view. Other reasons mentioned are that TANAPA limits fishing (9%), tree cutting or hunting (7%), or a general mention of conflicts (7%).

Figure 27 Perception of the relationship between TANAPA and the village at village level

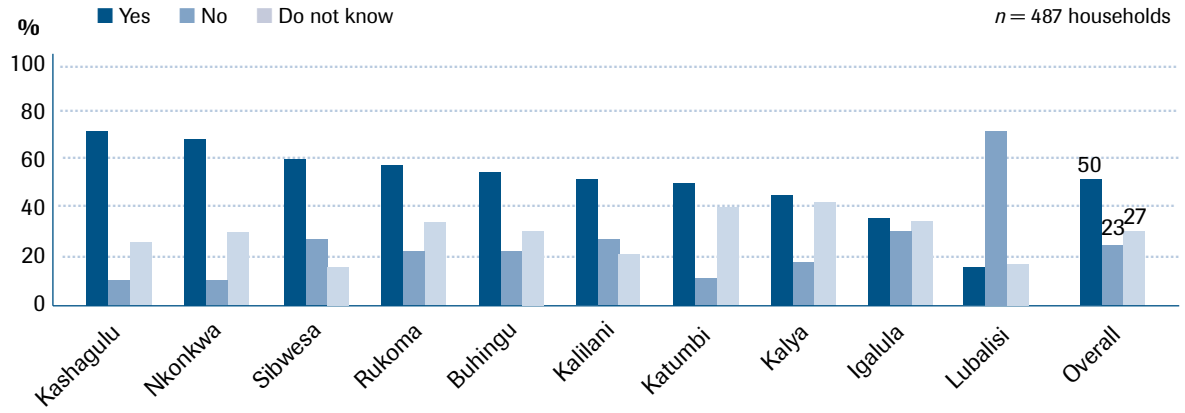


5.2 COMMUNITY PARTICIPATION

Environmental management committee

Most of the villages have environmental management committees, yet there is a fair degree of uncertainly in most villages about the existence of an environmental management committee. Half of all respondents say the village has an environmental management committee. The other half is roughly divided between those that do not know and those that say there is no committee (Figure 28).

Figure 28 Knowledge about an environmental management committee in the village



When those who know about the committee were asked how often it meets, only 20 percent could give an answer. Half think it meets monthly, and the remainder that it meets less often or even never. Only people in Kalilani seem a bit better informed about the schedule of the committee: more than 40 percent could answer the question, with the majority saying it met once a month. In Sibwesa, more than 95 percent did not know about the frequency of the meetings.

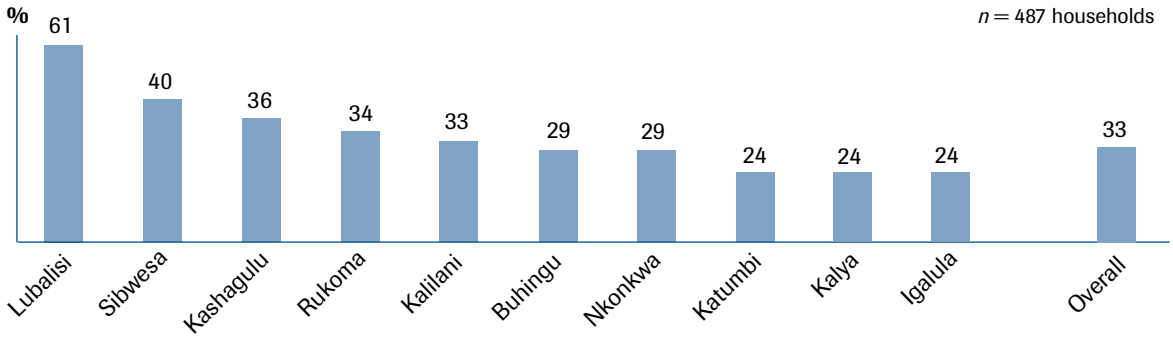
Only four percent of the households have a member participating in the committee.

Other village organizations

Nineteen percent of households have a member participating in other village organizations, such as women groups, cooperatives or self-help groups. In Lubalisi, only 2 percent participate, and in Katumbi the figure is highest at 32 percent.[15] The other villages do not differ from the overall proportion at statistically significant levels. Seventy-two percent of households participating in village organizations are members of Community Conservation Banks, while other organizations, including fishers' unions, and national women's and youth groups, were each mentioned by only a few respondents. Sections of the village and ward government were also mentioned, such as the village land council that handles land disputes between villagers, and village agricultural groups that receive agricultural training from the government. Finally, a few households had members in self-help groups, such as a women's group that provides assistance for weddings or family problems.

Overall, one third of respondents reported having attended a public meeting about village land-use planning, health issues, or lake or forest management (Figure 29). In Lubalisi, that figure was highest, at 61%. Households were specifically asked about participation in Beach Management Units, but only 3 percent said they had participated.

Figure 29 Proportion that attended a public village meeting



[15] For Lubalisi the difference with the overall proportion is statistically significant at the 1% level: Chi2=8.945; df=1;p<0.01. The test results for Katumbi are: Chi2=5.818; df=1;p=0.02.

6 SECURITY

The security dimension of poverty relates to how well people are able to deal with negative shocks and the availability of safety nets to buffer their effects. One such safety net is the natural environment, which can act as a source of food, fuel and other products when crops fail or income sources are negatively affected by outside influences. How well the environment can provide this function depends both on its state and on the ability of people to use its services. Social cohesion is another type of safety net, as people can help each other when necessary, for instance through loans. Communities also need ways of dealing with disputes between members that are perceived as fair. A final important feature of security is health. People in poor health and with poor access to health care are more likely to be disproportionately affected by negative shocks.

6.1 NATURAL ENVIRONMENT

This section presents respondents' knowledge and attitudes about the natural environment, an analysis of the ability of forest products to provide goods and services, and a discussion of how population pressure is perceived in the area.

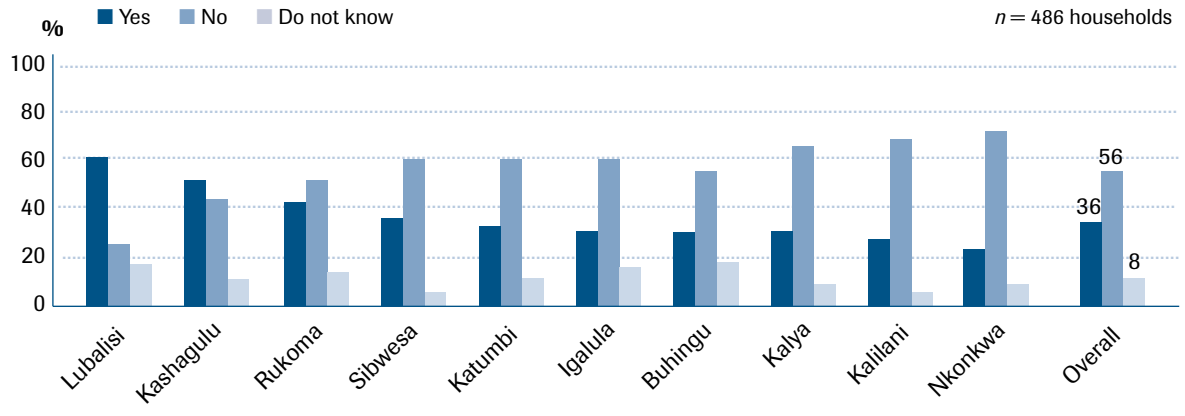
Respondents were asked whether they agreed or disagreed with a set of statements about the natural environment (Table 28).

Table 28 Statements about the natural environment (%).

Statement	Agree	Disagree	Don't know
There is sufficient forest close to this village for us to meet our day-to-day needs.	36	56	8
Deforestation causes siltation.	48	10	42
Siltation from the rivers is harmful to the fish in the lake.	29	22	49
The village forest should be protected.	79	11	9
Mahale National Park should continue to be protected.	81	8	11
Wildlife such as chimpanzees should be protected.	77	11	12
The national park provides benefits for our community.	53	30	17

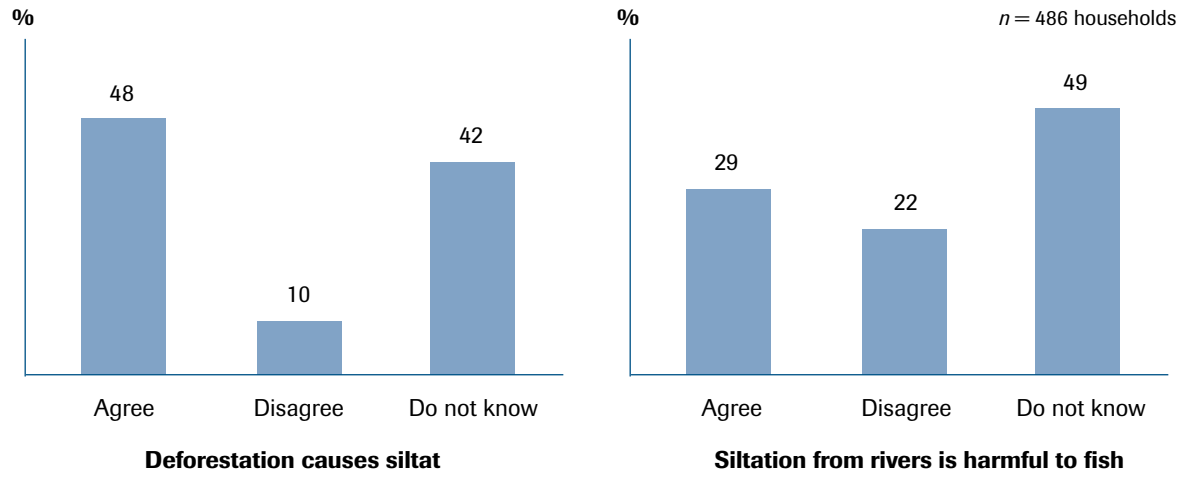
More than half the respondents disagreed with the statement that there is enough forest around the villages to meet their day-to-day needs. At village level, Lubalisi is the only village where a clear majority agrees with the statement (Figure 30). As this is the only inland village, and is surrounded by forest, this result isn't very surprising. In most lake-side villages, the majority of respondents feel there is a shortage of forest, including Kalilani, which is located inside park boundaries. This may be less of a reflection of the proximity and abundance of forest, and more of the restrictions to their use of the forest. Kashagulu and Rukoma are the only coastal villages where people agree and disagree in roughly the same numbers.

Figure 30 Statement: "There is sufficient forest close to this village to meet our day-to-day needs."



About half the respondents agrees that the link between deforestation and siltation exists, but there is a large group that does not know. There is even more uncertainty about the link between siltation and fish (Figure 31). At village level, there are large majorities in Lubalisi that choose the "do not know" answer for both statements, and in Kalilani almost 50 percent disagrees with the second statement, but otherwise the response to these two statements is fairly similar across the villages. The village level results are therefore not shown separately for these statements.

Figure 31 Statements: "Deforestation causes siltation" and "Siltation is harmful to fish"



Large majorities, roughly 80% in each case, agree with the statements about protecting the environment (Figure 32). The picture is largely the same at village level, except for Lubalisi, where respondents are much more negative about protection, especially of chimpanzees and Mahale Mountains National Park. In this village, several respondents expressed the fear that

the park would extend its boundaries to include their farmland. In one story, the villagers had once tried to kill a park employee who they thought was mapping their land as part of the park. In another story, villagers said they kill chimps whenever they see them to take away a reason to protect the area and incorporate it in the park.

For the other villages, the responses to the statements about protecting the environment are similar we shall only show the village level results for the national park (Figure 33).

Figure 32 Statements about protection of village forests, and chimpanzees

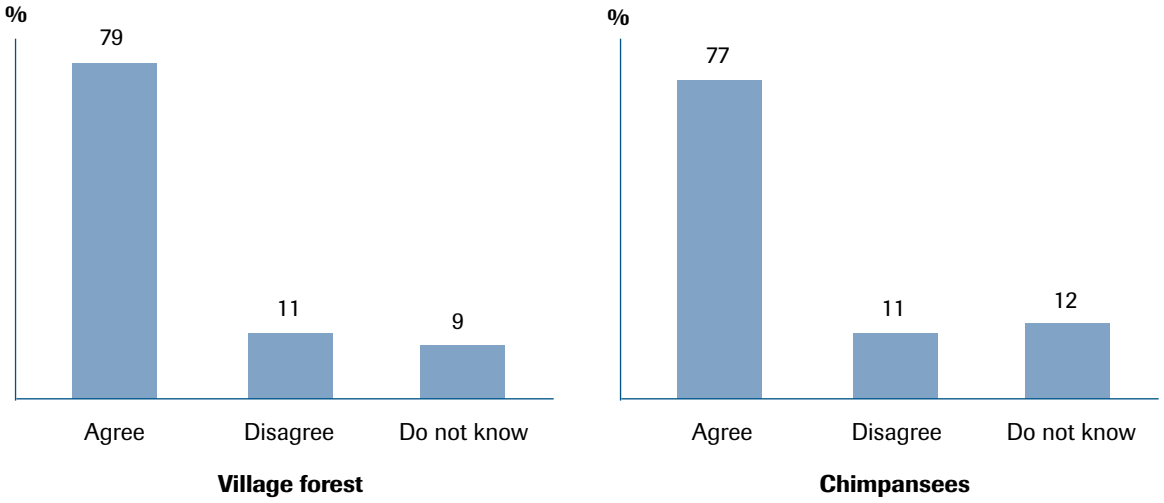
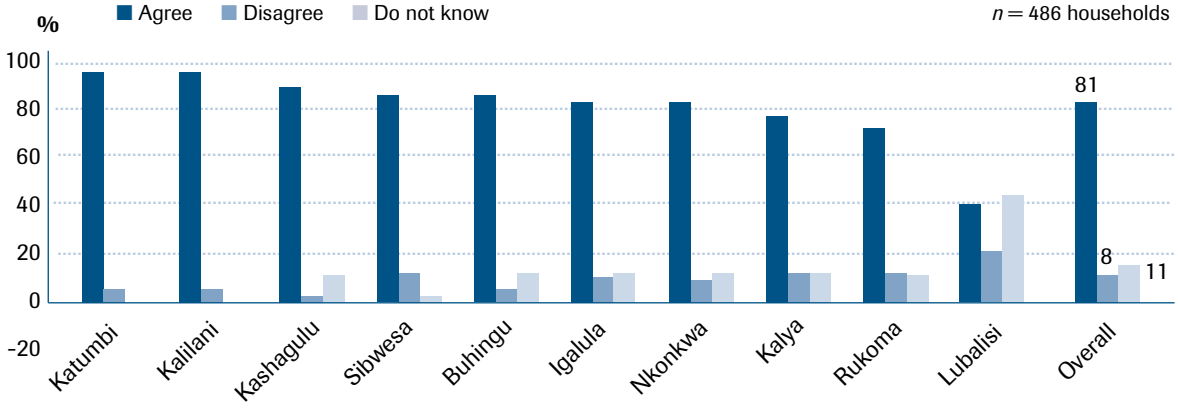
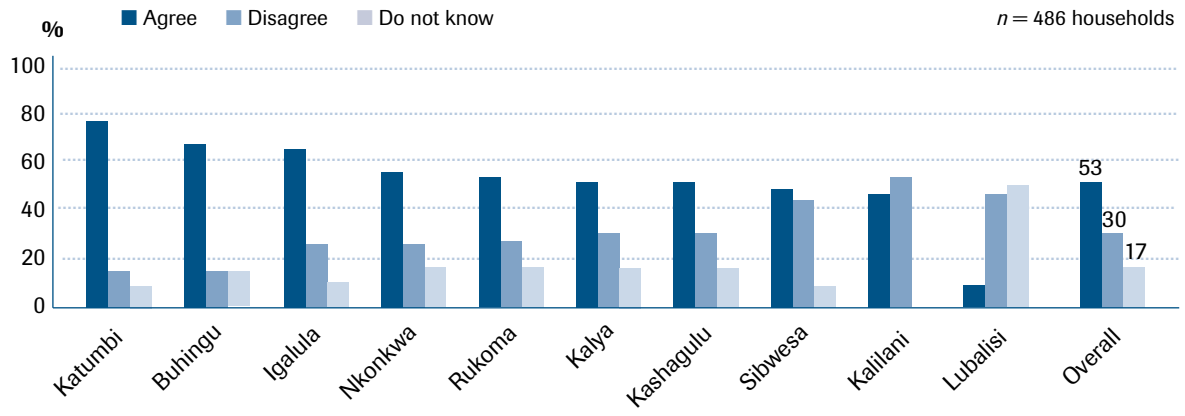


Figure 33 Statement: "Mahale Mountains National Park should continue to be protected" by village.



The last statement also relates to the national park, and refers to the benefits that it provides the communities around it. Interestingly, the responses are quite different from the statement about protection. Overall, there is less agreement that the park provides benefits, and in Sibwesa and Kalilani the groups that agree and disagree are of similar size. In Lubalisi, fewer than 10 percent of the respondents perceive any benefits flowing from the park. In most of the villages, however, a majority does perceive direct benefits from the park.

Figure 34 Statement: "The national park provides benefits for our community."



Collection of forest products

Figure 35 shows the proportion of households that collect different forest products. The forest appears most important as a source of fuel and building materials for the house. As shown in Section 3.3, cooking is almost exclusively done using either firewood or charcoal, and indeed 83 percent of households collect firewood. Charcoal is obtained from the forest by only 4 percent. Grass for roofing and building poles are collected by 48 and 29 percent, respectively. Only 2 percent of the households said they take timber from the forest.

The forest is not used by many as a source of food or medicines. Mushrooms are collected by 14 percent, medicinal plants by 8 percent, and roots and fruit by 6 and 5 percent, respectively.

On average, households collect two different forest products (Figure 36). Twelve percent of the households do not collect any forest products, while 31 percent collect only one, which is generally firewood. No household in the survey collected all nine products.

There are some differences at village level (Table 29). The percentage of those collecting forest products is higher in Lubalisi for everything except charcoal and timber. Of the lake-side villages, Igalula has a relative high dependence on forest products, while households in Katumbi and Kashagulu seem to rely least on the forest. Only households in Buhingu, Igalula and Kalilani said they take timber.

Figure 35 Proportion of households that collect forest products

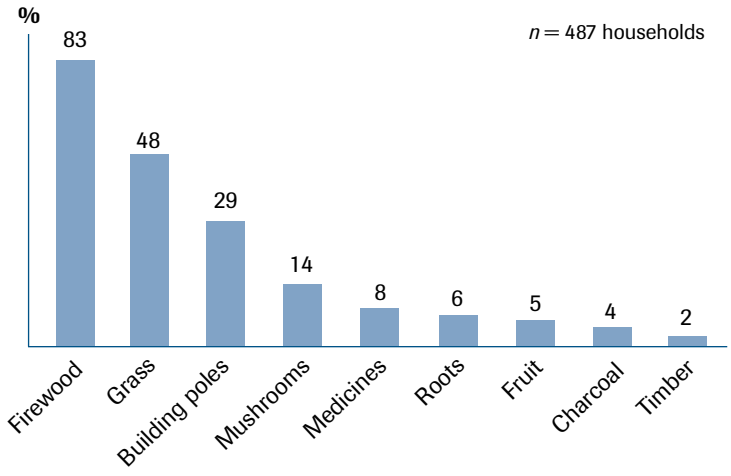


Figure 36 Number of different forest products collected

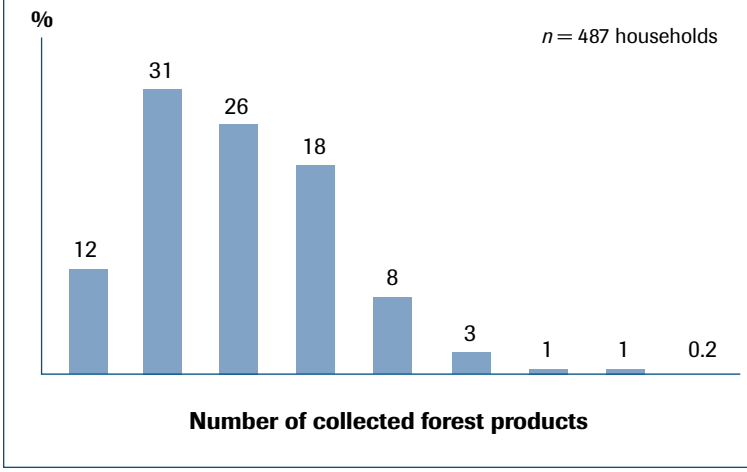
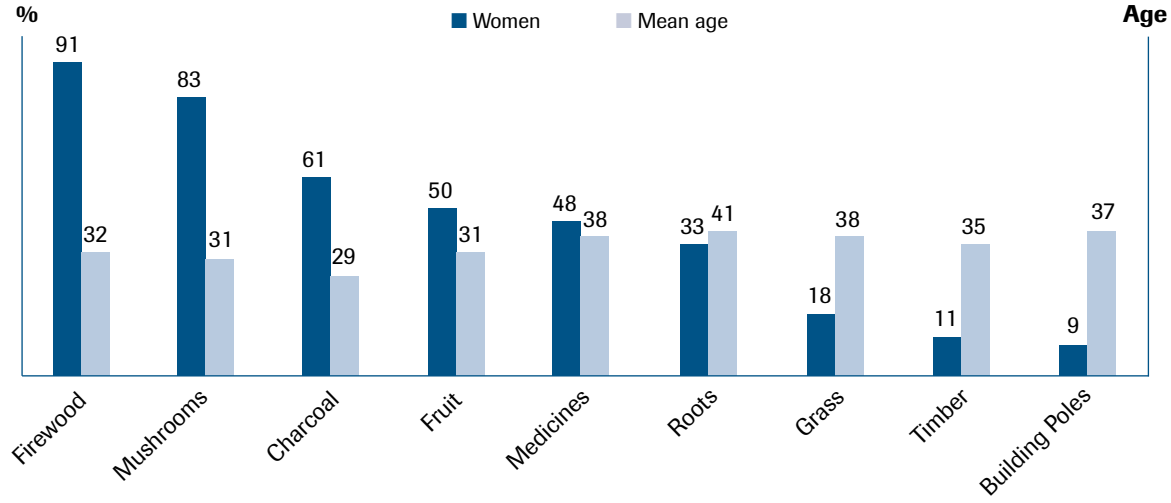


Table 29 Proportion of households that collect forest products at village level

	Mean no. of collected products	Firewood	Grass	Building poles	Mushrooms	Medicines	Roots	Fruit	Charcoal	Timber	*n*
Rukoma	1.9	94	45	26	13	2	4	-	4	-	53
Lubalisi	3.2	100	82	67	22	18	12	16	-	-	49
Igalula	2.4	86	57	35	22	18	10	-	4	4	51
Buhingu	2.0	76	40	27	16	11	4	4	9	11	55
Nkonkwa	1.8	88	43	22	16	4	2	2	4	-	49
Katumbi	1.4	66	24	10	12	8	6	10	2	-	50
Kalilani	1.8	83	47	13	20	3	7	-	-	3	30
Sibwesa	2.0	90	54	36	2	4	10	2	2	-	50
Kalya	1.8	72	42	26	14	12	2	6	10	-	50
Kashagulu	1.5	72	48	24	6	-	-	4	-	-	50
Overall	2.0	83	48	29	14	8	6	5	4	2	487

The household member responsible for the collection of forest products depends on the type of product (Figure 37). Fuel and mushrooms are predominantly collected by women, while building materials are mainly collected by men. Medicinal plants, fruit and roots are collected by both. The average age is relatively high, indicating that this is not a job that is predominantly done by children. For firewood, only 2 percent of those mainly responsible for collecting were below 15 years old.

Figure 37 Age and sex of the person responsible for the collection of forest products



Forest products are usually collected for household use rather than sale (Figure 38). With the exception of timber and charcoal, less than 10 percent of households sell any of the forest products they collect.

Most households mainly collect firewood from the bush or open land (65%) (Figure 39). Own (farm) land is the most important source for many other households (27%). Community forests are the main source of firewood for 8 percent of the households. The importance of these sources is roughly similar for the other forest products as well.

Firewood is collected at least once a week by three quarters of the households, and 6 percent make daily trips. The average duration of a collecting trip is 3 hours and 28 minutes.

Households were also asked about the consumption of bush meat, which is technically illegal. Only two households said they eat bush meat at least once a week, and a few more (8%) said they eat it less than once a week, but the far majority reported that they never eat it.

Figure 38 Proportion of households that collect and sell some of the forest products

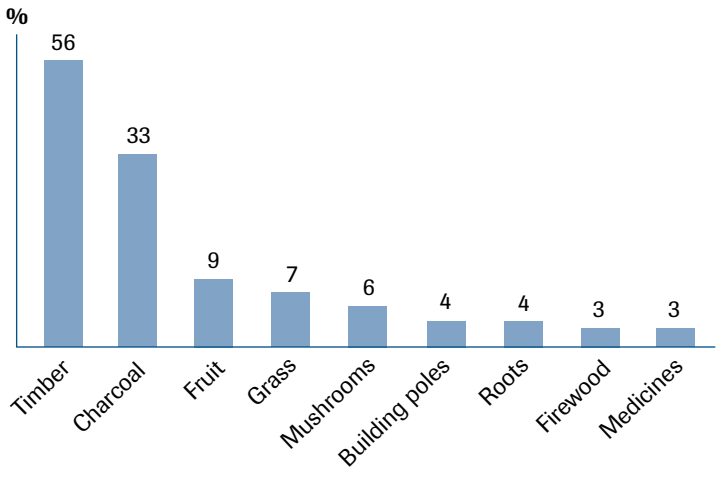
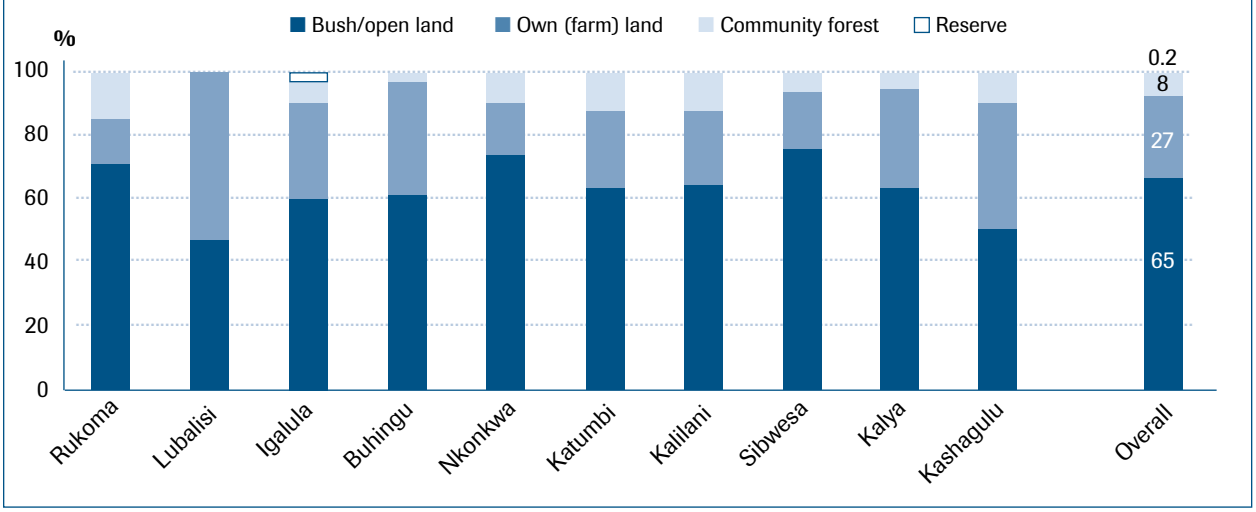


Figure 39 Source of firewood



Population pressure

Most respondents perceive that the village population increased over the last five years. This opinion is most common in Kashagulu and Lubalisi and least so in Sibwesa (Figure 40).

Of those respondents who perceive an increase in the population, almost half believe this increase does not cause any problems. Among those who do see problems, the most commonly mentioned ones are related to the availability of land (23%), an increase in crime (17%), and rising food prices (14%). Problems mentioned less often include a lack of forest products and fish, and an increase in disease.

Figure 40 Proportion of households that think the village population has increased over the last 5 years

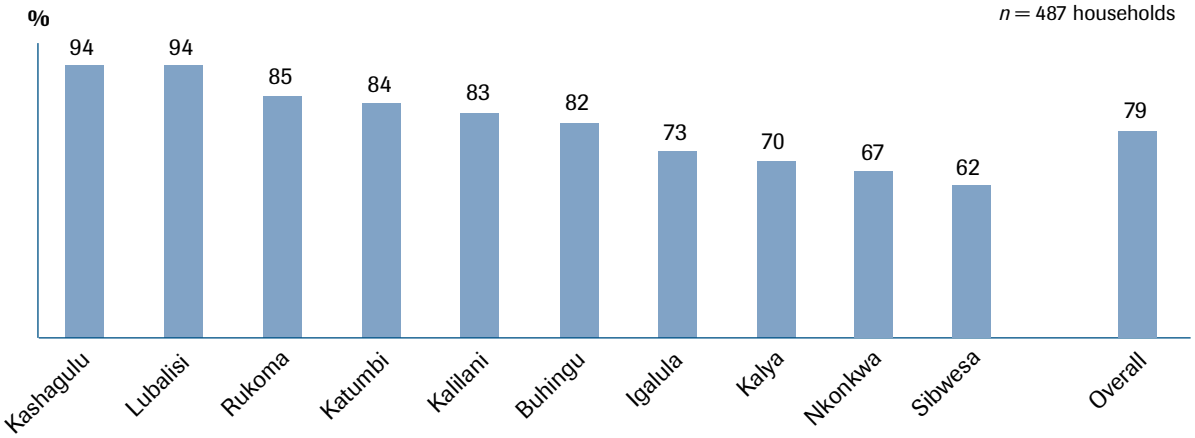
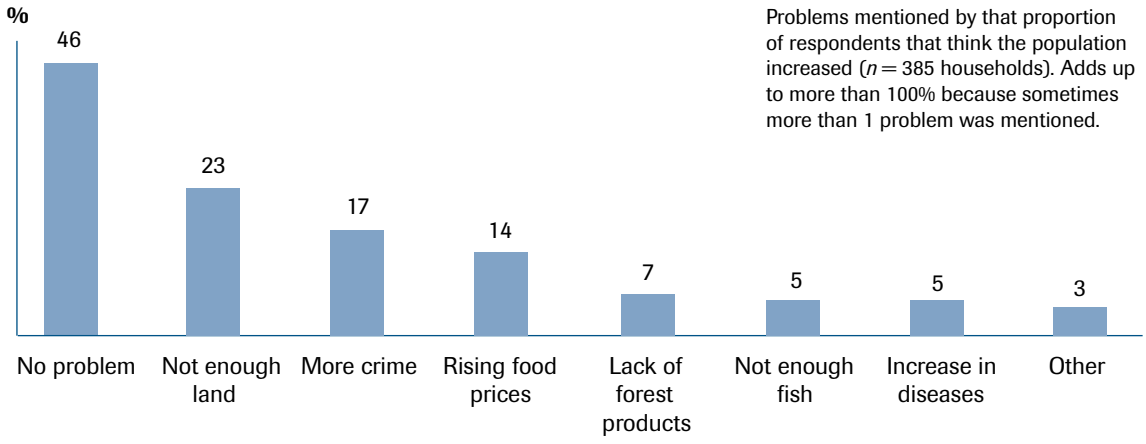


Figure 41 Problems caused by population growth



Overall, there are equal proportions of people who attribute population growth to natural increase and migration, and 11 percent think it is due to both (Table 30). However, there appears to have been more migration to Lubalisi and Kalilani than to the other villages. In Nkonkwa and Igalula, high fertility rates are more often seen as the cause of the increase.

Table 30 Reasons for population increase at village level (%)

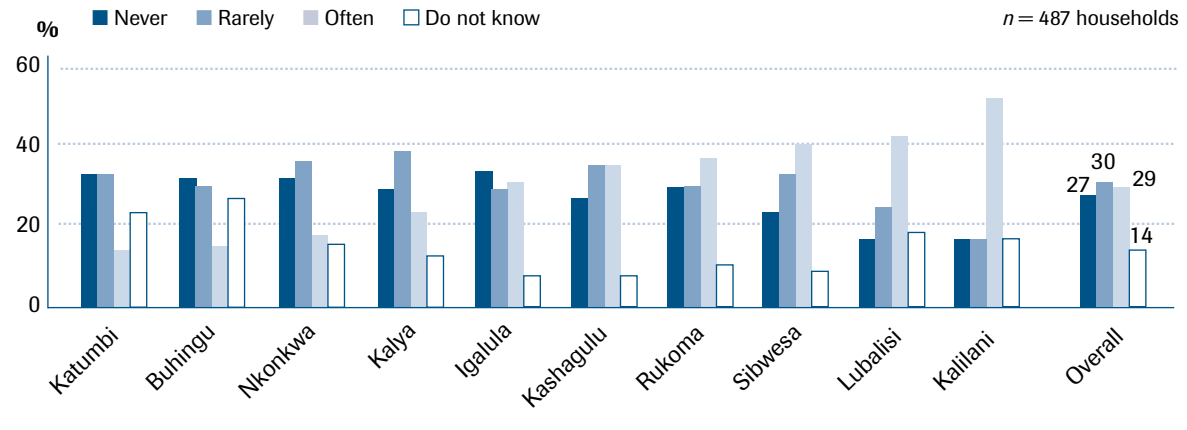
	Perception of population change (n=487)				Reason for increase (n=385)			
	Increased	No change	Decreased	Do not know	Many births	Migration	Both	Do not know
Rukoma	85	4	2	9	32	30	13	9
Lubalisi	94	2	0	4	6	65	18	4
Igalula	73	6	8	14	33	20	10	6
Buhingu	82	4	2	13	29	31	16	5
Nkonkwa	67	6	14	12	49	12	4	2
Katumbi	84	0	4	12	30	34	16	4
Kalilani	83	10	7	0	13	50	7	10
Sibwesa	62	10	22	6	36	20	2	4
Kalya	70	14	6	10	34	22	8	6
Kashagulu	94	0	0	6	38	38	14	4
Overall	79	5	6	9	31	31	11	6

6.2 SOCIAL COHESION

This section discusses social ties that create social safety nets, conflicts that have the potential to reduce these ties, and methods used to resolve those conflicts.

About a quarter (27%) of the respondents indicated that disputes about land, forest products or fishing never occur in their village, while 30 percent rarely witness such disputes, and 29 percent think they occur often. Fourteen percent do not know (Figure 42). Katumbi, Buhingu and Nkonkwa have the smallest proportions of people who think disputes occur often, while disputes are reported more commonly in Kalilani, Lubalisi, and Sibwesa.[16]

Figure 42 Occurrence of disputes at village level



[16] In these villages the proportion of respondents who said "often" differed at a statistically significant level (p≤0.1) from the proportion in the entire survey (determined by Chi2 tests with 1 degree of freedom: Katumbi: Chi2=5.588, p=0.02; Buhingu: Chi2=5.713, p=0.02; Nkonkwa: Chi2=2.781, p=0.095; Kalilani: Chi2=6.278, p=0.01; Lubalisi: Chi2=3.198, p=0.07; Sibwesa: Chi2=2.721, p=0.09).

Respondents who said disputes occur rarely or often were asked a number of follow up questions about the type of dispute, among whom the disputes occur, and how and by whom they are resolved.

The most commonly reported type of dispute was conflict over private land boundaries (Table 31). This confirms what was said by local leaders in the focus group discussions. Almost 60 percent of these types of disputes were said to be between villagers from the same village, while 32 percent were between villagers and TANAPA staff or the government. In 9 percent of the cases, the dispute was between villagers of different villages.

Other common disputes, each mentioned by roughly 20 percent of the respondents, involved robberies, trespassing in the park, or fishing in the park. Conflicts about robberies were mainly between local villagers, but a large proportion also said they were between villagers and the government. It is not clear what is meant by this, but it could be that people feel they are not sufficiently protected by the government. Problems related to the park, either on land or water, are predominantly between local villagers and TANAPA.

Conflicts about private land were mentioned often in all villages, while robberies appear to pose a bigger problem in Lubalisi and Kashagulu. Trespassing in the park causes relatively few problems in Nkonkwa, Kalilani and Sibwesa, but is high in Lubalisi and Kalya. Fishing in the park was mentioned rarely in Rukoma, Kalya and Kashagulu, and causes most problems in Kalilani and Nkonkwa.

Table 31 Causes of conflicts at village level (%)

	Private (farm) land boundaries	Robberies	Trespassing in the park	Fishing in the park	Other	*n*
Rukoma	59	6	26	9	9	34
Lubalisi	41	38	41	-	3	32
Igalula	55	10	26	19	6	31
Buhingu	46	25	13	25	-	24
Nkonkwa	58	19	4	38	-	26
Katumbi	52	22	17	26	-	23
Kalilani	35	-	5	65	-	20
Sibwesa	58	17	8	19	6	36
Kalya	40	30	30	10	3	30
Kashagulu	32	38	24	12	6	34
Overall	48	21	20	20	4	290

The most common method of conflict resolution was “to do nothing”. This answer was given by 46 percent of the respondents. Going to the village government was mentioned by 36 percent, while a further 16 percent try to resolve the conflict through direct negotiation. At village level, the same rough proportions are found, except in Kalilani where direct negotiation is the main tool for conflict resolution.

Forty percent think that usually these disputes are not resolved in a fair way. Thirty-five think they are resolved in a fair way, and 26 percent do not know.

6.3 HEALTH

This section addresses the prevalence of disease, access to health facilities, information about diet and nutrition, and perceptions relating to reproductive health.

Disease prevalence

In the large majority of households (86%), at least one household member had suffered from malaria in the last 12 months. This is similar to the prevalence rate of 90 percent found in a survey in two coastal districts in the northeast of Tanzania (Pangani and Bagamoyo) in 2009 (The BALANCED Project, 2010). Excluding malaria, 94 percent of the households reported a member suffering from at least one of the diseases presented in Figure 43 in the past year. Prevalence rates are roughly similar across villages (Table 32).

Figure 43 Disease prevalence

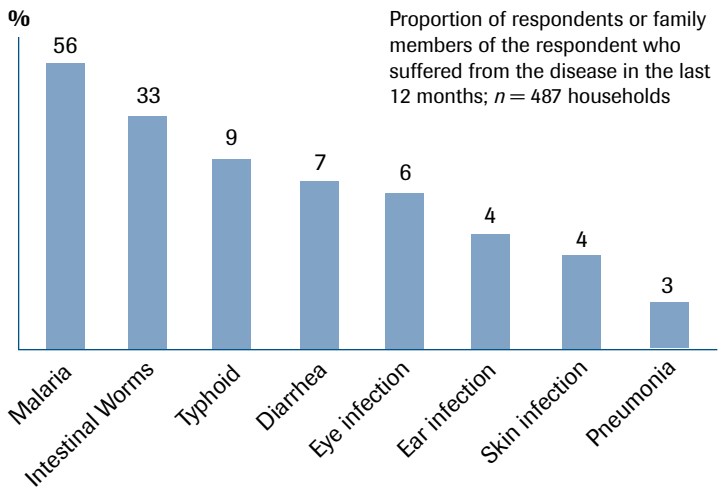


Table 32 Disease prevalence at village level (%)

	Malaria	Intestinal worms	Typhoid	Diarrhea	Eye infection	Ear infection	Skin infection	Pneumonia
Rukoma	79	68	51	53	49	43	42	6
Lubalisi	78	73	45	47	67	45	37	31
Igalula	90	59	59	57	63	43	31	16
Buhingu	89	58	56	53	40	38	24	13
Nkonkwa	84	82	55	63	53	29	27	10
Katumbi	94	64	48	42	46	20	38	8
Kalilani	83	47	53	40	33	27	17	13
Sibwesa	86	64	70	62	52	44	36	12
Kalya	88	82	64	64	48	46	34	18
Kashagulu	88	66	64	58	64	46	34	18
Overall	86	67	57	54	52	39	32	14

Access to medical care

The options for medical care in the area are medical shops or pharmacies, village dispensaries, a medical centre in Buhingu, and hospitals in Kigoma and Mpanda. In the Pathfinder International assessment of the health facilities, the medical shops were found to be relatively well equipped with malaria medication, water purification tablets, contraceptive pills and condoms, and other medications. Villagers interviewed in this assessment said that medical shops often have shorter waiting times and more medications available than the dispensaries, though it is unclear whether the shopkeepers are trained to give medical advice. There are medical facilities in all villages, except Kalilani. The people of Kalilani use the TANAPA dispensary, but some frictions exist and some villagers said only women and children are permitted to use the

facility. The only staffed medical center is in Buhingu; the other villages have medicine dispensaries. Patients are referred to the medical center if the dispensaries cannot handle a case. The nearest hospital requires a boat ride of up to 30 hours (Pathfinder International, 2011; personal communication with a member of the assessment team).

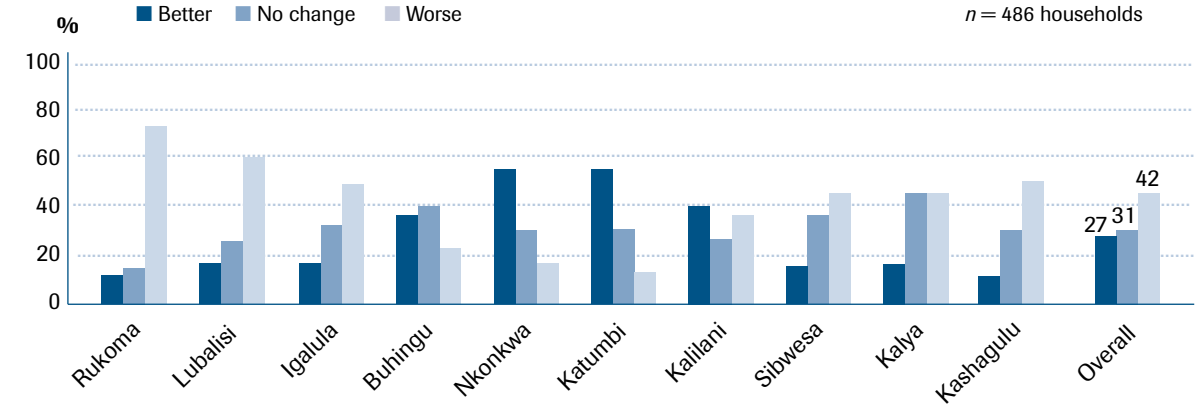
In the survey, respondents were asked where they go if a household member had a serious medical problem. The village dispensary is what most respondents answered (49%). Traditional healers were rarely mentioned. In Pathfinder's health facility assessment, it was said by some people that for "shameful" diseases, such as HIV or sexually transmitted infections, villagers prefer the traditional healers, but in this more general question, only 2 percent of the respondents mentioned traditional healers.

Table 33 Location for medical care at village level

	Traditional healer	Medical shop/ pharmacy	Village dispensary	Dispensary in other village	Buhingu health center	Health center in other village	Kigoma/ Mpanda hospital	Other	Total	*n*
Rukoma	-	17	62	-	11	-	9	-	100	53
Lubalisi	-	4	6	88	-	-	-	2	100	49
Igalula	6	20	63	-	10	-	2	-	100	51
Buhingu	-	-	18	-	80	-	2	-	100	55
Nkonkwa	2	-	65	-	27	-	2	4	100	49
Katumbi	2	-	70	-	24	-	4	-	100	50
Kalilani	-	3	27	-	63	-	-	7	100	30
Sibwesa	4	12	60	-	-	10	14	-	100	50
Kalya	10	22	56	-	-	-	10	2	100	50
Kashagulu	-	10	60	2	-	2	24	2	100	50
Overall	2	9	49	9	20	1	7	1	100	487

Overall, 42 percent of the respondents feel that access to medical care has worsened over the last five years, but there is an interesting difference at village level (Figure 44). Villages that are relatively close to the Buhingu medical center are the most positive, although within this group of Buhingu, Nkonkwa, Katumibi and Kalilani, those where the medical center was mentioned most often (Buhingu and Kalilani) are not the most positive. This suggests that those who use it most are not as satisfied as those who use it less.

Figure 44 Change in access to medical care compared to 5 years ago at village level



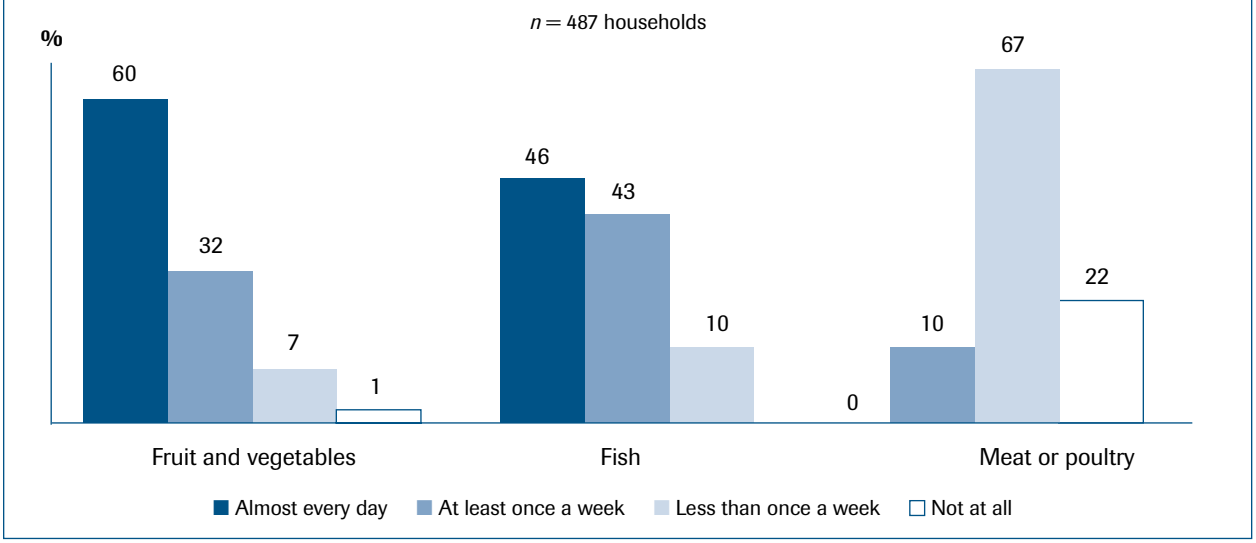
Diet

Fruit and vegetables are eaten almost every day by 60 percent of the households, and more than 90 percent have fruit and vegetables at least once a week. Fish is eaten almost daily by 46 percent, and almost 90 percent eat it at least once a week. Meat and poultry are eaten less than once each week by most households, and 22 percent never eat it (Figure 45).

Fruit and vegetables are eaten most often in Lubalisi (86% eat it almost every day), and least often in Katumbi (44%). Fish is eaten least in Lubalisi (4%), and it is also less common in Rukoma (28%), while in Kalilani and Katumbi, around 60 percent of households have it almost every day. Meat consumption is most common in Kalya, but even there only 20 percent eat it regularly.

As discussed in Section 4.1, fish consumption is perceived to have decreased over the last 5 years. Fifty-three percent report eating less meat than five years ago, while fruit and vegetable consumption has remained fairly constant.

Figure 45 Diet: frequency of eating fruit & vegetables, fish, and meat or poultry



Reproductive health

Just over 40 percent of all respondents were familiar with the concept of family planning (Table 34). There is no difference between men and women, but familiarity decreases with age.

Fewer women (52%) than men (60%) report wanting more children than they have today. The average ideal number of children indicated by respondents is 7.6. This figure is higher than the national average in which rural women said 5.2 children was the ideal number (NBS & ICF MACRO, 2011).[17] The difference between men and women is not statistically significant, but the relationship with age is: the number generally rises with age (Figure 46).

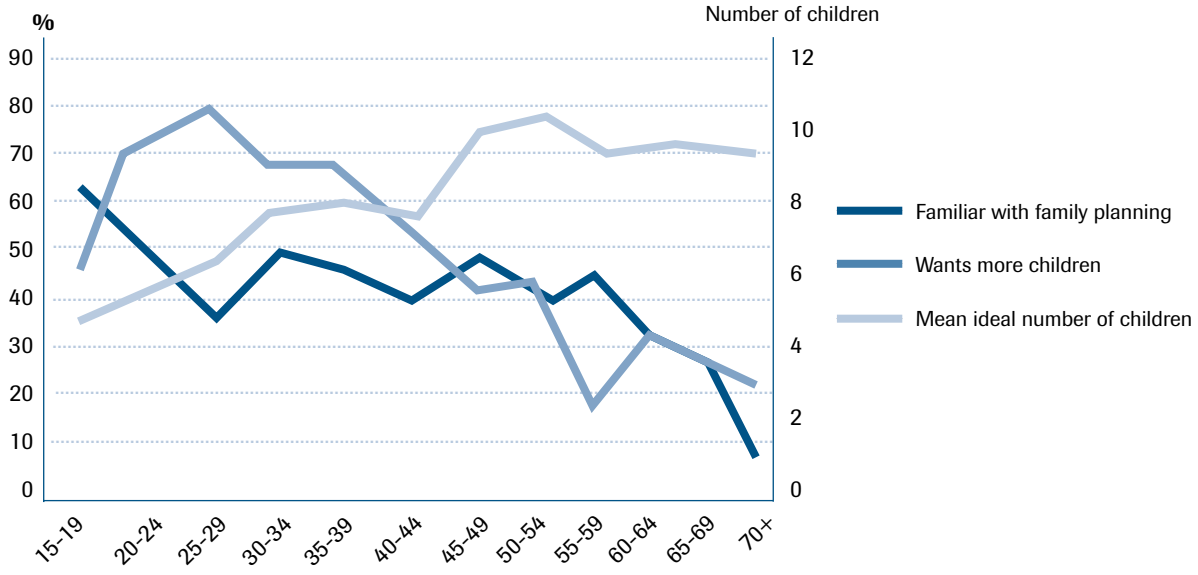
The remainder of this section is based on a sub-section of the questionnaire administered to women of reproductive age (15-49). The structure follows the 2010 DHS as closely as possible to facilitate comparison (NBS & ICF MACRO, 2011). Where possible, variables have been calculated in the same manner and differences and similarities between the Mahale area and the national data are noted.

[17] The formulation of the question in both surveys was slightly different, so it cannot be ruled out that this had a small effect on the results.

Table 34 Familiarity with family planning, desire for more children and the ideal number of children

	Familiar with family planning	Wants more children	*n*	Mean ideal number of children	*n*
Men	43%	60%	260	8.0	219
Women[18]	42%	52%	227	7.2	186
Age					
15-19	61%	44%	18	4.5	13
20-24	51%	69%	49	5.4	45
25-29	35%	79%	82	6.2	72
30-34	49%	66%	80	7.6	67
35-39	47%	66%	64	7.9	60
40-44	42%	47%	36	7.6	29
45-49	48%	39%	44	10.1	35
50-54	39%	42%	38	10.4	34
55-59	43%	17%	23	9.0	16
60-64	33%	33%	12	9.2	6
65-69	29%	29%	7	9.1	7
70+	8%	23%	13	9.2	9
Overall	43%	57%	487	7.6	405[19]

Figure 46 Relationship between age and familiarity with family planning, wanting more children and the ideal number of children



[18] The difference between the proportions of men and women wanting more children is statistically significant at the 10% level: Chi2:3.129;df=1;p=0.77. The differences in familiarity with family planning and the ideal number of children are not statistically significant.

[19] Eighty-two respondents did not know.

In total, 364 women participated in this part of the survey. The sample of women interviewed for this section slightly oversampled age groups 20-24 and 25-29 and under-sampled women of 35 and older compared to their proportion in the general population. The proportions in both the sample and in the population as determined from the household information are presented in Table 35. Twelve women did not know their age, and so are included in the overall but not the age-specific results.

Table 35 Comparison of age-group representation in the population and the sample

Age	Proportion of the 15-49 female population	Proportion in the sample	*n*
15-19	5	6	22
20-24	13	21	73
25-29	22	26	91
30-34	21	22	77
35-39	17	12	41
40-44	10	7	24
45-49	12	7	24
Total	100	100	352

Overall, 82 percent of the interviewed women were married or living together with a partner at the time of the survey (Table 36). This proportion is highest for the 35-39 age group and lowest for the teenage respondents.

Table 36 Marital status of the sample per age group (%)

	Marital status						
Age	Married/ living together	Divorced/ separated	Widowed	Never married	Missing	Total	*n*
15-19	55	-	-	45	-	100	22
20-24	79	7	-	14	-	100	73
25-29	82	10	2	5	-	100	91
30-34	88	5	5	1	-	100	77
35-39	93	2	2	2	-	100	41
40-44	83	8	8	-	-	100	24
45-49	79	8	13	-	-	100	24
Overall	82	7	3	8	0.3	100	364

Thirteen percent of the children born in the second half of 2006 did not survive their fifth birthday (Table 37) giving Mahale an under-5 mortality rate of 130/1000. All children born from January to June 2011 were still alive.

Table 37 Children born in the last 5 years		
Year of birth	**Proportion of all children <5**	**Proportion of children alive in June 2011**
July-Dec 2006	7	87
2007	18	93
2008	15	93
2009	26	98
2010	23	95
Jan-June 2011	11	100
Total	100	
n	461	

A total of 461 live births over the past five years were recorded among the 364 women in the survey. Of these, 63 percent were wanted at the time, 33 percent were wanted later, and for 10 percent of all births, the mothers would have liked to postpone the birth by more than five years after the actual birth (Table 38). Three percent were not wanted, and the proportion of unwanted pregnancies increases for the higher age groups.

The 2010 DHS found that, at the national level, 74 percent of births were desired by the mother, though unlike this survey, those results included current pregnancies.

Table 38 Fertility planning status for all births in the 5 years prior to the survey (%) [20]

			Wanted later							
Mother's age at birth	**Wanted then**	**Un-wanted**	**Total wanted later**	**<3 yrs later**	**3-5 yrs later**	**5+ yrs later**	**Don't know**	**Missing**	**total**	***n***
<20	67	0	33	na	na	na	na	-	100	61
20-24	60	0	37	9	16	10	2	3	100	148
25-29	68	0.8	32	10	12	8	1	-	100	130
30-34	61	2.9	36	7	14	12	3	-	100	69
35-39	52	24	24	na	na	na	na	-	100	25
40-44	44	38	19	na	na	na	na	-	100	16
45-49	na	na	na	na	na	na	na	-	100	2
Overall	63	3	33	9	12	10	2	1	100	461

Of the women interviewed in this section, 16 percent reported being pregnant at the time of the survey. As noted in the 2010 DHS study, women in their early pregnancy might not always know or be willing to tell, so the real proportion is probably higher. The proportion found here is larger than the national rural average (11%) in the 2010 DHS survey (NBS & ICF MACRO, 2011).

[20] For some age groups the number of observations was too low to present specific data. These cases are marked "na".

The proportion of women between 15 and 19 who have never given birth is 32 percent compared to the national average of 83 percent (NBS&ICF MACRO, 2011). Because there were only 22 respondents of this age group in the survey, the confidence interval is quite large (15-53%). Moreover, the national DHS data in this case are for both rural and urban areas, making a direct comparison difficult. For women currently living with a partner, only 25 percent of the 15-19 age group had never given birth compared to 40 percent nationally.

The mean number of births for women in the highest age group is 6.7.

Table 39 Children ever born and living

	All women				Currently married women			
Age	**Women who have never given birth**	**Mean number of children ever born**	**Mean number of living children**	***n***	**Women who have never given birth**	**Mean number of children ever born**	**Mean number of living children**	***n***
15-19	32%	1.5	1.2	22	25%	1.8	1.3	12
20-24	10%	2.5	2.3	73	12%	2.6	2.3	58
25-29	-	3.3	3.0	91	-	3.5	3.2	75
30-34	4%	5.5	4.6	77	3%	5.6	4.7	68
35-39	-	6.2	4.8	41	-	6.3	4.9	38
40-44	4%	8.0	6.2	24	5%	7.9	6.1	20
45-49	-	8.5	6.7	24	-	8.6	6.8	19
Overall	5%	4.7	3.9	364	4%	4.9	4.0	299

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 24 months, increase the risk of health problems and death at a young age (NBS & ICF Macro, 2011) for children and maternal mortality for women.

The median birth interval in this survey is 26 months, which is considerably lower than the median of 33 months in rural Tanzania (NBS & ICF Macro, 2011). In this survey, 61 percent of subsequent births occurred at least 24 months after a previous birth, but in the rest of rural Tanzania, 84 percent of women give birth at least 24 months after the previous birth (NBS & ICF MACRO, 2011).

The age at which childbearing starts is an important factor for the overall level of fertility and for the health of mother and child (NBS & ICF Macro, 2011). By age 15, 14 percent of women 15-18 in this study had already given birth. Looking at women of all ages, more than half of 18-year-old women had given birth, and among 20-year-olds this figure rises to 80 percent.

The median age at first birth confirms that half the women have given birth at the age of 18. For the whole of rural Tanzania the median age is 19 (NBS & ICF Macro, 2011).

Contraception is used by 17 percent of women in the survey. Hardly any difference was found for currently married women. Use of contraception is lower for the lowest and highest age groups, but the number of observations is relatively low. Most of the women using contraception use a modern method. Only 7 respondents mentioned a traditional method, such as the rhythm method, withdrawal, or a folk method. Of the modern methods, injectables are most common (60%). Other modern methods were mentioned by a maximum of five respondents, and included condoms, female sterilization, and birth control pills. A full list of the methods mentioned in this survey is provided in the appendices.

The use of contraception among currently married women is lower than in rural Tanzania as a whole, where 31 percent use it, but closer to the averages for the Western Regions (20%)(NBS & ICF Macro, 2011).

Table 40 Age of respondents at first birth and proportion who has not yet given birth by age group

	Proportion who gave birth by exact age (%)					Proportion who have never given birth (%)	*n*	Median age at first birth
	15	18	20	22	25			
15-19	14	na	na	na	na	32	22	17
20-24	18	61	82	na	na	10	73	18
25-29	12	52	82	93	100	0	91	18
30-34	9	57	79	87	93	4	76	18
35-39	13	67	87	95	100	0	41	18
40-49	17	65	90	94	96	2	48	18

Table 41 Current use of contraception of all women by age group

Age	Using any method	Of which, using a modern method	Currently pregnant	Not using birth control	Total	*n*
15-19	9	9	9	82	100	22
20-24	19	16	22	59	100	73
25-29	18	15	16	66	100	91
30-34	19	16	17	64	100	77
35-39	17	17	15	68	100	41
40-44	13	13	8	79	100	24
45-49	8	8	4	88	100	24
Overall	17	15	16	67	100	364

The two most common reasons are for not using contraception among non-pregnant women are: not knowing any method (17%), and wanting to get pregnant (13%). Other common reasons are presented in Table 42, and a full list of all reasons is provided in the appendices.

[21] The last two age groups have been combined to have sufficient observations per group.

[22] Two folk methods were mentioned. The first was described as "herbal" and the second is called pige, which involves the use of special charms made of wood that are carried around the waist.

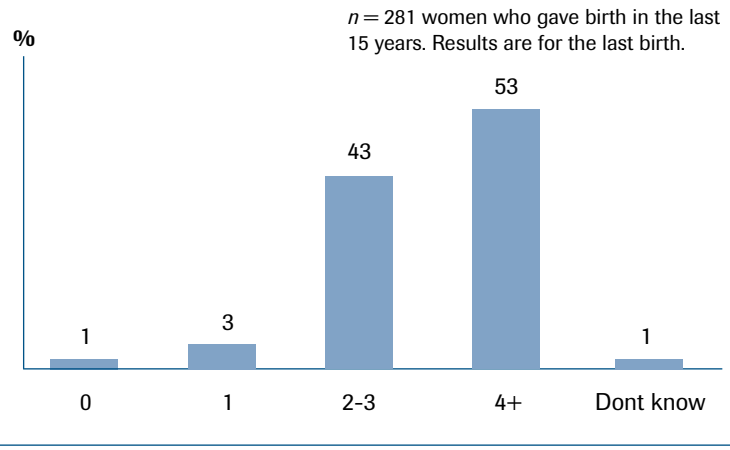
[23] It is not clear in the DHS calculations if pregnant women are included or excluded. As nothing is said about this, it is assumed they were included (and counted as not using any method), as they are in this study.

Table 42 Most common reasons for not using birth control (%)	
	Proportion of non-pregnant women not using birth control
Knows no method	17
Says she wants to get pregnant	13
Breastfeeding	9
Concern about side effects	9
Menopausal/hysterectomy	8
Husband/partner opposed	7
Not having sex	6
Not menstruated since last birth	5
Health concerns	5
Other reason	18
Do not know	3
n	245

Of all women who participated in this section of the survey, 281 (81%) had given birth at least once in the last five years. Fifty-three percent of these women reported having at least four antenatal care visits, the minimum number recommended by WHO. The national rural average is 39 percent.[24]

The traditional birth attendant is most commonly mentioned as the person assisting a birth (Figure 48). In 40 percent of births, assistance was given by a trained provider such as a nurse, midwife or doctor, which is close to the national rural average and the average for the Western Regions (42 and 38%, respectively) (NBS & ICF Macro, 2011). There was nobody present at two percent of the births.

Figure 47 Antenatal care: number of visits



Of the 87 children between 12 and 23 months identified in this study, 85 had received a measles vaccination (recommended to be given at 9 months), as reported by the child's mother.

Due to a difference in the elicitation method, these data cannot be compared well to the national average reported in the 2010 DHS report, however, it seems high. The national average for rural Tanzania is 83 percent, and for the Western regions 68 percent (NBS & ICF Macro, 2011).[25]

[24] While the question was the same in the DHS survey, there it was preceded by a number of other questions about antenatal care. It is therefore possible that the different set-up of the question partly caused the divergent results.

[25] 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.

Above, it was shown that in 86 percent of the households at least one member had suffered from malaria in the year previous to the survey. 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 5 years previous to the survey. It was not specified in the survey whether the nets were treated with insecticide or not.

The proportion of pregnant women sleeping under a net is slightly larger than for all women (90% vs. 86%), but the difference is not statistically significant (Table 43). This is higher than the national level where the proportion is 67 percent for rural Tanzania and 65 percent for the Western Regions. The Mahale proportion of 83 percent of children sleeping under a net is also higher than the national average: 70 percent for rural Tanzania, and 76 percent for the Western Regions.

Figure 48 Assistance at birth

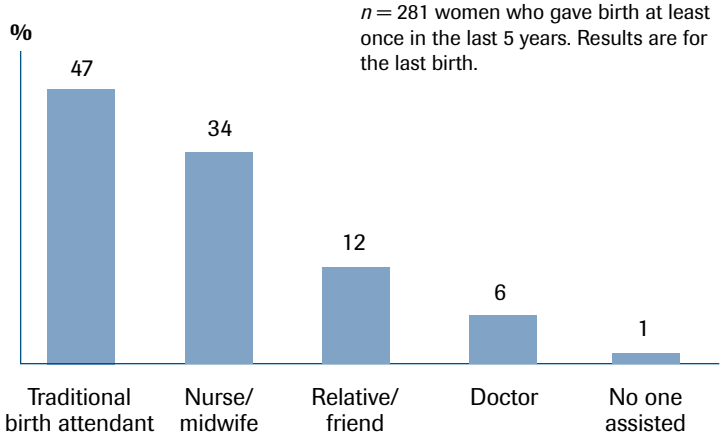


Table 43 Proportion sleeping the previous night under a treated or untreated mosquito net

	All women	Pregnant women	Children <5
Overall	86	90	83
missing	-	-	0.2
n	364	58	530

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.

Almost all (97%) of the 281 most recently born children in the survey were breastfed at some point, and 17 percent 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 percent were fed something besides breast milk in the first three days.[26]

Overview of the Reproductive Health Section

Table 44 summarizes the results of the above section and compares these to the national and regional data found in the nationwide DHS survey of 2010 (NBS & ICF MACRO, 2011). The comparison is sometimes imperfect because of small differences in the elicitation method. These are described in more detail in the text above.

On average, women in the Mahale area want more children but have a higher proportion of unwanted births and shorter birth intervals than the average rural women in Tanzania or in the Western Regions. However, Mahale has a higher proportion of women who have at least 4 antenatal care visits during pregnancy, higher measles vaccination rate, and higher proportion of women and children sleeping under mosquito nets than the average rural in Tanzania or the Western Regions.

[26] 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, but there is no reason why this should make a difference. The second question, about other food given during the first three days after delivery, was phrased slightly differently. 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.

Table 44 Overview of the reproductive health section

		2010 DHS survey	
	Mahale	**Rural Tanzania**	**Western Regions**
Ideal number of children (women)	7.2	5.2	5.8
Unwanted births[27]			
(a) Wanted later	33%	22%	-
(b) No more	3%	4%	-
Currently pregnant	16%	11%	13%
Median birth interval	26 months	33 months	-
Median age at first birth	18 years	19 years	-
Use of contraception by married women	17%	31%	20%
4+ antenatal care visits	53%	39%	-
Birth assisted by professional care person	40%	42%	38%
Measles vaccination in 1 year olds	98%	83%	68%
Pregnant women sleeping under a net	90%	67%	65%
Children (<5) sleeping under a net	83%	70%	76%
Breastfed	97%	97%	-
Other food	17%	32%	-

REFERENCES

Harrison P (2007) Sustainable Livelihoods Analyses and Threat Assessments in Priority Areas of the Mahale Ecosystem. Kilimanyika report. Bucks, United Kingdom.

Magnani R (1997) Sampling guide. Food and Nutrition Technical Assistance Project, Academy for Educational Development, Washington, D.C., USA.

National Bureau of Statistics (NBS) [Tanzania] and ICF Macro (2011) Tanzania Demographic and Health Survey 2010. Dar es Salaam, Tanzania: NBS and ICF Macro.

The BALANCED Project (2010) Population, Health, Environment Situational Analysis for the Saadani National Park Area, Tanzania. Coastal Resources Center, Narragansett, Rhode Island.

Pathfinder International (2011) Assessment of Health Facilities and Health-Seeking Behavior in the Greater Mahale Valley: The Tuungane Project.

van Beukering P, Scherl LM, Leisher C, Sultanian E, and Fry J (2007) Bunaken National Marine Park (Indonesia)The Role of Marine Protected Areas in Contributing to Poverty Reduction. Arlington VA: The Nature Conservancy. 62 p.

World Bank (2001) Attacking Poverty, World Development Report 2000/2001. Washington DC: World Bank. 352 p.

Table A1 Farming problems at village level

	Rukoma	Lubalisi	Igalula	Buhingu	Nkonkwa	Katumbi	Kalilani	Sibwesa	Kalya	Kashagulu	Overall
Lack of equipment	58	61	36	59	56	56	33	62	49	67	55
Drought	19	22	27	45	51	70	17	45	38	67	41
Lack of inputs	40	24	45	37	40	26	39	30	34	22	33
Damage by wildlife	31	45	48	22	16	16	83	21	21	13	29
Lack of capital	6	4	5	6	5	2	-	6	9	4	5
Crop disease	2	-	5	-	9	5	-	2	2	4	3
Soil exhaustion	-	2	-	8	5	-	6	4	-	2	2
Lack of infrastructure/ transport	4	-	5	2	-	-	-	2	4	2	2
Hard to get farm/lack of land	2	-	-	-	5	2	6	2	-	2	2
Floods	8	6	-	-	5	-	-	-	-	-	1
Farms are far from the homes	6	-	2	2	-	-	-	-	-	-	1
Lack of a market	2	-	-	-	-	-	-	-	2	-	1
Lack of manpower	2	6	-	-	-	-	-	-	-	-	1
Other	4	6	2	2	-	2	-	2	-	-	2
No problem	2	-	11	4	2	5	6	-	11	-	4
n	48	49	44	49	43	43	18	47	47	45	433

Table A. 2 Full list of birth control methods mentioned in the survey

	Proportion using a method
Injectables	60
Condom	8
Female sterilization	7
Rythm method	7
Pill	5
Iud	3
Implants	3
Lactational amen. Method	2
Withdrawal	2
Herbals	2
Pige (traditional method)	2
n	60

Table A.3 Full list of reasons mentioned for not using birth control (for those not currently pregnant)	
	Proportion of reasons
Knows no method	17
Says she wants to get pregnant	13
Breastfeeding	9
Concern about side effects	9
Menopausal/hysterectomy	8
Husband/partner opposed	7
Not having sex	6
Not menstruated since last birth	5
Health concerns	5
Up to god/fatalistic	3
Do not know	3
Knows no source	3
Respondent opposed	2
Infrequent sex	1
Religious prohibition	1
Lack of access/too far	1
Not married	1
Inconvenient to use	1
Others opposed	0.4
Other reason	3
n	245

Figure A 1 Diet at village level: fruit and vegetables

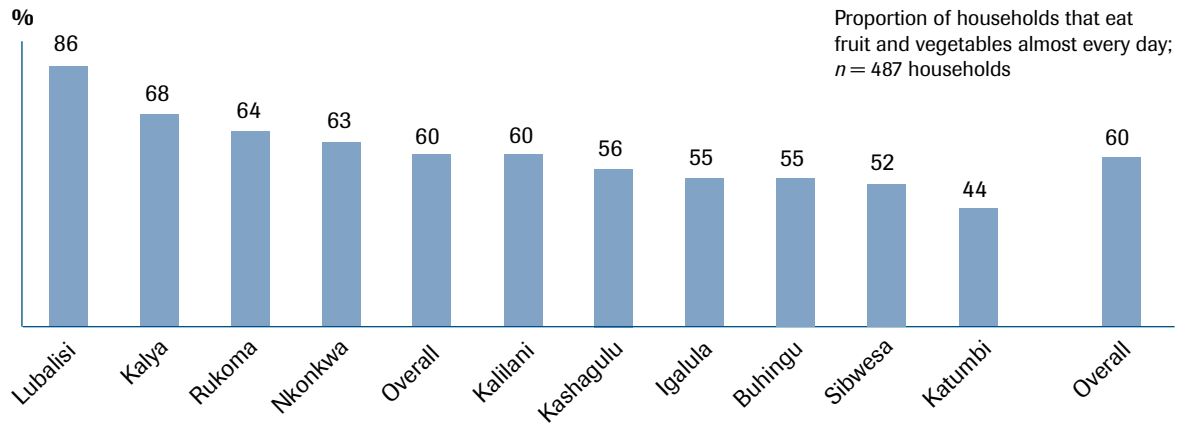


Figure A 2 Diet at village level: fish

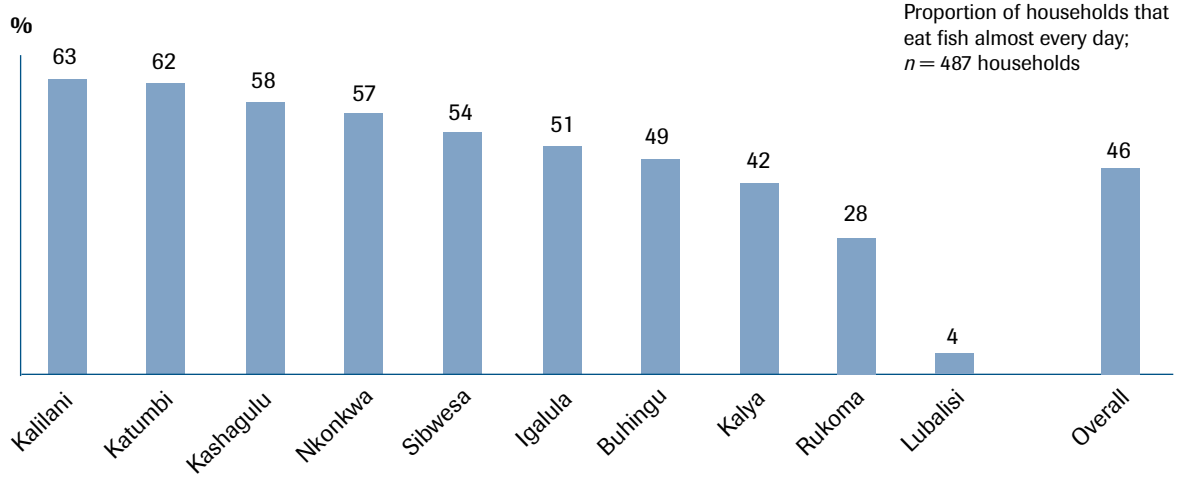
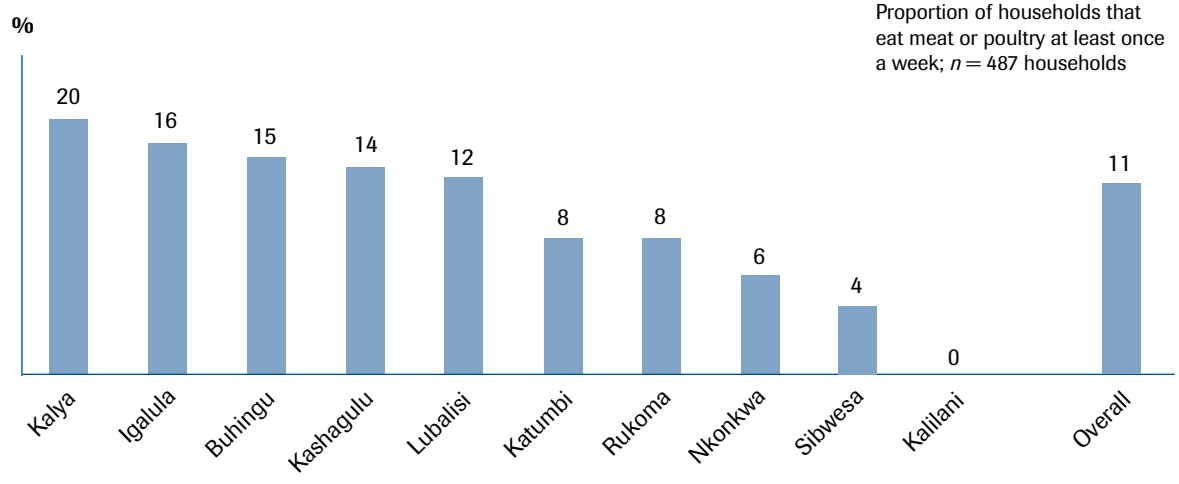


Figure A 3 Diet at village level: meat or poultry



Appendix II KISWAHILI AND ENGLISH HOUSEHOLD QUESTIONNAIRES

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DODOSO LA UTAFITI KATIKA KAYA

<JAZA TAARIFA ZA HAPA CHINI KABLA YA KUANZA USAHILI AU MARA TU BAADA YA KUMALIZA USAHILI>

Jina la msahili		**Namba ya utambulisho wa kaya**	
Tarehe ya usahili		Muda wa kuanza usahili	
Kijiji		Muda wa kumaliza usahili	
Kitongoji			

UTANGULIZI

Habari, mimi ni..... Huu ni mradi wa utafiti wenye lengo la kuchunguza hali ya maisha ya wakazi wanaoishi maeneo ya kuzunguka hifadhi ya taifa ya Mahale . Lengo la mradi huu ni kujua mambo yanayo waathiri katika maisha ya kila siku.

<OMBA KUONGEA NA MKUU WA KAYA, KAMA HAYUPO KARIBU AU ANA SHUGHULI OMBA KUONGEA NA MTU MZIMA MWINGINE YEYOTE>

Ningependa kukuuliza maswali yanayokuhusu wewe mwenyewe na kaya yako. Majibu yote utakayotoa yatakuwa siri na hayataweza kutolewa kwa mtu mwingine yeyote . Taarifa zitatumika tu kuelezea eneo mnaloishi . Taarifa za kila mtu zitajumuishwa kwa pamoja kuelezea wastani wa maisha ya jamii kwa ujumla, hivyo hakuna mtu ambaye ataweza kumtambua mhusika aliyeshiriki.

Unaweza kuturuhusu kuendelea na majadiliano haya?

Hakuna majibu sahihi au yenye makosa . Mtazamo wako ndio utakuwa wa muhimu zaidi.

Tunaweza kukaa sehemu tulivu ambapo tunaweza kuongea?

Full version at http://conserveonline.org/library/2011-mahale-questionnaire-swahili/@@view.html

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Household Survey Questionnaire

<FILL OUT THE DATA BELOW BEFORE THE INTERVIEW OR DIRECTLY AFTERWARDS>

Name of the interviewer		**Household ID code**	
Date of the interview		Start time of the interview	
Village		Finish time of the interview	
Sub-village			

INTRODUCTION

Hello, I am... I am involved in a research project to investigate the livelihoods of the people who live in this area. I am part of a group of interviewers who will interview households in the villages in this area in the next 2 to 3 weeks. The goal of the project is to better understand the issues that affect your daily life.

<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>

I would like to ask you a number of questions related to yourself and your household. Please note that any information you give me will be treated completely confidentially and will not be shared with anyone else. The information will only be used to characterize the area in which you live. All individual information will be added together to determine the average for the whole community, so nobody will be able to identify individual participants.

Would you like to participate in this interview?

There are no right or wrong answers, only your opinion counts.

Can we find a comfortable place where I can ask you the questions?

Full version at http://conserveonline.org/library/2011-mahale-basline-final-questionnaire-english/@@view.html


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The Nature Conservancy
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