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Poverty and Access to Water in Namwala District, Zambia
Report on the results from a household questionnaire survey, Zambia

Carol Emma Mweemba, Mikkel Funder, Imasiku Nyambe and Barbara Van Koppen

DIIS Working Paper 2011:19

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Cover Design: Carsten Schiøler
Layout: Allan Lind Jørgensen
Printed in Denmark by Vesterkopi AS

ISBN: 978-87-7605-464-9

Price: DKK 25.00 (VAT included)
DIIS publications can be downloaded free of charge from www.diis.dk

ACKNOWLEDGEMENT

The Competing for Water programme is funded through a research grant from the Danish Council for Development Research.

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DIIS Working Paper Competing for Water sub-series includes papers generated as part of the Competing for Water programme (www.diis.dk/water), a comparative and collaborative research programme which aims to understand conflict and cooperation in local water governance. The research programme is coordinated by Mikkel Funder and Helle Munk Ravnborg at DIIS and entails field-based research in Tiraque district, Bolivia; Douentza district, Mali; Condega district, Nicaragua; Con Cuong district, Vietnam; and Namwala district, Zambia

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ABSTRACT

In view of the increasing competition for water, there is a risk that particularly the rural poor will increasingly face difficulties in meeting their water needs for domestic and productive purposes. Based on a questionnaire survey carried out during 2008 in in Namwala district, Zambia, this DIIS Working Paper provides a household poverty profile for the rural population of the district and analyses access to water enjoyed by the poor, less poor and non-poor households and their contact to water governance institutions.

1. INTRODUCTION

Water resources have not been well managed in many countries, resulting in problems such as inadequate supplies to meet various needs, pollution, inadequate information for decision making, inefficient use of the resource, inadequate financing and limited stakeholder awareness and participation. However, there is a general perception that these problems can be addressed with the application of varied methods including the principles of integrated water resources management (IWRM) which are now well established in many countries. The application of the IWRM approaches is largely concerned with putting a balance on economic efficiency, social equity and environmental sustainability.

Social well-being is particularly important in integrating water access needs with people's livelihoods. In Zambia, large segments of the population live under pervasive poverty. Many live in income deficit situations and suffer from other deprivations such as little access to and poor quality of social services, including water access. Currently, the high prevalence of poverty in the country generally and in rural areas in particular is also seen in the deficient water supplies available for various uses. Zambia's water potential is in fact considered sufficient to meet current and future water demands, but the low level of water development is inadequate to meet the current needs for domestic and productive uses. This understanding is important for proper management of water resources, and is also important to research on people's access to water and water governance institutions in rural areas.

This household survey on well-being, access to water and water governance institutions brought out a variety of issues in water access with significance importance put on water for drinking and cooking, washing clothes, bathing and cattle watering. Issues of land and crop watering were also explored. An understanding of such issues is crucial for decision making in water management and governance, and a joint understanding of needs and issues in water management can hopefully provide a better basis for cooperation.

2. METHODOLOGY[1]

Inspired by the reservations expressed by Sen (1981, 1985) towards understanding and measuring poverty and well-being solely on the basis of income or expenditure data, and in line with the increasing recognition among agencies like IFAD (Jazairy *et al.*, 1992), UNDP and the World Bank (e.g. Narayan *et al.*, 2000) of the multidimensionality of poverty and the importance of including poor people's own perceptions in poverty assessments, the poverty profiles developed as part of the Competing for Water programme are based on people's own perceptions of poverty, identified through well-being rankings.

The rankings were conducted in a sample of three communities from each of the five research locations, drawn through a maximum variation sampling strategy with respect to factors which could potentially lead to the existence of different perceptions of well-being. The descriptions of different poverty levels resulting from the rankings were 'translated' into indicators. While differences were encountered with respect to the specific characteristics of these indica-

[1] A more detailed description of the methodology is available in Ravnborg *et al.* (1999) and Ravnborg et al (forthcoming).

tors across research locations, e.g. what constitutes a good house in Douentza district in Mali is different from what constitutes a good house in Namwala district in Zambia, a common set of indicators were encountered across the five research locations. The indicators, which are listed in Table 1, cover aspects related to demography, sources of livelihood and living conditions and were made quantifiable through the formulation of a household questionnaire.

The questionnaire was administered to five independent samples, one from each of the five research locations, drawn as a two-stage random sample, based on complete lists of households living in the research locations, elaborated as part of the programme. This means that absentee landowners are not included in the survey, and thus that the survey data cannot provide a full picture of issues such as land distribution. The samples comprise 400 households for each of the research locations. A scoring system was designed according to which a score (33, 67 or 100) was assigned to each household for each indicator depending on the characteristics of the household with respect to the indicator. Table 1 lists the indicators and describes the scoring system. For each household, the scores obtained on each of these ten indicators were then combined into a poverty index – calculated as the arithmetic mean of the scores obtained on each of the indicators – on the basis of which three poverty categories were defined, namely the poorest, the less poor and the non-poor households. Table 2 describes the resulting household poverty index and the threshold values defining the three poverty categories. Following this procedure, qualitative poverty descriptions are turned into an absolute, but locally informed poverty measure. For a more detailed description of the methodology, please refer to Ravnborg *et al.* (1999).

Table 1. Household poverty indicators and scoring system

Indicator	Score	Description
IMARITAL	67	Household head is a married (religious, civil or customary wedding) or co-habitating man or woman
	100	Household head is a single, divorced or widowed man or woman
IHOUSING	33	Good roof and good floor (tiled or iron roof, nicalit, and cemented or tiled floor) and house not in need of major repair – in Douentza, Mali, good roof and house not in need of repair!
	67	Either good roof or good floor (but not both) and house not in need of major repair – in Douentza, Mali, good roof quality but house in need of some repair!
	100	Poor roof (thatched, plastic, wood, etc.) and poor floor or house in need of major repair – in Mali, poor roof and house in need of major repair!
IFACILITIES	33	Have electricity and/or piped water at the house
	67	Do not have electricity nor piped water at the house
IEDUCATION	33	Household has children/youngsters who attend secondary education, university and/or other higher education
	67	All children between 6 and 12 years of age attend school
	100	Some children between 6 and 12 years of age do not attend school

Table 1. (continued)

Indicator	Score	Description
IFOOD	33	Household did not experience a period with insufficient food
	67	Household had short period of insufficient food and/or could cope with food insufficiency by reducing the amount of meat or by buying food (from own money)
	100	Household experienced extended periods of insufficient food (e.g. > 2 months) during which they reduced the number of meals, borrowed food or money to buy food, asked for food aid or had to send wife and/or children to day-labour to raise money for food
ILAND	33	Having a lot of land[2] or having some land[3] with irrigation on part of the land during part of the year[4] – in Douentza, Mali, owning land[5] and having irrigation part of the year[6] on part of the land
	67	Having some land without irrigation or having a little land with irrigation on part of the land during part of the year – in Douentza, Mali, owning land but without irrigation
	100	Having no or just a little land,[7] all without irrigation

[2] In Tiraque, Bolivia, a lot of land is >2 hectares; in Condega, Nicaragua, it corresponds to >8 manzanas (1 manzana = 0.7 hectare); in Con Cuong, Vietnam, it corresponds to >4 hectares; and in Namwala, Zambia, it corresponds to >8 acres or >4 hectares.

[3] In Tiraque, Bolivia, some land is between 1-2 hectares; in Condega, Nicaragua, it corresponds to between 1 and 8 manzanas (1 manzana = 0.7 hectare); in Con Cuong, Vietnam, it corresponds to between 2-4 hectares; and in Namwala, Zambia, it corresponds to between 4-8 acres or 2-4 hectares.

[4] In Tiraque, Bolivia, and Con Cuong, Vietnam, irrigation during the dry season; in Condega, Nicaragua, and Namwala, Zambia, irrigation during the dry and/or the rainy season.

[5] Very few people in Douentza, Mali, have a reliable estimate of the size of their land holding.

[6] During the dry and/or the rainy season.

[7] In Tiraque, Bolivia, a little land is <1 hectare; in Condega, Nicaragua, it corresponds to <1 manzana (1 manzana = 0.7 hectare); in Con Cuong, Vietnam, it corresponds <2 hectares; and in Namwala, Zambia, it corresponds to <4 acres or <2 hectares.

Table 1. (continued)

Indicator	Score	Description
IPRODCAP	33	Own a plough and animal traction (pair of oxen, camels or buffaloes) and in Con Cuong, Vietnam, also a cart, or own a tractor or contract labourers for at least three agricultural tasks (land clearing, preparation; sowing/planting/transplanting; weeding; harvesting, livestock herding; maintenance or watching of irrigation canals) – in Tiraque, Bolivia, for at least four agricultural tasks.
	67	Own only either the plough or the traction animals or, in Con Cuong, Vietnam, a cart, or contract labourers but not for more than two of the mentioned tasks – in Tiraque, Bolivia, not for more than three of the mentioned tasks
	100	Do not own traction animals or ploughs – and in Con Cuong, Vietnam, do own a cart, and do not contract labourers or only contract labourers for one task – in Tiraque, Bolivia only for a maximum of two tasks
ILIVESTOCK	33	Having a lot of cattle – in Tiraque, Bolivia, Condega, Nicaragua, and Con Cuong, Vietnam, more than three heads of cattle; in Douentza, Mali, and Namwala, Zambia, more than 10 heads of cattle
	67	Having cattle or other livestock – in Tiraque, Bolivia, Condega, Nicaragua, and Con Cuong, Vietnam, three heads of cattle or less; in Douentza, Mali, and Namwala, Zambia, 10 heads of cattle or less – or having oxen, buffaloes, camels or donkeys
	100	Not having any livestock (cows, donkeys, camels, buffaloes or oxen)

Table 1. (continued)

Indicator	Score	Description
INONAG	33	Having a shop, bar, clinic, etc; buying up and transporting agricultural products and natural resources; or somebody in the household being employed as a professional
	67	Somebody in the household engaged in charcoal burning, brick making, tailoring, carpentry, construction etc. or the household receives remittances
	100	Nobody in the household having any of the above non-agricultural sources of income
IDAYLAB	67	Wife does not day-labour on other people's land and husband either does not day-labour on other people's land or only does so during one month a year or does so more than one month a year but less than once per week
	100	Wife day-labours on other people's land or husband day-labours on other people's land either during more than one month a year more

Table 2. Description of household poverty index and threshold values defining the categories of 'non-poor', 'less poor' and 'poorest' households

Research location	Minimum	Maximum	Median	Average	Threshold values
Tiraque district, Bolivia	43.2	90.1	66.7	65.5	
Douentza district, Mali	43.2	90.1	70.0	68.9	
Condega district, Nicaragua	43.2	93.4	70.1	69.8	non-poor: =<61.0 less poor: >61.0 and =<72.0 poorest: >72.0
Con Cuong district, Vietnam	39.8	90.0	63.5	64.8	
Namwala district, Zambia	39.8	93.4	70.1	68.6	

Apart from the questions necessary to quantify the poverty indicators, the questionnaire contained sets of questions aimed to establish the access enjoyed by the household to water for different purposes such as domestic (drinking, washing and bathing) and productive uses (e.g. irrigation, livestock and fishing).[8] The following chapters presents selected findings from the survey.

[8] In Con Cuong, the average duration of the questionnaire-based interviews was 63 minutes.

3. DESCRIPTION OF STUDY AREA

3.1 Introduction to Namwala District

Namwala District is situated in the southern province of Zambia. Namwala District is a highly rural district located on the low-lying plains with pastoral farming as a major economic activity. The district holds a higher percentage of livestock compared to all districts in the Southern Province of Zambia, but also has high poverty rates. The Kafue River that drains the district gives it opportunities for fishing and crop irrigation.

The district covers an estimated total area of about 10,000 square kilometres, at an altitude of 1,100-1,300 meters above sea level. It is characterized by a dry and

hot weather from September to October, warm to hot and rainy weather from November to April, cool to cold and windy weather from May to August. The district features three ecological zones namely:

- The Kafue basin covering the Southern bank with heavy alluvial clay soils. The average annual rainfall is 800 mm. Approximately one quarter of the district consists of the Kafue floodplain.
- Semi-arid zone covering Ngabo/Kaluweza, Luubwe and Baambwe. The soils are generally light brown to grey silt or sand loam (covering the Central part of the District), and the annual range of rainfall is 600-1000 mm.
- The plateau zone covering Mbeza/Nakamboma, Muchila and Chitongo areas. The soils are generally rich red clay/red brown loams. The annual range of rainfall is 800-1100 mm.

Figure 1. Location of Namwala District in the Southern Province of Zambia

According to the 2002 census of population and housing, the population of the district is about 83,000 and is concentrated in major settlement areas of the District such as Namwala town, Kabulamwanda, Muchila, Maala, Mbeza and Chitongo. The annual growth rate of the population is estimated at 4 percent.

3.2 Water Availability, Use and Access

The main river is the Kafue, with a braided channel known as the Namwala River. The Kafue and Namwala rivers are the main source of water for domestic use and animal watering. The other usages of the two rivers are small-scale agriculture and fishing. The abundant water resources from the rivers and the fertile plains give the district great potential for irrigation on a large scale, but so far only small-scale irrigation takes place in an experimental form. The other rivers that drain the district are Chitongo and Mbeza, which flow intermittently.

The water resources are theoretically available to meet all needs in Namwala District. However, the rural parts of the district lacks developed water resources and infrastructures to enable easy access of water for all uses. Water infrastructures are inadequate to meet people's demands over water access for various uses. Generally, boreholes, wells, dams, dambos, rivers and streams are the major water resources found in the district. The average distance between water sources is about 2.8 kilometres for most areas. The distance increases in the dry season as most water sources nearby dry up, silt or break down, causing people – especially women and children – to walk more than three kilometres in search of domestic water. The situation challenges people in accessing water for various uses. In addition, consumption of clean water is compromised in water-scarce situations, because people tend to get water for drinking from any available sources; whether or not the water is clean is usually the last concern. Namwala D-WASHE reports that only 46 percent have access to safe drinking water, out of the total population of 82,708 people (GRZ 2008).

Wells and boreholes are the main sources of water mostly used by the rural people of Namwala for domestic purposes, i.e. drinking, washing and bathing. Construction, crop and stock watering are usually done at rivers, dambos and streams. However, wells and boreholes are still used for these purposes when streams within the communities dry up. The peri-urban part of the district uses tap water for domestic purposes. However, the water reticulation network in the peri-urban area of the district is old. Pipes and the two available pumps used to supply water to the communities are old, and the water tanks are dilapidated. The peri-urban community of Namwala receives water supplies for 16 hours a day. The population within the peri-urban district with access to water is above 70 percent. The organisation responsible for supplying water is the Southern Water and Sewage Company (GRZ 2004).

4. POVERTY AND ACCESS TO DOMESTIC WATER

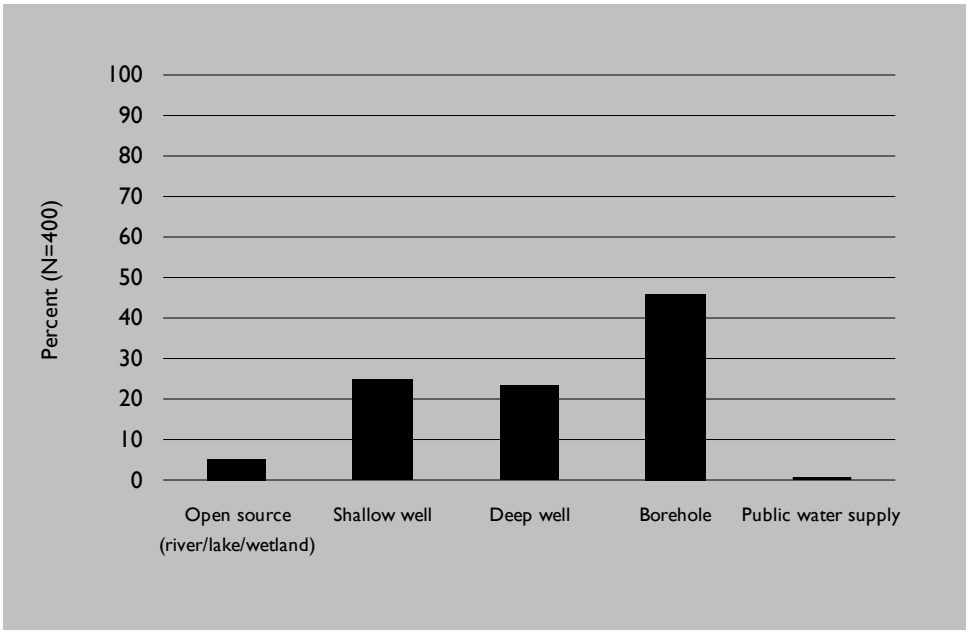
This section presents selected results related to domestic water uses, i.e. water for drinking and cooking, for washing clothes, and for bathing. In general, the study found a fairly limited variation between results among these different types of domestic water use. The following presentation of results therefore only occasionally distinguishes between the different types of domestic water uses, although disaggregated analysis was done for all water uses. Productive water uses are described in section 5.

4.1 Most important sources of domestic water

Domestic water uses include water for drinking/cooking, washing clothes and bathing.

Borehole water is the most common source of water for domestic uses in Namwala district. Among the respondents, 45.8 percent responded that boreholes were the most important source of water for drinking/cooking water. For washing clothes 41.5 percent of respondents used boreholes as the primary source of water, while 43.0 percent used boreholes for their most important source of bathing water.

Figure 2. Most important sources of water for drinking/cooking



The sources of domestic water were disaggregated into the three different well-being levels established under the study.

Figure 3. Most important sources of drinking water by well-being category

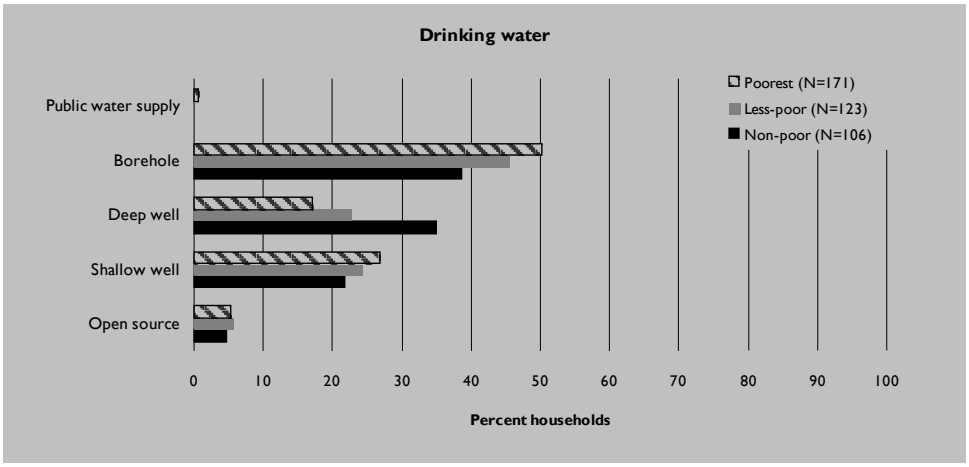


Figure 4. Most important sources of clothes washing water by well-being category

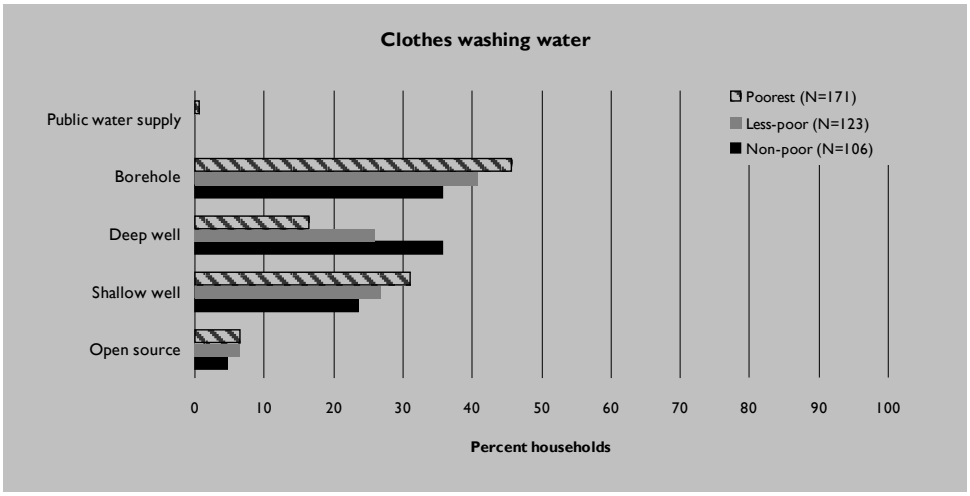
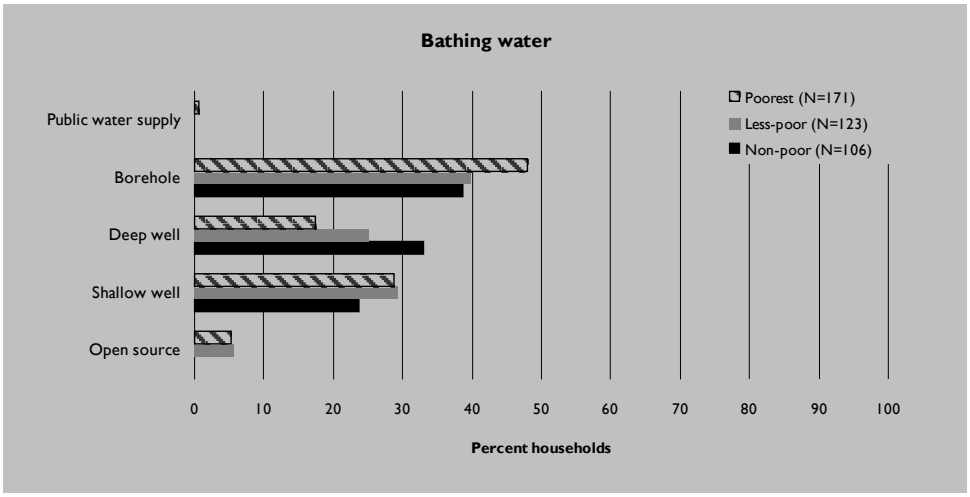


Figure 5. Most important sources of bathing water by well-being category



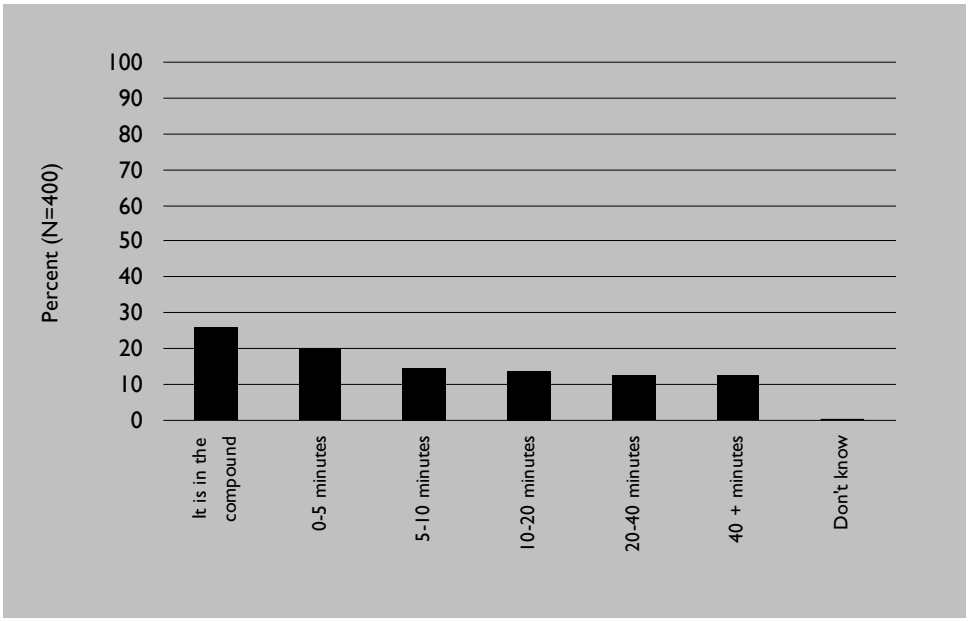
The data suggest that households in the lowest levels of well-being are particularly dependent on borehole water. Unlike better-off households, the poorest households cannot afford to have their own private "deep wells" dug. A small percentage of households from the poorest and middle well-being categories must resort to open surface water for their domestic water. Typically, water from these sources will be sifted through cloth (e.g. a t-shirt) one or several times as a rudimentary cleaning of the water.

Despite the tendency for the better-off households to use deep wells, it is important to note that they also rely on boreholes for domestic water in many cases. Borehole water is often considered more reliable in dry seasons, and of a better quality. Boreholes are thus typically used by all social segments of communities.

4.2 Distance to domestic water

The study found that 25.8 percent of the 400 households sampled have access to domestic water within their compounds, while 20.2 percent walk 0-5 minutes to the nearest domestic water source and 14.5 percent walk 5-10 minutes. However, a considerable percentage of the households have to walk for a much longer time to get to the nearest water source. Results show that 12.8 percent of the population walked 20-40 minutes to the nearest domestic water source, while 12.5 percent walked 40 or more minutes.

Figure 6. Distance to most important source of drinking/cooking water in the dry season



Many households thus spend a good deal of productive hours collecting water – typically by women and children. The importance of saving valuable time means that some people prefer walking shorter distances, even if the water source is less clean, i.e. a local dambo/wetland.

Distance to domestic water sources is not equal across well-being levels. This applies across all types of domestic water use. A relatively larger proportion of households in the high well-being category have water sources in their compounds, and therefore walk shorter distances than households in the middle- and lowest levels of well-being. Other factors also play a role in creating unequal distances to domestic water sources: Public boreholes are often located near the homes of the better-off, either because they are placed in the geographical centre of villages and/or near roads where the better-off households are often located, or because local elites manipulate the borehole siting process to ensure that it is located near their home/land. In some cases, poor households are furthermore excluded from the use of public boreholes, and thereby marginalized to more distant water sources (Mweemba & van Koppen 2010, Funder & Mweemba 2010).

Figure 7. Distance to most important source of drinking water by well-being category

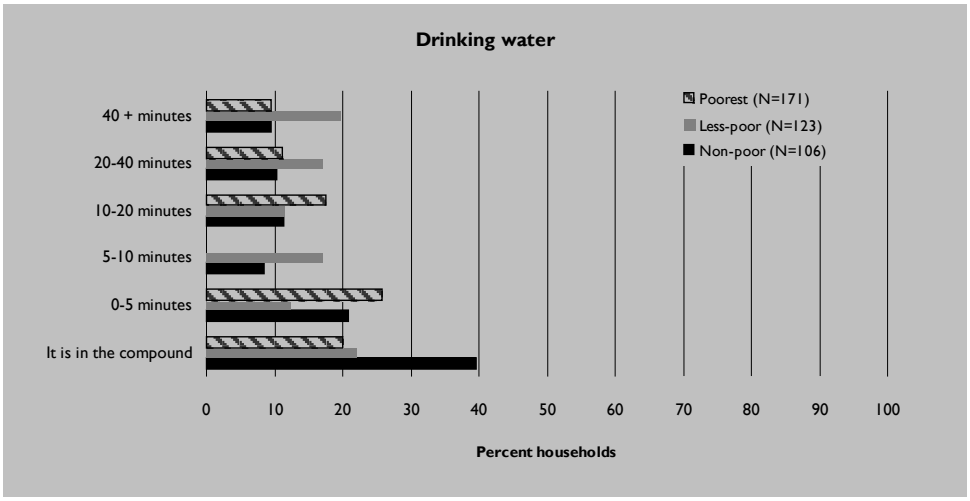


Figure 8. Distance to most important source of clothes washing water by well-being category

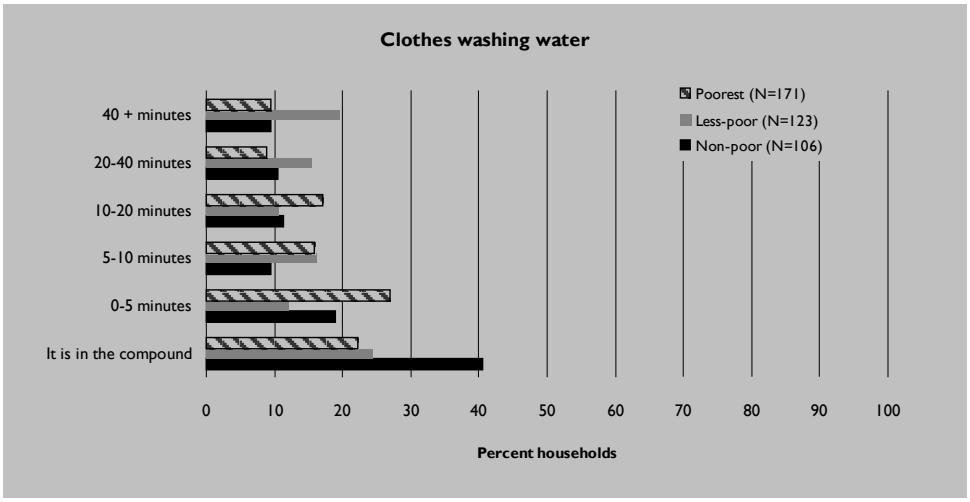
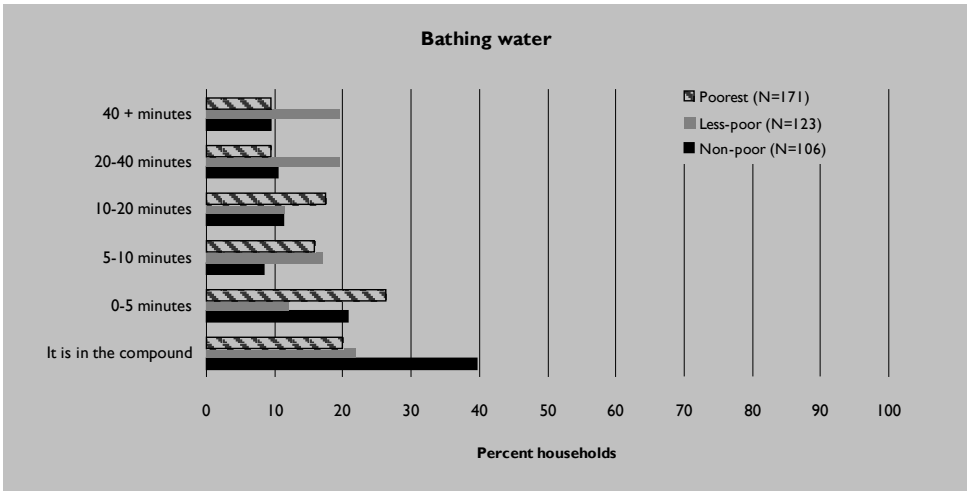


Figure 9. Distance to most important source of bathing water by well-being category



4.3 Means of domestic water transportation

Results show that 95 percent of the population walked on foot to transport water for drinking from the water sources. A similar pattern was observed for water carried for washing clothes and bathing. Just 4 percent of the sampled households transported water from sources on motorized vehicles/animals or carts, most of whom were from the better-off well-being category. Accessing water using motorized vehicles or carts and animals allows households to obtain large quantities in one trip, thereby saving time and obtaining greater quantities of water.

4.4 Ownership of domestic water sources

Ownership of the most important sources of domestic water for households includes community-owned sources (e.g. boreholes) and household-owned sources (typically privately-owned "deep wells"). The use of sources owned by neighbours and relatives is widespread.

The types of ownership for domestic water uses show a notable difference between the poorest and the better-off households. Households in the lowest levels of well-being are largely dependent on domestic water sources that they do not control individually, i.e. sources owned by the whole community, and/or or neighbours and extended family members, or sources owned by "no-one". The latter are typically streams, wetlands and dambos seen as open access and with no particular community having ownership.

By contrast, households in the high levels of well-being typically own a private domestic water source, such as a deep well. As mentioned above, better-off households typically also use collectively-owned water sources such as boreholes, but the fact that they also have an individual source of water provides a greater degree of control and security in terms of water access. This also means that households in the poorest well-being category are more dependent on water resources involving multiple water users, and which therefore require cooperation and/or are subject to the frequent conflicts that take place over access to e.g. community-owned boreholes (Mweemba *et al.* 2010).

Figure 10. Ownership of most important sources of drinking water

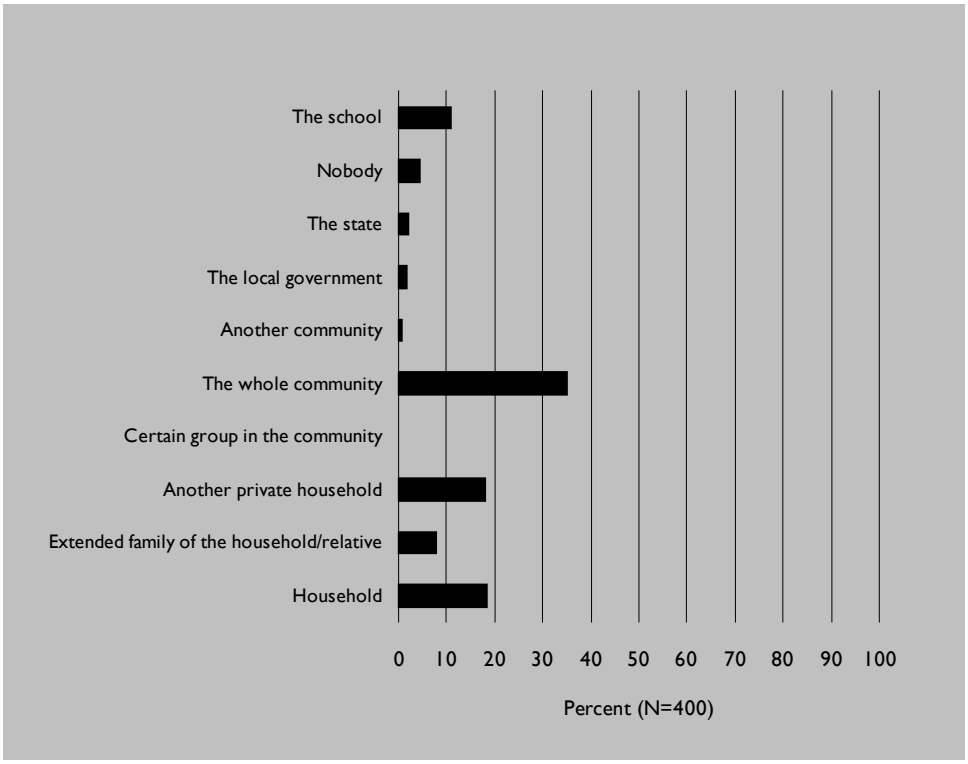


Figure 11. Relationship between well-being category and ownership of drinking water source

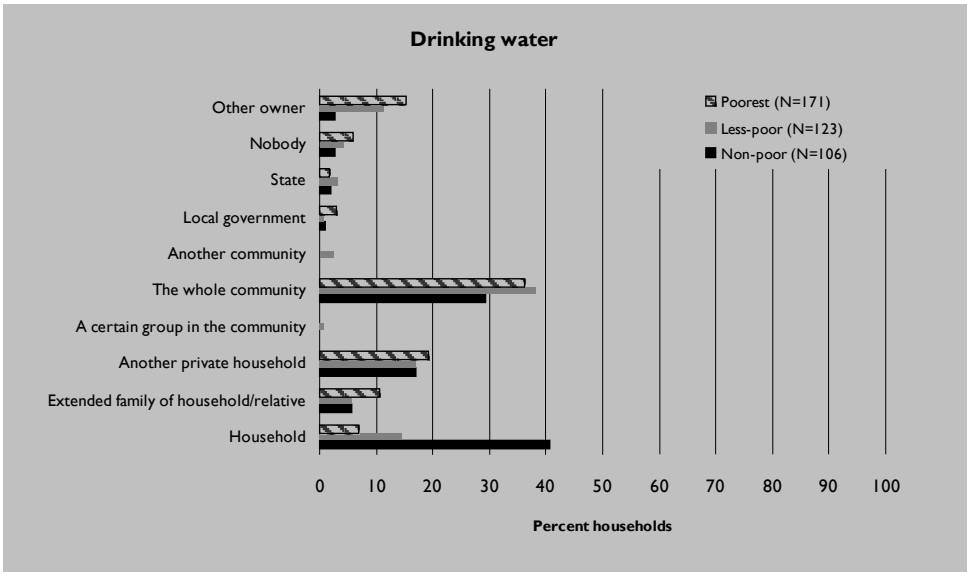


Figure 12. Relationship between well-being category and ownership of clothes washing water source

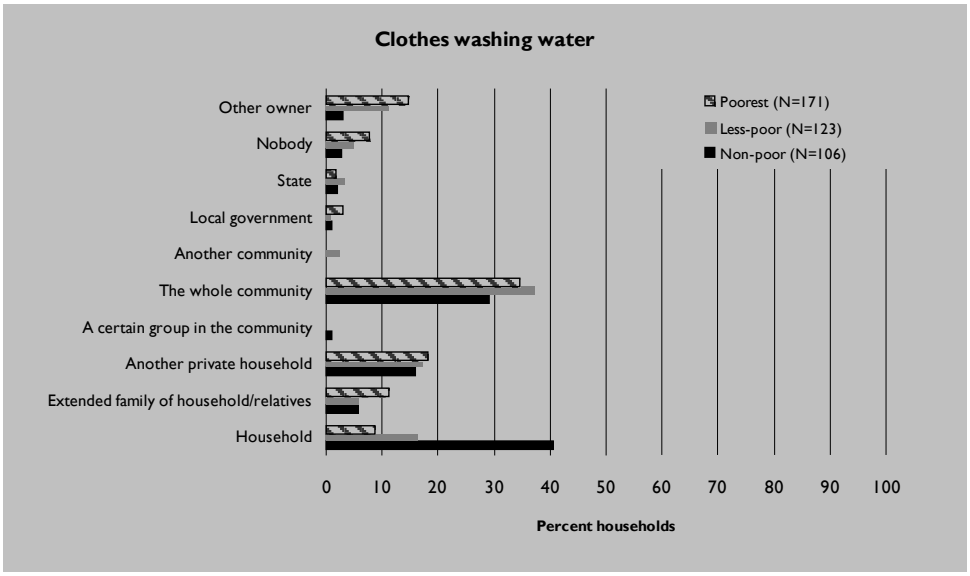
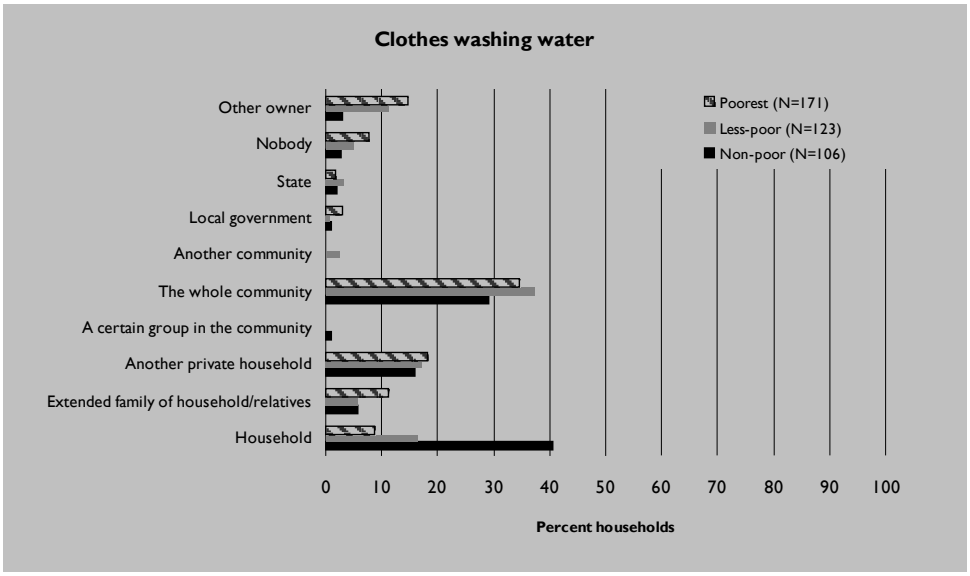


Figure 13. Relationship between well-being category and ownership of bathing water source

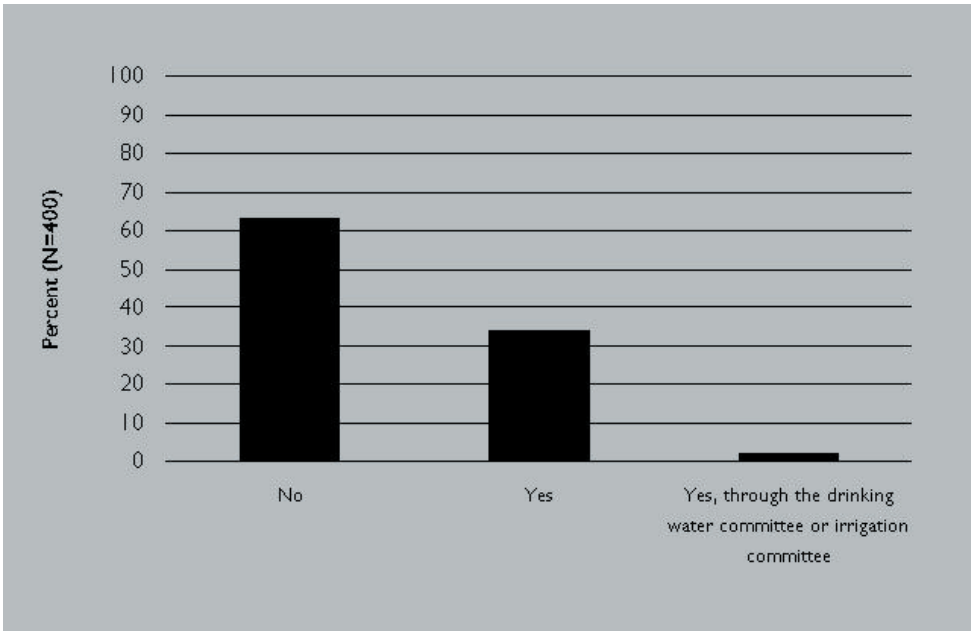


4.5 Agreements on domestic water access

Of the sampled households, 37 percent responded that they had made agreements with other water users over domestic water access. Such agreements are mainly verbal and not endorsed by a third party (22 percent of all households), e.g. agreements with e.g. neighbours over access to water. Some households had entered into verbal agreements that were endorsed by a third party, e.g. a borehole committee (9 percent of all households). Written agreements (6 percent of all households) were more rare and were both endorsed and non-endorsed.

The remaining 63 percent of households did not consider that they had entered into any explicit agreement with other parties over access to domestic water. Boreholes and other sources of domestic water were considered community-owned and/or provided by public authorities and therefore seen as freely accessible in principle. Some households expressed a reluctance to engage in formal agreements proposed by borehole committees, out of concern that this would eventually commit them to unforeseen costs or manipulation by other parties. Some households in the poorest group were furthermore marginalized from agreements made by others (see Funder & Mweemba 2010).

Figure 14. Percent of households that have entered into agreements over domestic water access



4.6 Payments for domestic water access

Payments in cash for use of domestic water sources are applied mainly as a means of raising funds for maintenance purposes, and typically apply to collectively-owned water sources. Of the surveyed households, 61 percent paid cash for domestic water use, while 39 percent did not.

Significantly, the most common type of cash payments were not regular but rather *ad hoc* contributions towards water source use (e.g. when requested by a borehole committee to pay for a new spare part and/or repairs), with 165 households out of the 400 sampled mentioning that they paid such *ad hoc* fees for domestic water use. 54 households paid regular fees, and 19 made initial contributions of funds to use the source of water for domestic purposes, while 2 made payments of fees per use to water source owners. The emphasis on *ad hoc* payments is preferred by many local

Figure 15. Percent of households that have paid cash and in kind for domestic water access

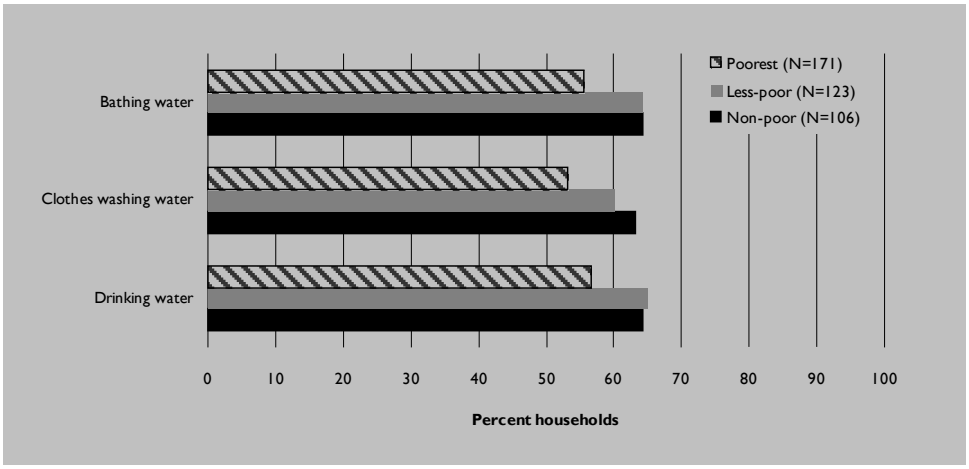
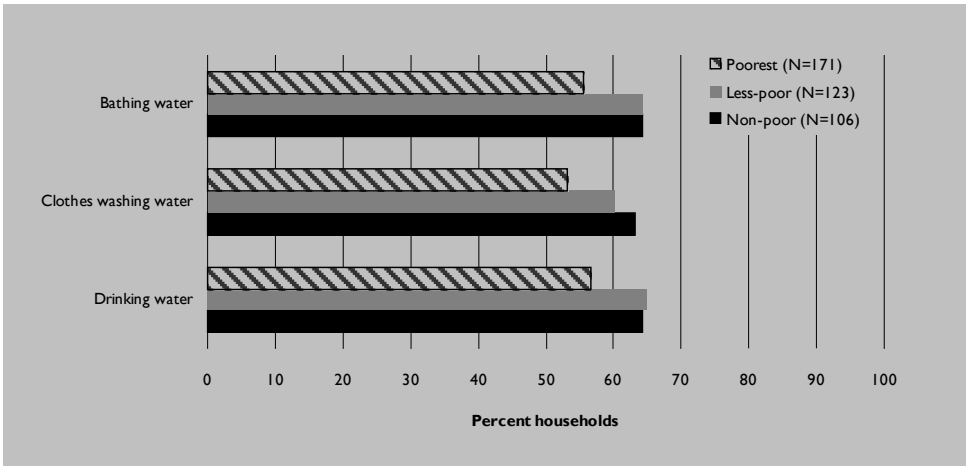


Figure 16. Percent of households that have paid cash for domestic water access, by well-being category



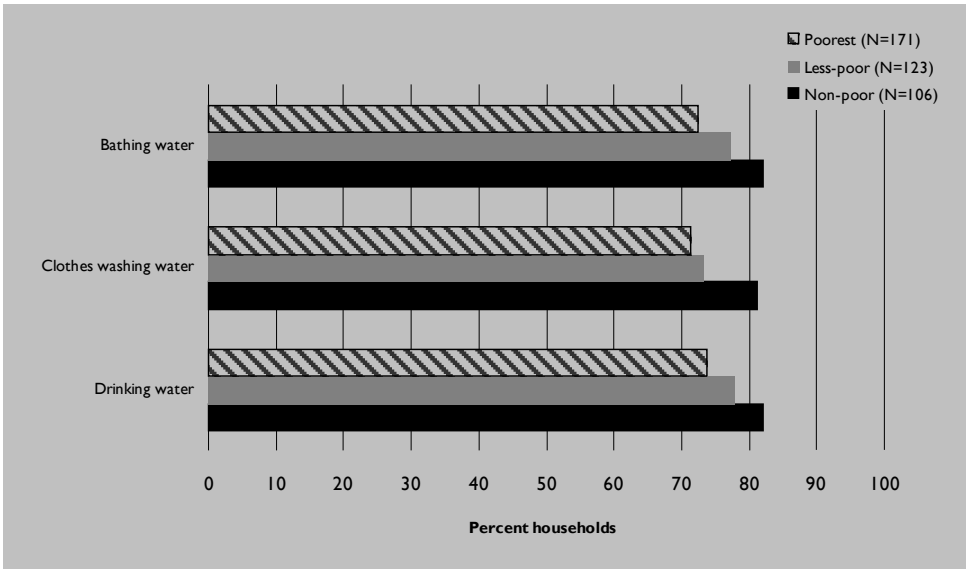
water committees and community members, since past experiences with more regular payments have often resulted in mismanagement of the funds. The direct payment for a particular purpose within a short time frame is therefore preferred. Qualitative interviews conducted within the wider study also indicated that the poorest households preferred giving out smaller sums of money at the time, thereby reducing the immediate strain on available cash resources.

A slightly larger proportion of households in the highest well-being category paid fees, despite the poorest households being relatively more reliant on collectively owned water sources. It is, however, noticeable that a fairly large share of the poorest households have in fact paid cash contributions – although as mentioned above these are typically *ad hoc* rather than permanent fees, and may therefore only have been paid once or twice.

In kind payments were also made by many households, and to a greater extent than cash payments. Again, these were typically made on an *ad hoc* basis, and consisted mainly of assistance to maintenance and cleaning. In kind payments such as labour for borehole construction does occasionally take place, but is relatively limited since the establishment of new domestic water infrastructure (e.g. sinking of boreholes) tends to be carried out by local authorities, while private individuals set up their own sources.

Poor households may ask to contribute in-kind payments for water use such as cleaning around a well/borehole, which is usually accepted. Despite this, in-kind payments are not a particular domain of the poorest households. Indeed, a slightly larger number of better-off respondents said they had made in-kind payments to domestic water uses. In some communities, it is accepted that households which are particularly poor or stricken by a crisis make no contributions at all to domestic water use. This is in keeping with the custom that water cannot be denied to a person in crisis (although, as will be seen below, this principle is only adhered to in some situations).

Figure 17. Payments in kind for domestic water access, by well-being category



4.7 Perceived problems of domestic water use

Of the households surveyed, 75 percent mentioned that their most important sources of water for domestic uses had some sort of problem, while 25 percent said they had not experienced problems.

The problems mentioned included sediments in the water, pollution of the water, the distance to obtain water, maintenance of the water point and cost to get the water. Other problems concerned permission to get water from an authority, volume used by other users, timing of other people's uses

Figure 18. Respondents mentioning problems with water source, by well-being category

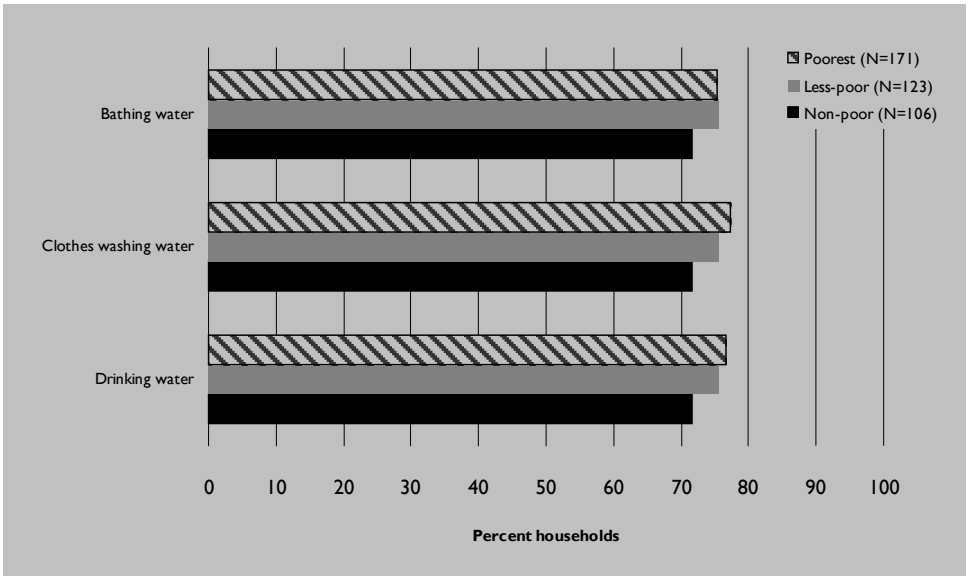
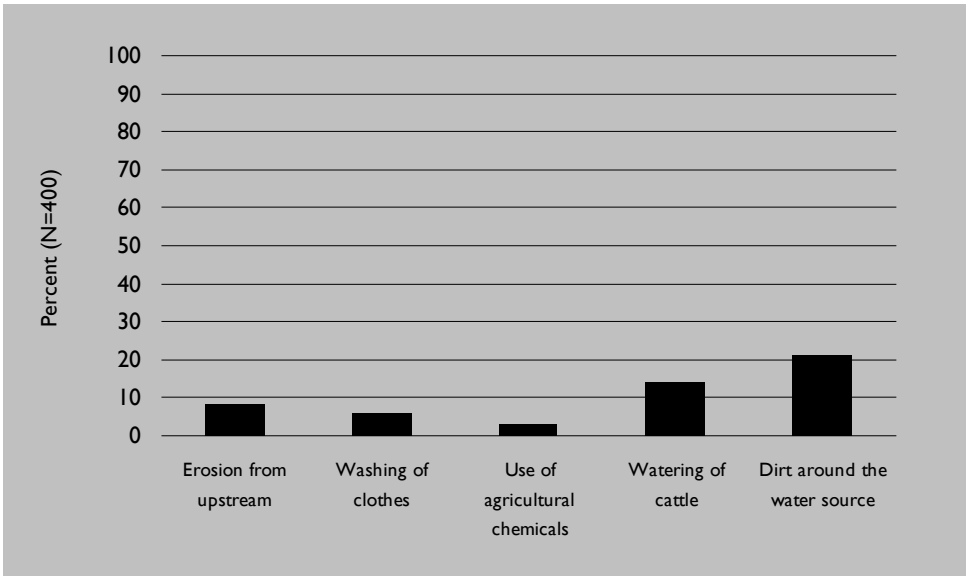


Figure 19. Perceived causes of domestic water pollution/sedimentation



and other users' challenges of right to use the water.

In the questionnaire, households were asked to rank the most important problems. In this ranking, distance to water and poor water quality were ranked highest. The former has been discussed above. Poor water quality was ascribed to pollution issues such as watering of cattle near water sources, the use of agricultural chemicals, washing of clothes near water sources, erosion from upstream fields and erosion/sedimentation. Poorly functioning and rusting pipes in boreholes also account for pollution/sedimentation, and unprotected water sources such as shallow wells and dambos increase the risk of pollution and sedimentation.

4.8 Reasons for using most important domestic water source

The use of domestic water sources was guided by various preferences. The most widespread reason given for using a particular source of water was its proximity to the household (206 out of 400 households). In addition, 176 households said that they used particular sources of water because these were the only ones available, while 132 said they preferred these sources because they were open for use to everyone in the community (i.e. collectively owned or considered open access). Households in the lowest well-being category were more likely than better-off households to cite the latter reason, just as the poorest households were more likely to cite low cost/free access as a reason for preferring a particular source of domestic water.

Figure 20. Reasons for use of most important source of domestic water

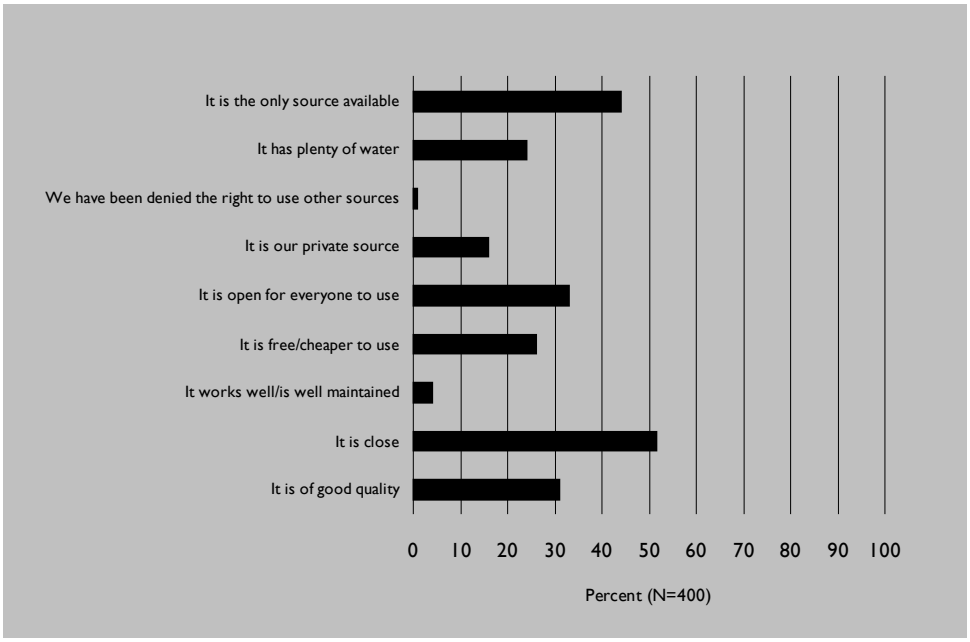
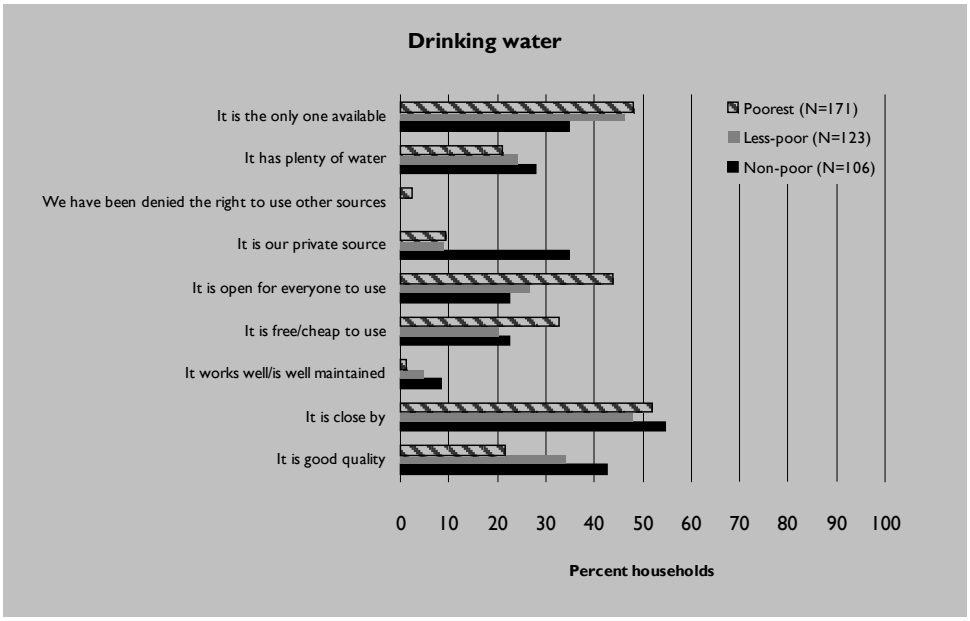


Figure 21. Reasons for use of most important sources of drinking water, by well-being category



4.9 Seasonal differences and number of domestic water sources

The study found that 82 percent of the households sampled in the survey used the same source of water for drinking/cooking during the dry and the rainy season, while 18 percent had different sources for the two seasons. A similar patter was evident for water used for washing clothes and bathing.

Results showed that 284 of the 400 households relied on only one source of water during a "normal" year. This response does not take into account periods of severe drought, where households may be forced to seek other water sources if their preferred source dries up.

Among the households who rely on more than one water source during a normal year, some are from the highest well-being category who own multiple private water sources or combine private and collectively-owned sources of domestic water. Others with multiple sources of domestic water are households from among the poorest well-being category, who in some cases combine community-owned water sources with dambos and streams considered "open access", or with granted access to privately-owned wells, in particular in times of particular need. The case studies carried out in conjunction with the household survey suggested that the poorest households may be excluded periodically or permanently from permanent use of community-owned boreholes by the better-offs, and therefore have to resort to a combination of other water sources (Mweemba & van Koppen 2010, Funder & Mweemba 2010).

Figure 22. Percent households that use the same source of domestic water in the dry and rainy seasons, by well-being category

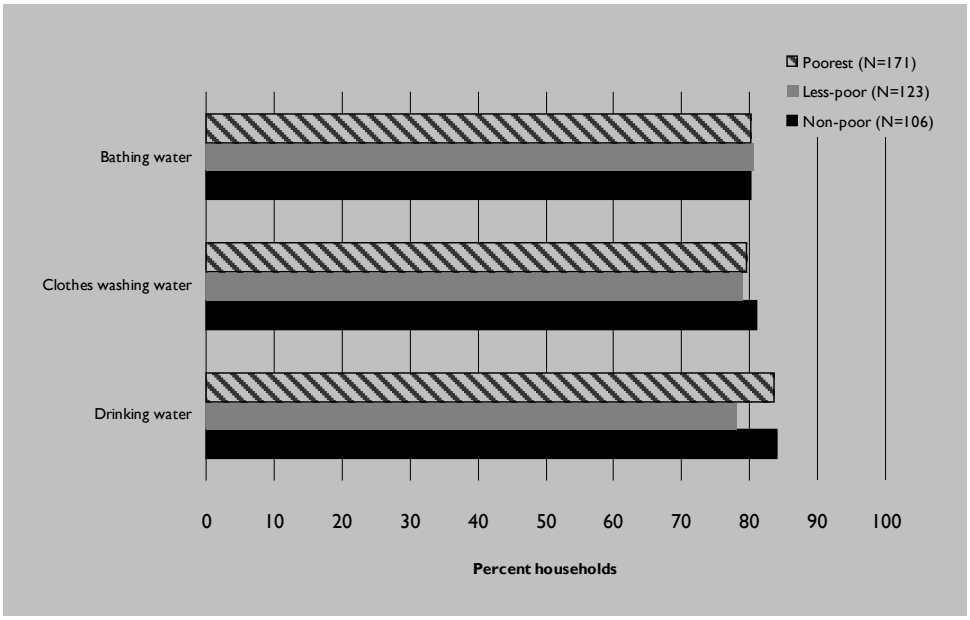
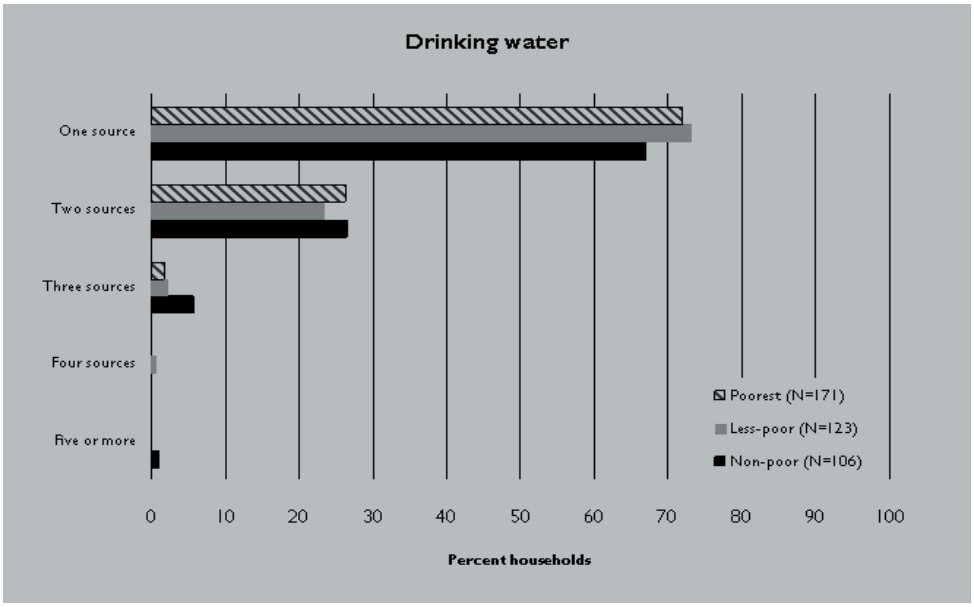


Figure 23. Number of sources of drinking water per household



5. POVERTY AND ACCESS TO PRODUCTIVE WATER

Zambia has good agricultural potential, with 56 percent of its surface arable. However, only 14 percent of the arable land is farmed and most cultivation is rainfed. The study examined relationships between poverty levels and access to water for productive purposes (cultivation and pastoral farming).

5.1 Extent and means of irrigation

In Zambia, most crop production is done in the rainy season when there is sufficient rain water to nurture foods for consumption and/or sale. Very few households practice irrigation during the rainy season (6 of the 400 respondents). In the dry season, crop irrigation is hampered by the lack of necessary water infrastructure and funds. Many households therefore practice very little farming in the dry season. Nevertheless, out of the 400 households sampled for the household survey, 165 households did practice irrigation during the dry season. This includes watering of vegetable gardens on relatively small plots, as a means of generating incomes for the households in the dry season.

Figure 25 shows the farming acreage used to irrigate crops during the dry season, indicating that dry-season irrigation is more widespread among households in the high level of well-being.

During the dry season, irrigation is almost exclusively done by hand using buckets. Only four of the 165 households who irrigated crops during the dry season used plastic tubes and/or pumps (all of whom were in the highest well-being category). Buckets are used both to carry water to the fields/plots, and to distribute the water within the fields/plots.

Figure 24. Size of irrigated land during the dry season (percentage of households)

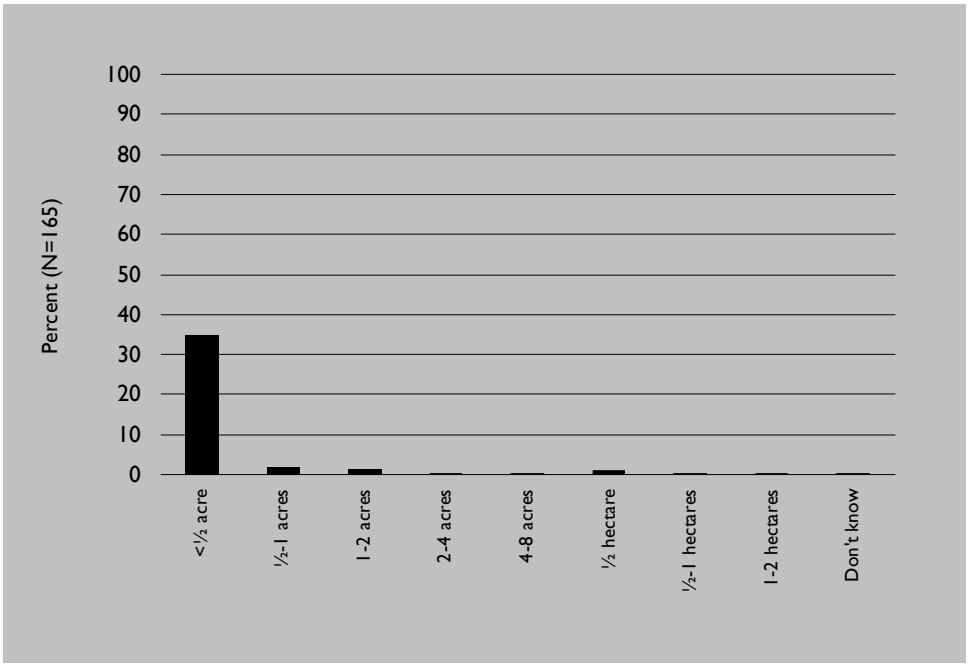


Figure 25. Irrigated land during the dry season, by well-being category

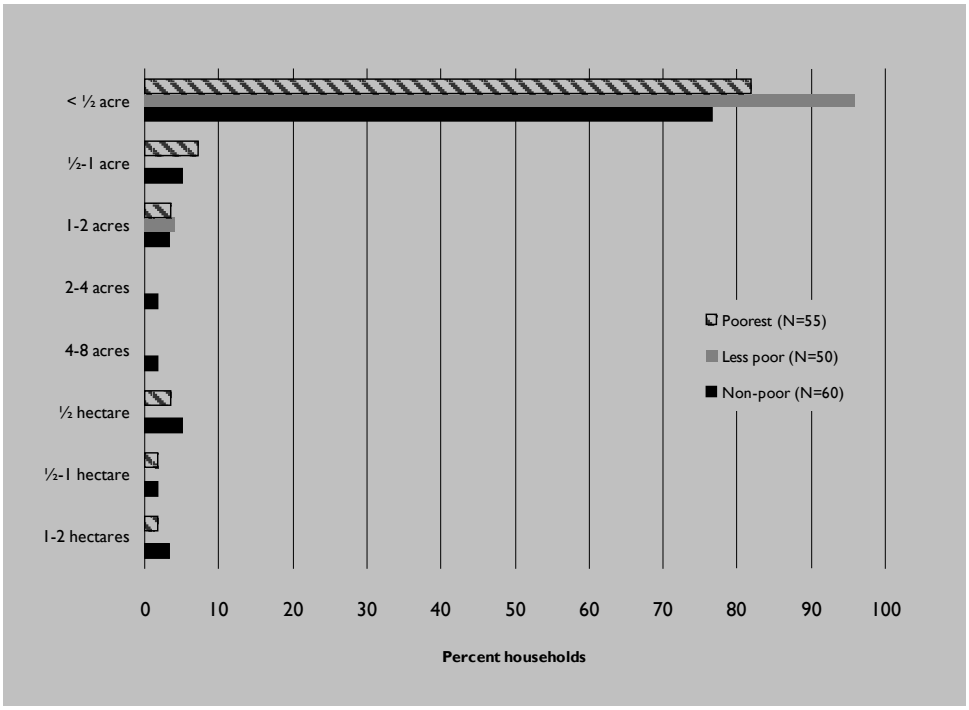


Figure 26. Means of conducting irrigation water to the fields during the dry season (percentage of households)

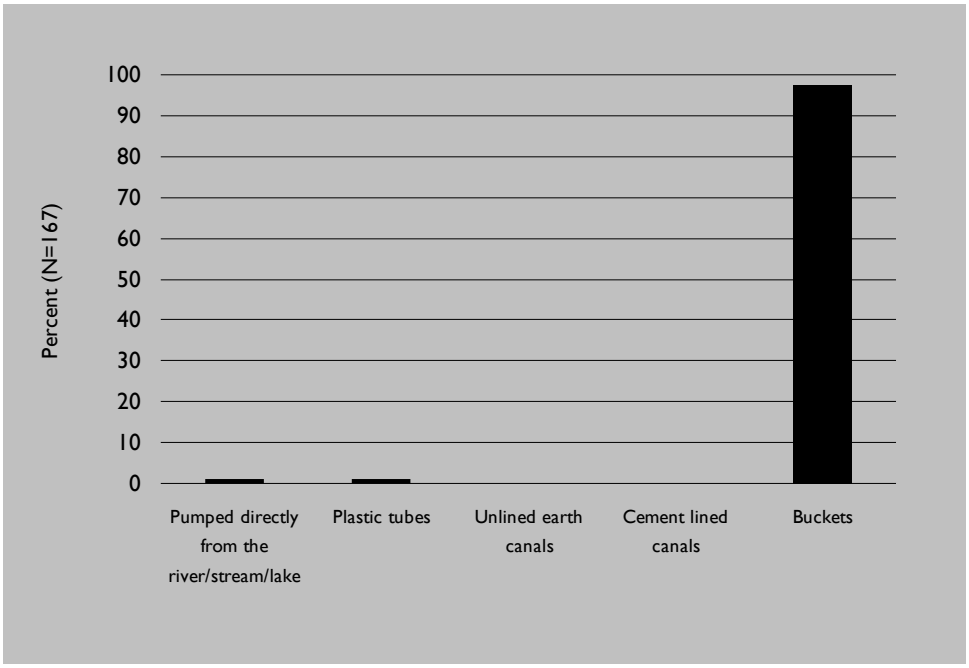


Figure 27. Most important sources of irrigation water during the dry season (percentage of households)

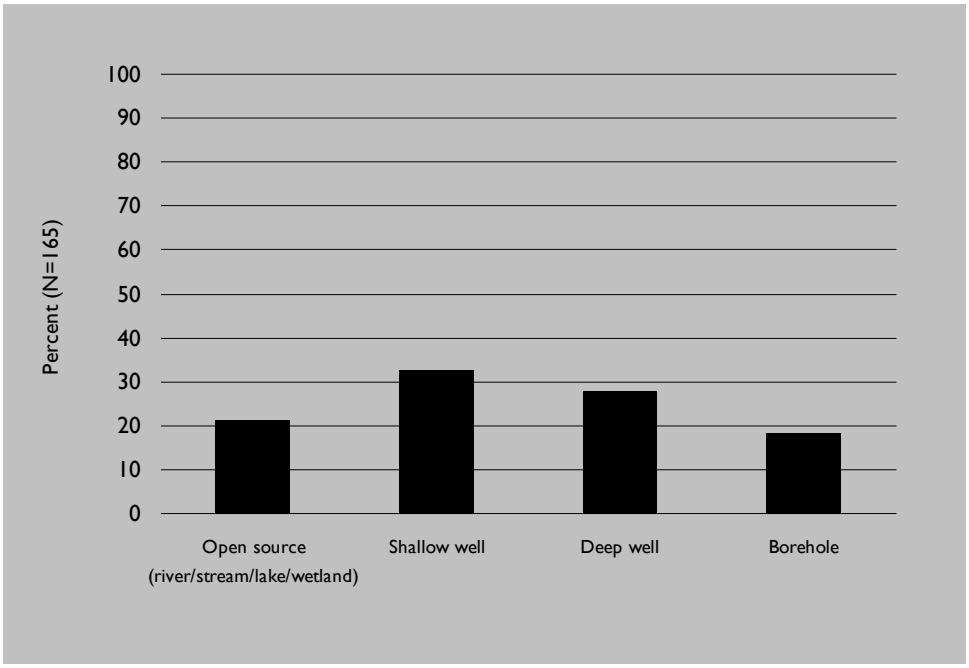
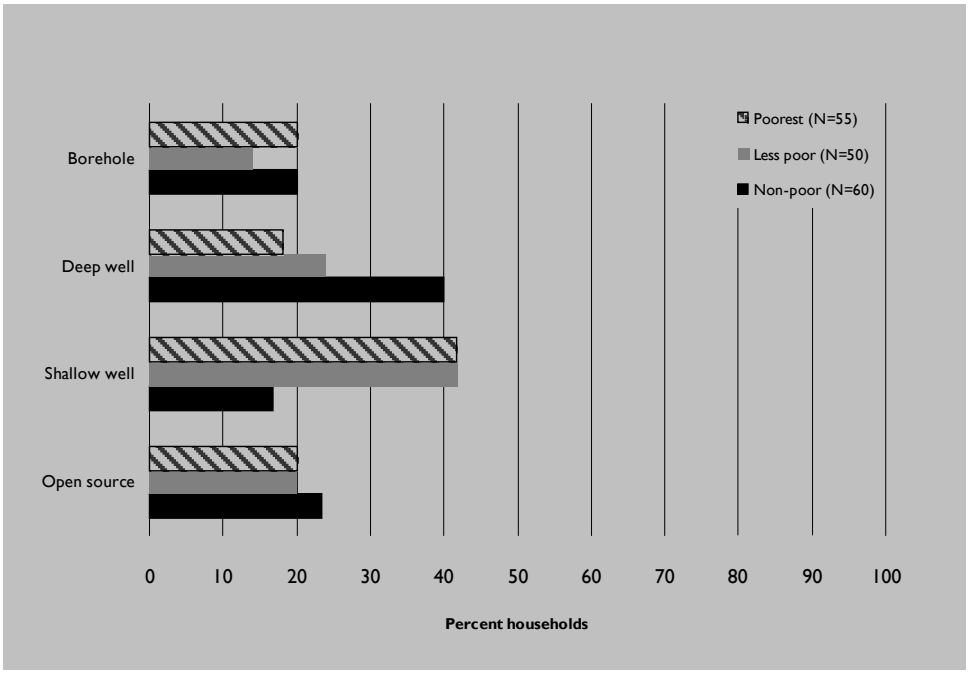


Figure 28. Most important sources of irrigation water during the dry season, by well-being category



The most important sources of irrigation water during the dry season shows considerable variation among households. In general, however, wells predominate over open sources. Among the different types of wells used for dry-season irrigation, our results indicate that shallow wells are marginally more often used than other types. In Namwala, shallow wells are often dug in river beds, and frequently used to irrigate gardens located alongside the river. Because shallow wells can be individually dug, they are also a means of avoiding waiting time etc. at boreholes where there may be many users. Shallow and deep wells are also still more widespread than boreholes, which in many parts of the district are relatively limited in number and/or dysfunctional.

Of the households that practice irrigation during the dry season, many in the highest level of well-being depend on their privately-owned deep wells. For the middle and lowest levels of well-being, the use of shallow wells is particularly widespread.

5.2 Extent and means of livestock watering

A little more than half (55 percent) of the households interviewed owned cattle. Livestock is primarily owned by better-off households in Namwala, in accordance with its status as a symbol of wealth and invested capital. During the rainy season, open sources of water (river/stream/lake/wetland) were by far the most widely used sources for livestock watering, and only a few households used water from rain water harvesting and boreholes as the most important source.

This pattern reflects the pastoral movement in Namwala, whereby cattle are migrated from the highlands – where they spend the rainy season – to the flood plains where they spend most of the dry season. During the rainy season, most seasonal streams, rivers, open wetlands and dambos in the highlands fill up, creating relatively easy access to water for stock at open sources at this time.

Figure 29. Most important sources of livestock water during the rainy season

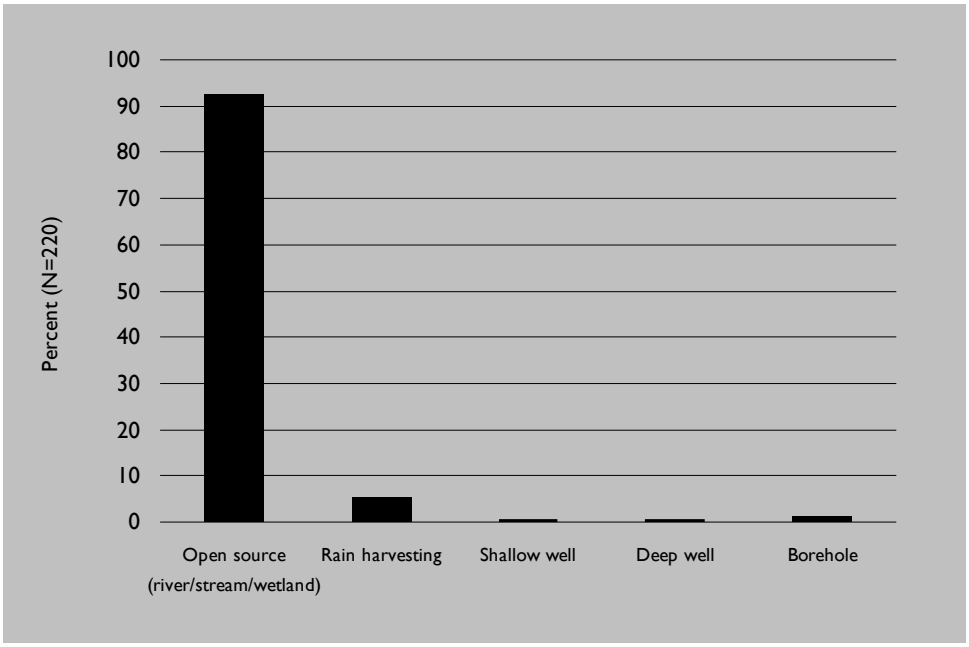
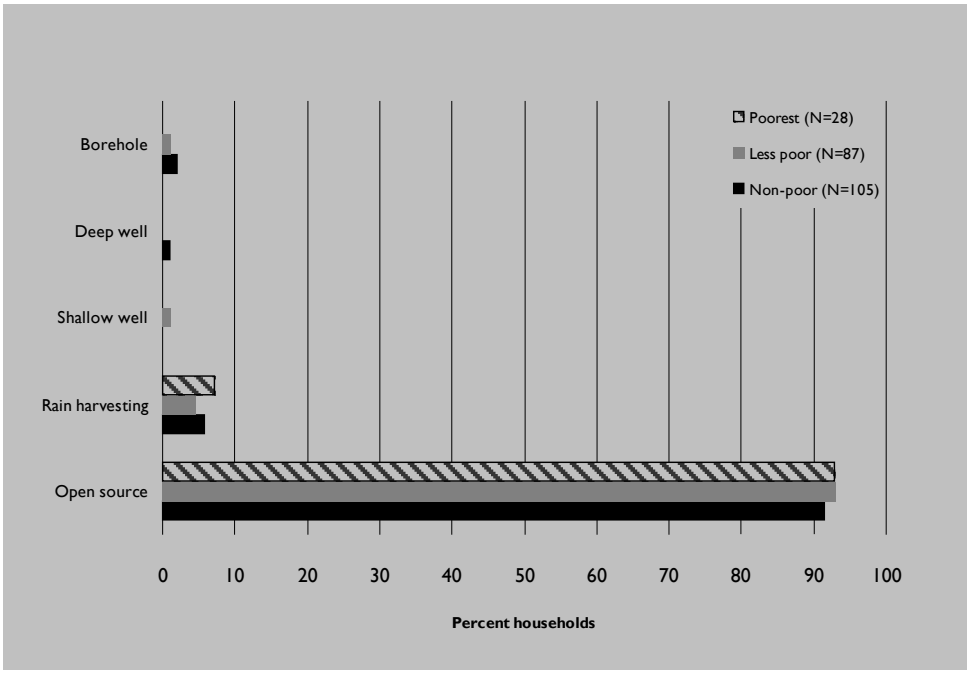


Figure 30. Most important sources of livestock water in the rainy season, by well-being category



During the dry season, open sources of water in the highlands dry up, and the majority of cattle is typically migrated to the flood plains along the Kafue river to allow for grazing of fresh grass and water access from the streams and main river channels of the Kafue and Namwala rivers. Open sources thus remain the most widespread sources of water for livestock during the dry season, but during this time boreholes and wells are also more frequently used than during the rains. This is mainly because some cattle remain behind in the highlands to provide services to the households, and therefore need access to permanent sources of water in the areas. Some cattle being migrated to the plains also pass through villages and need water access on the way.

During the dry season, conflicts often erupt at boreholes between users wanting to water their livestock and users wanting to use boreholes for domestic uses and gardens. These conflicts often have both gender and poverty dimensions (Funder *et al.* 2010, Funder & Mweemba 2010, Mweemba *et al.* 2010, Mweemba & van Koppen 2010). As can be seen from Figure 32, most cattle using the public boreholes are owned by the middle- and higher well-being levels.

Figure 31. Most important sources of livestock water during the dry season

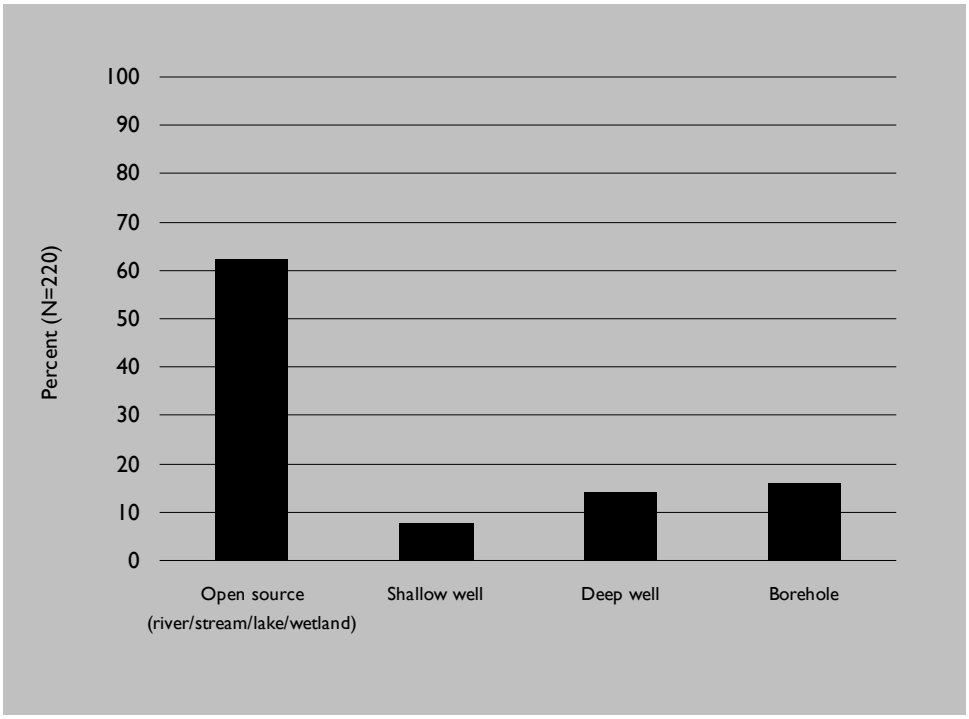


Figure 32. Most important sources of livestock during the dry season, by well-being category

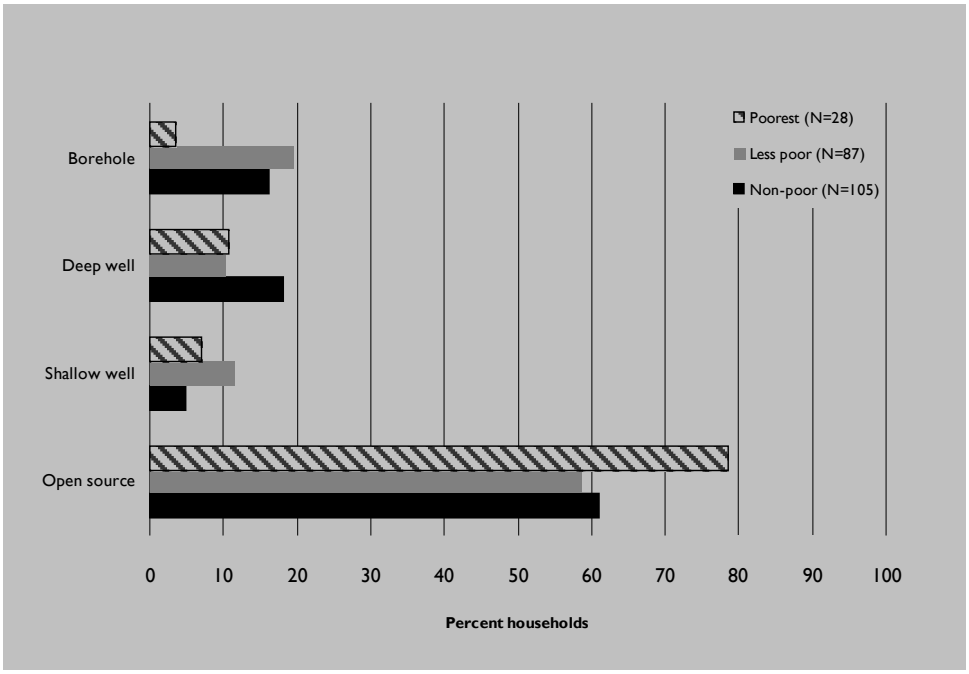


Figure 33. Ownership of most important sources of irrigation water during the dry season

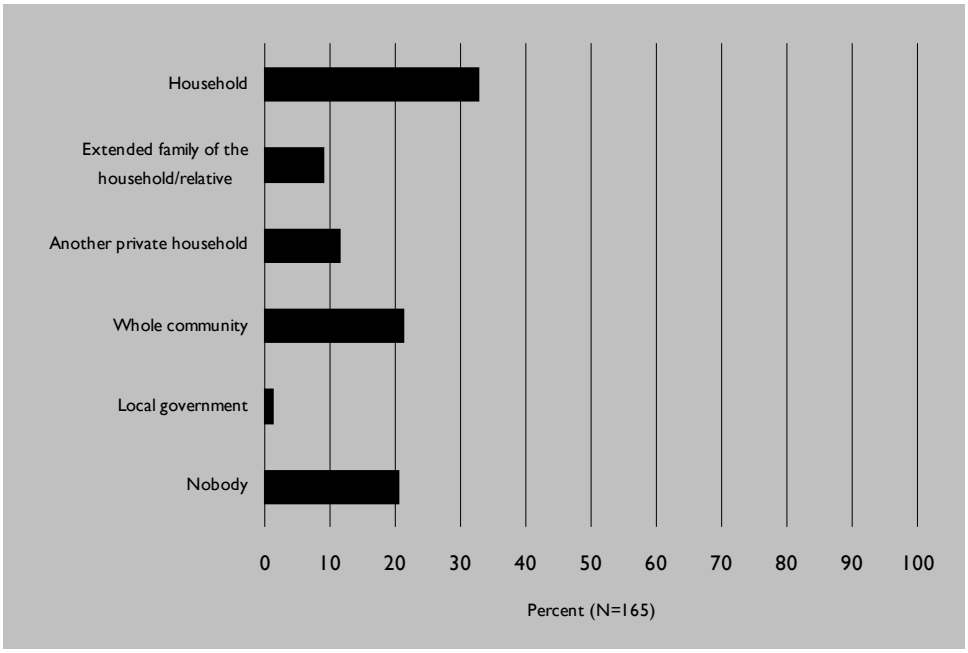
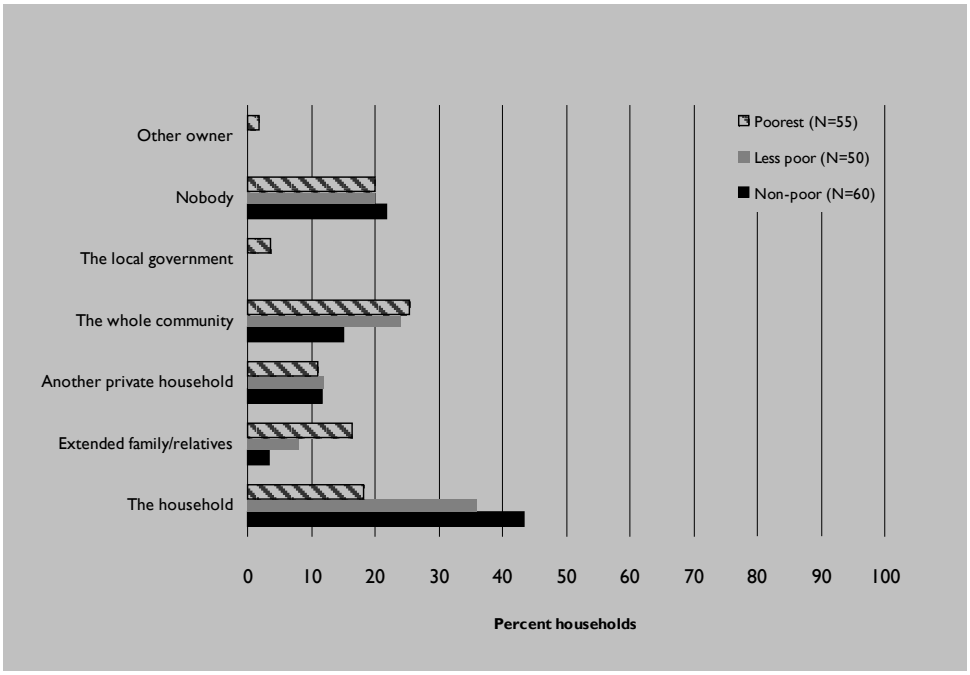


Figure 34. Ownership of most important sources of irrigation water during the dry season, by well-being category



5.3 Ownership of productive water

Irrigation

As mentioned earlier, the dependency on rainfed agriculture means that very little irrigation is practiced during the rainy season. During the dry season, the most important water sources used for crop irrigation (mainly vegetable gardening done by women) varies between different types of ownership. Those households that have their own deep well will typically use this, but other households resort to communally-owned boreholes or small dams (the latter being rare), shallow wells in river beds (owned by "nobody") or wells owned by relatives and e.g. neighbours.

Households in the lowest levels of well-being depend more on water sources communally owned for such irrigation during the dry season, or owned by others. It should however be noted that many households in the poorest category do not irrigate crops/ vegetables at all during the dry season.

Livestock watering

Ownership of water sources used for stock watering during both the rainy and the dry season reflects the emphasis on open water sources, which are not considered to be owned by anyone.

It is notable that ownership of livestock watering sources in the dry season are more diverse than in the wet season. This is partly due to the need for permanent water sources for the livestock that are not migrated to the plains (boreholes, wells etc.). Moreover, pastures in the floodplains (and associated dambos etc.) are divided according to traditional

Figure 35. Ownership of most important sources of livestock water during the rainy season

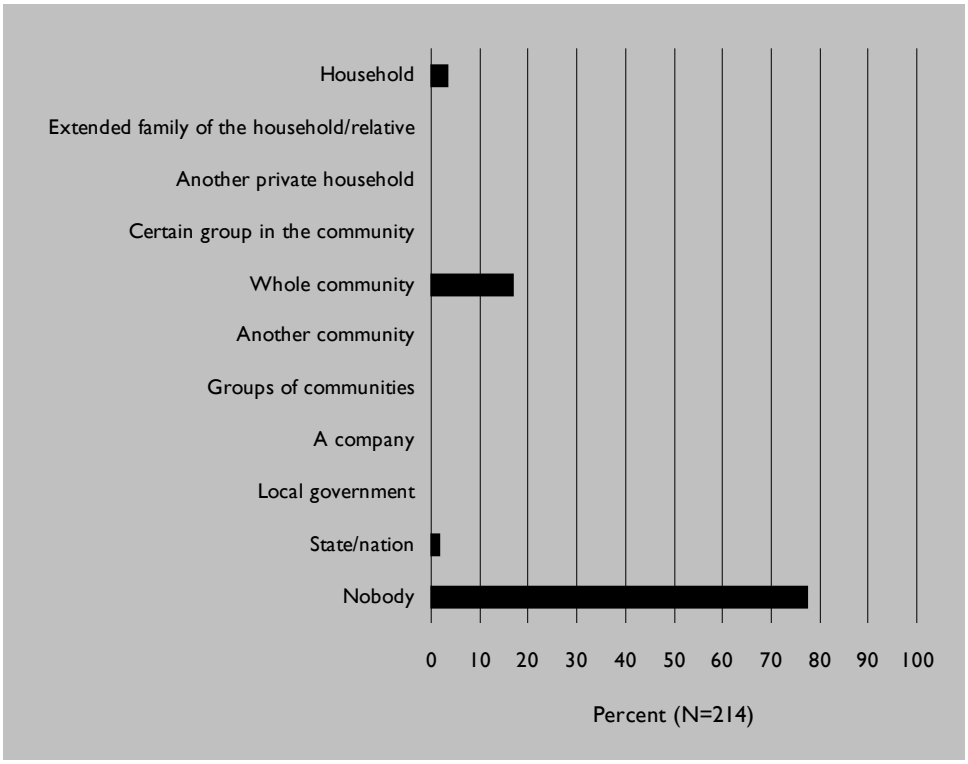


Figure 36. Ownership of most important sources of livestock water during the rainy season, by well-being category

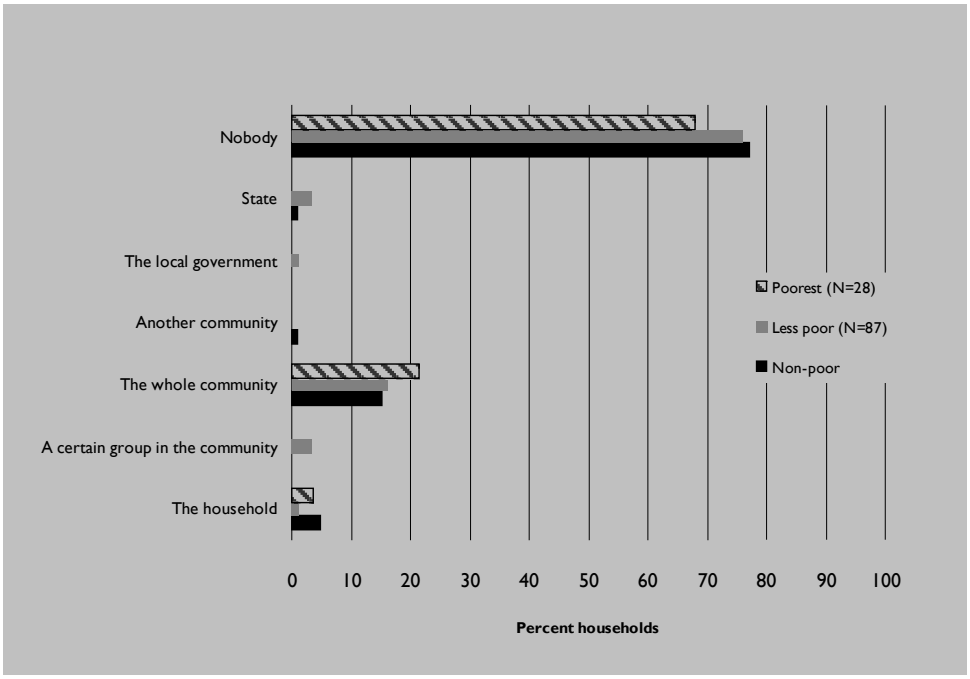


Figure 37. Ownership of most important sources of livestock water during the dry season

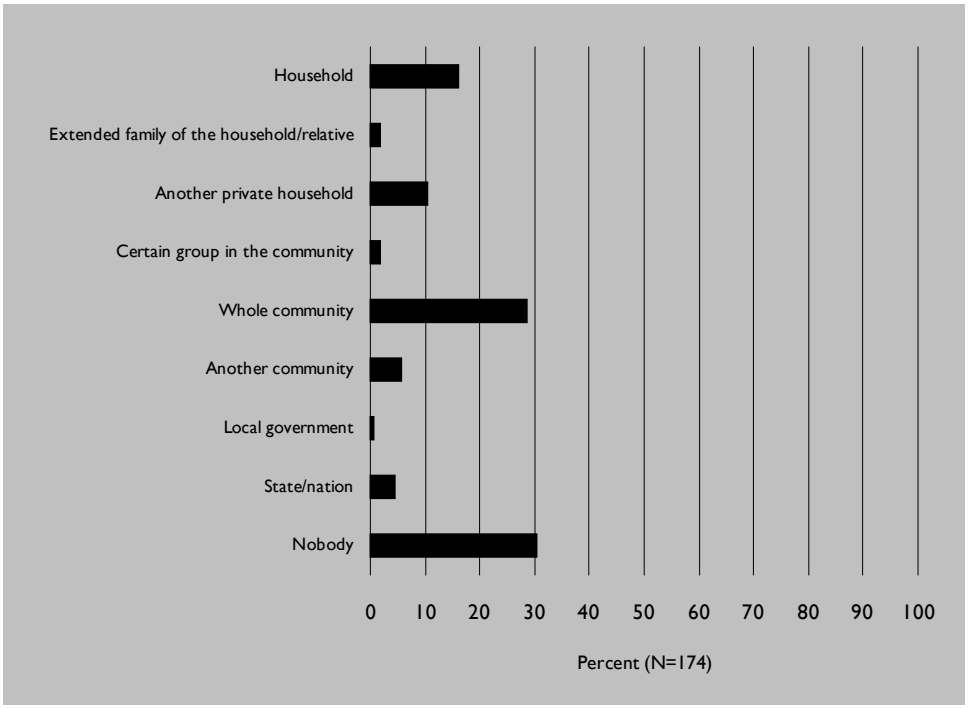
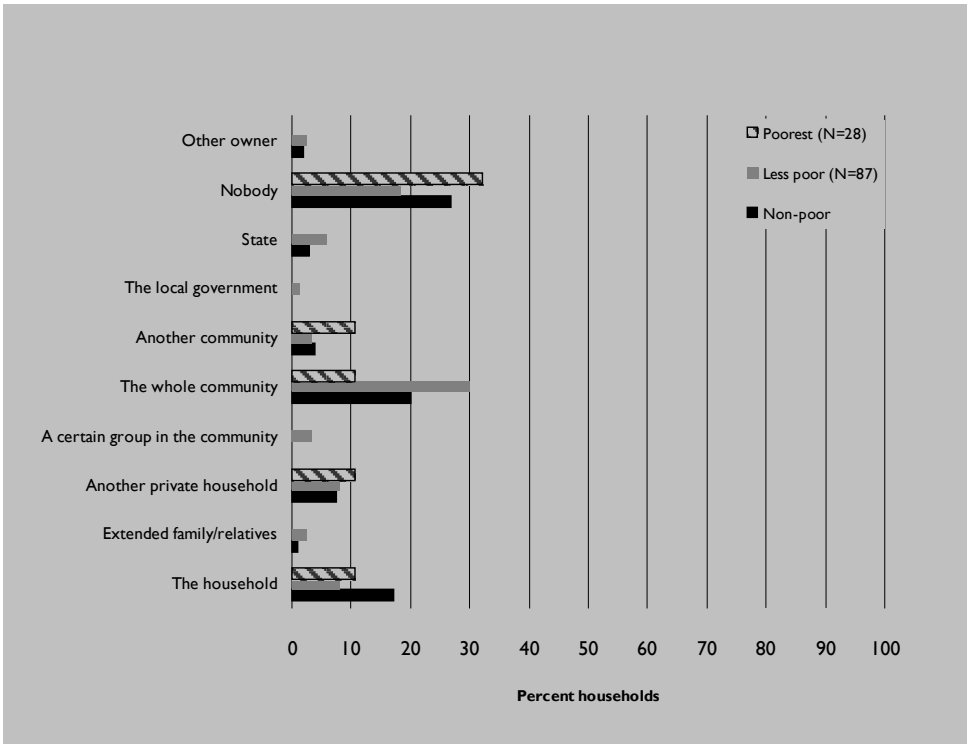


Figure 38. Ownership of most important sources of livestock water during the dry season, by well-being category



clan-based ownership patterns, which are in some cases considered privately controlled by individual clan-members/leaders, and in other cases considered collectively owned by the clan.

As can be seen from Figure 38, cattle owners from the middle and high well-being levels are major users of collectively-owned and "open access" water sources during the dry season.

5.4 Sharing of productive water

Irrigation

Water sources for productive purposes are to a large extent considered shared resources in Namwala. The notion of water as a shared resource is customary for the area, and includes principles such as not being able to deny a particularly needy (i.e. poverty- or illness-stricken) household access to one's private well. It should however be noticed that these principles are not always followed in practice, and that they do not by any means imply a lack of conflict over water, which are widespread in the area (see Mweemba *et al.* 2010).

Perceptions of irrigation water being shared thus pertains particularly to water sources seen as owned by "no one", as well as community-owned sources, and private sources shared with particular relatives and neighbours. Some respondents said that they did not share water for irrigation with other households at all. Reasons were varied with some households describing it a measure of conflict avoidance, while others were too isolated from the wider community to be able to share water sources with other people.

Figure 39. Sharing of most important sources of irrigation water during the dry season

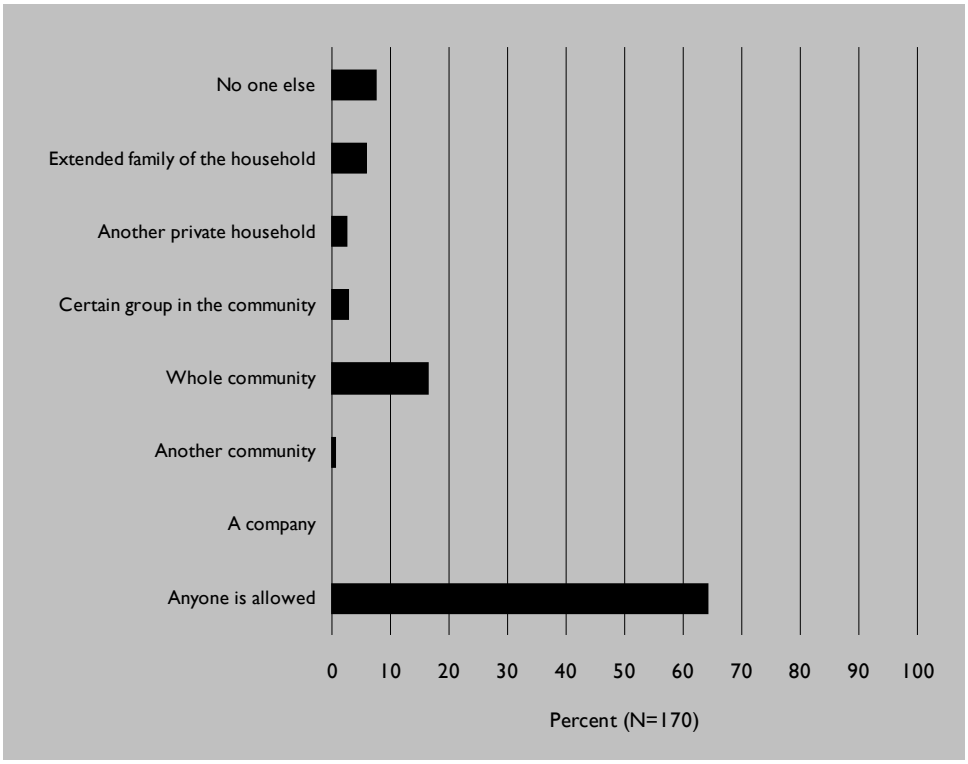


Figure 40. Sharing of most important sources of irrigation water during the dry season, by well-being category

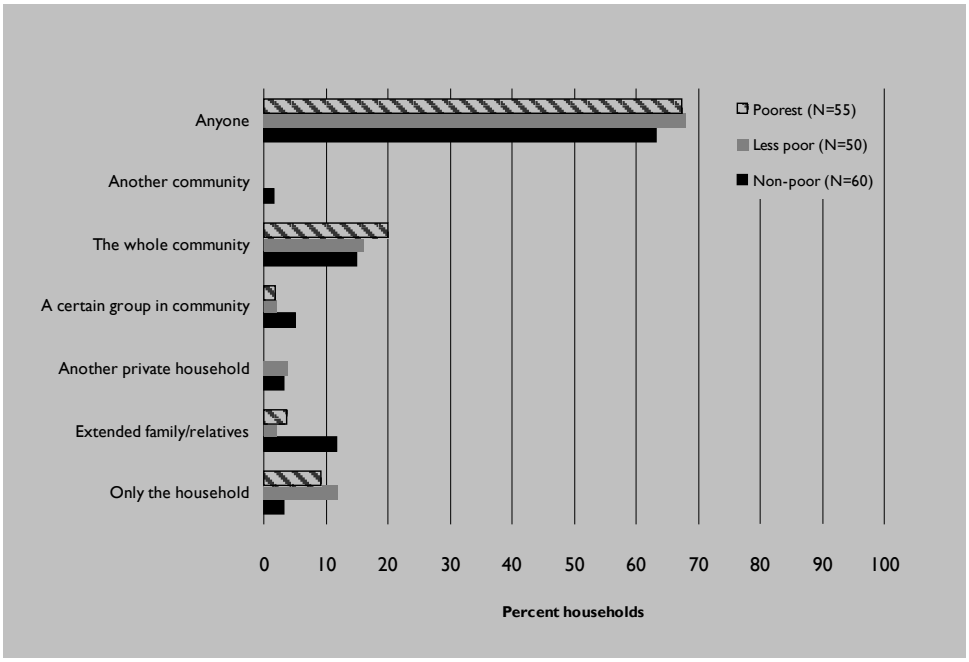


Figure 40 shows the sharing of most important sources of water for irrigation during the dry season. Households from all levels of well-being who practiced irrigation said they shared the water source with others.

Livestock watering

Likewise, for most of the communities in Namwala the most dominant sources of water for stock watering were open sources. Such sources were accessed by most people and usually had no restrictions in access for anybody in the communities neither in the rainy nor the dry seasons of the year.

Figure 42 disaggregates shared sources of water for stock watering during the dry season into levels of well-being. Results show that households in the lowest level of well-being had the least counts of sharing water sources with other households.

Figure 41. Sharing of most important sources of livestock water during the dry season

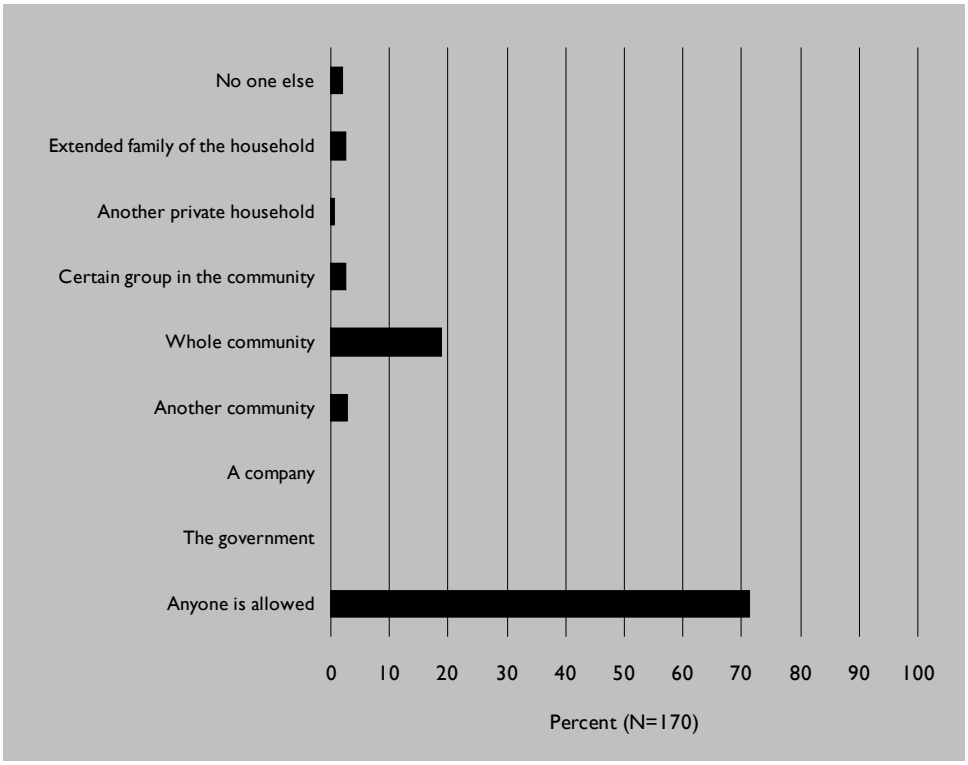
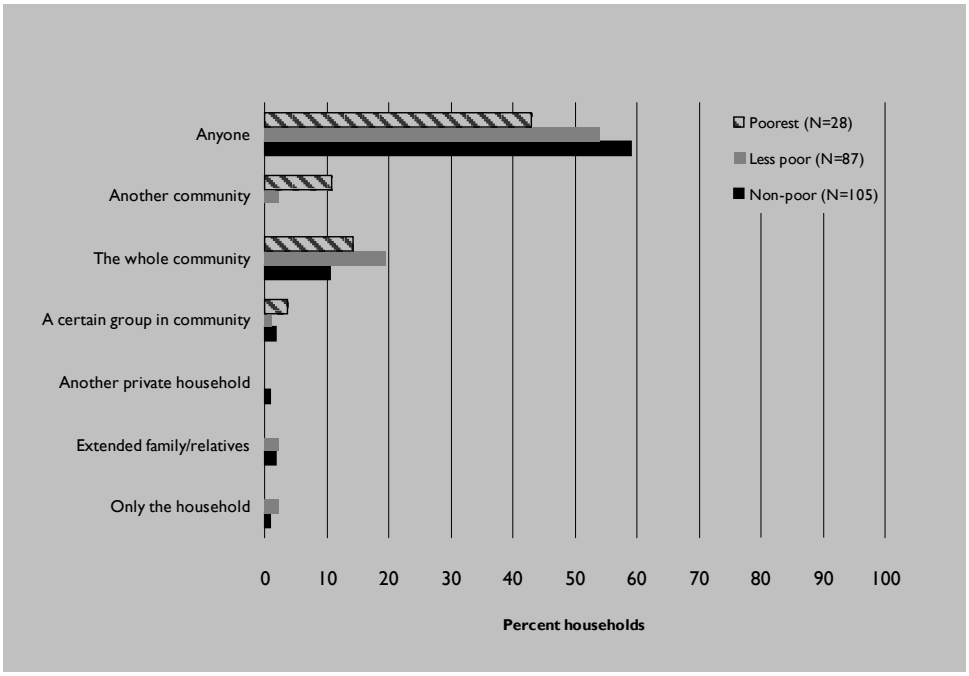


Figure 42. Sharing of most important sources of livestock water during the dry season, by well-being category



5.5 Agreements on productive water

Irrigation

Results show that during the dry season period, 35 of the 400 interviewed households mentioned that they made agreements with other water users to irrigate crops and 2 households mentioned that the agreements they made were part of the agreements made with the irrigation committee, while 128 households said they did not make any agreements with anyone.

Figure 44 shows agreements made with other water users to irrigate crops during the dry season disaggregated into level of well-being.

Figure 43. Agreement made with other users to irrigate crops during the dry season

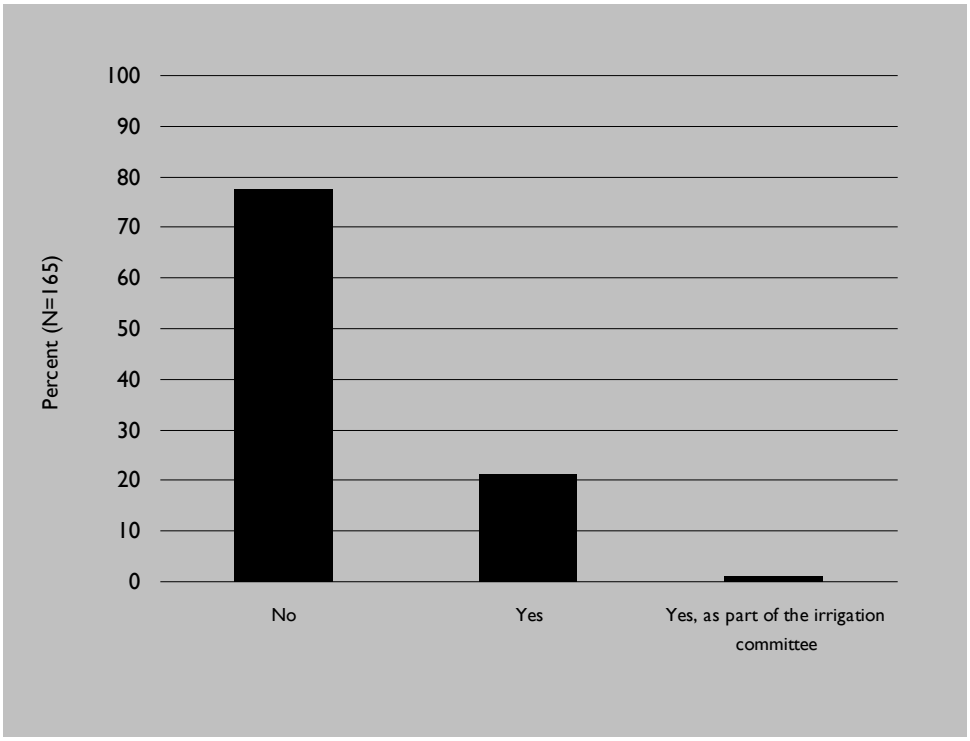
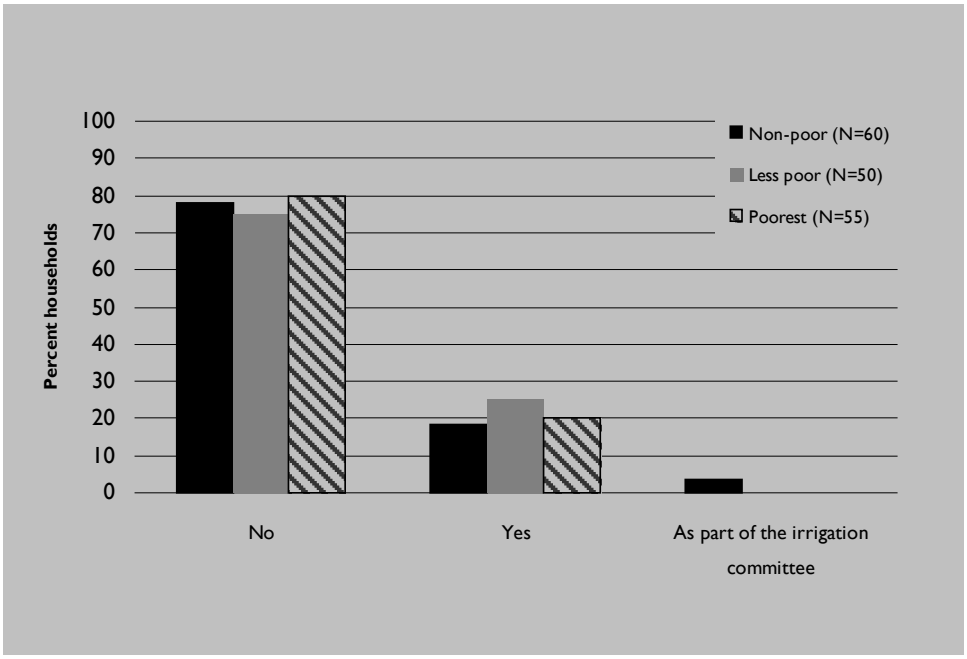


Figure 44. Agreement made with other users to irrigate crops during the dry season, by well-being category



Livestock watering

Results for the dry season period show that 38 households made agreements with other water source users to get access to the water sources for stock watering, while 182 households did not.

Figure 45. Agreements made with other users to access water for stock watering during the dry season

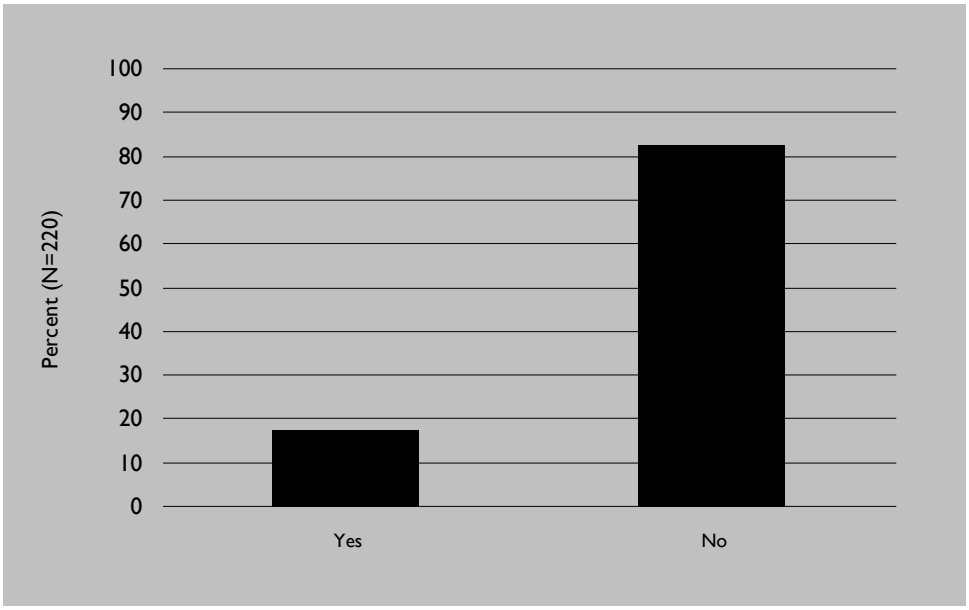
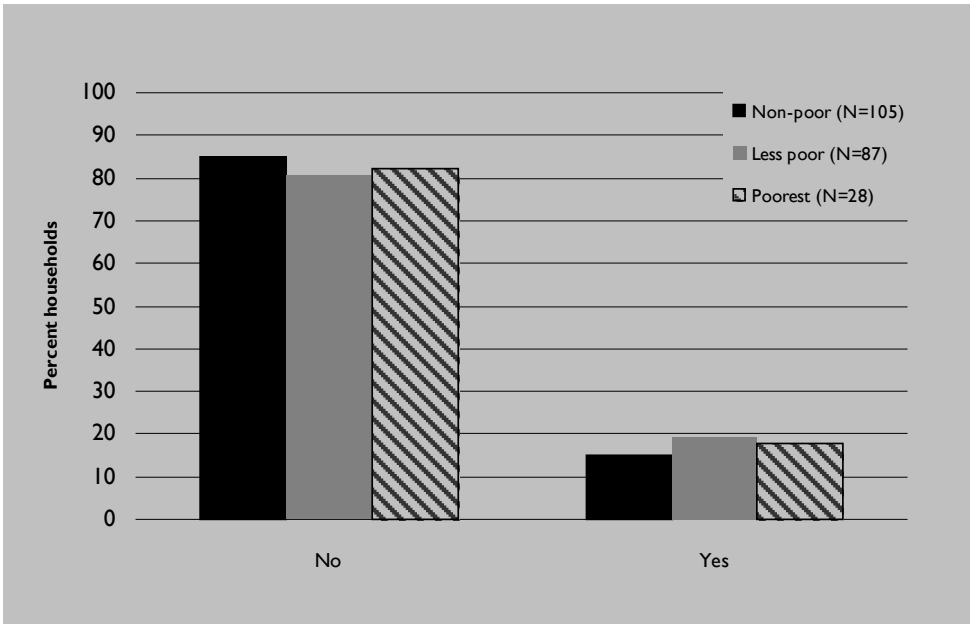


Figure 46. Agreements made with other water users to access water for stock watering during the dry season disaggregated into level of well-being



5.6 Payment for productive water

Irrigation

Payment in cash for use of most important sources of water for irrigation during the dry season is limited, and consists mostly of *ad hoc* contributions when boreholes etc. break down.

Figure 47. Cash payment made for irrigation water in the dry season (percentage of households)

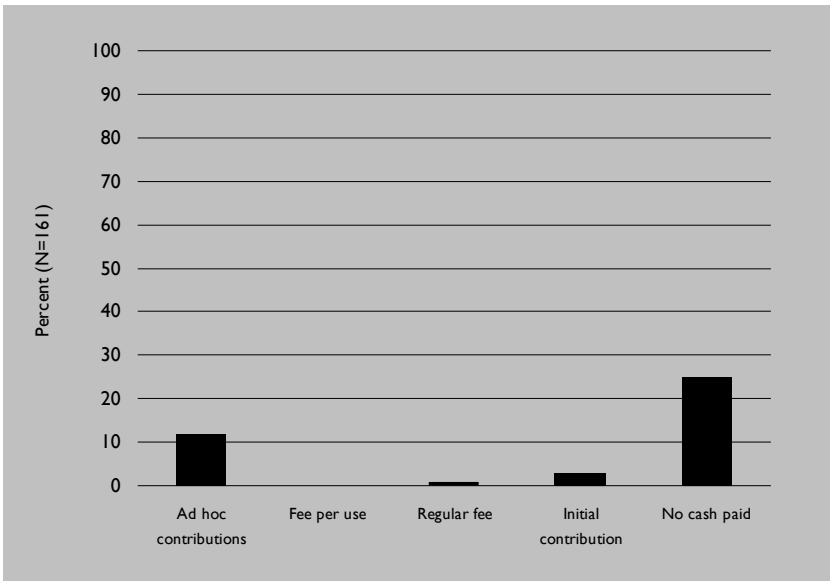
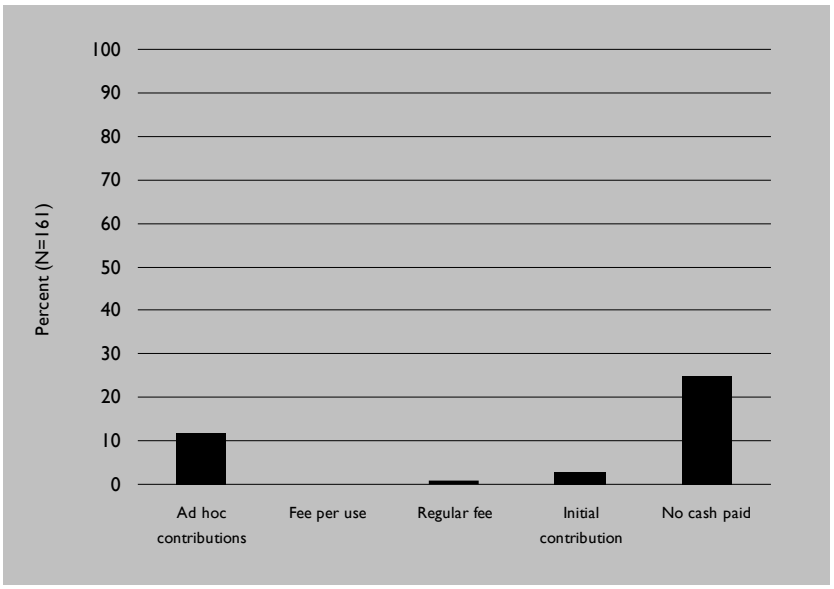


Figure 48. Cash payment for irrigation water in the dry season, by well-being category



Payments in kind for irrigation water are more frequently used than cash payments. Such contributions are in form of cleaning water source surroundings, fencing the water points, such as boreholes and wells, and helping with the construction of water points. Note however that these are not necessarily recurrent events; the responses seen here may therefore apply only to one-off contributions, such as e.g. labour assistance to clear land for a borehole.

Figure 49. Payment in kind for irrigation water in the dry season

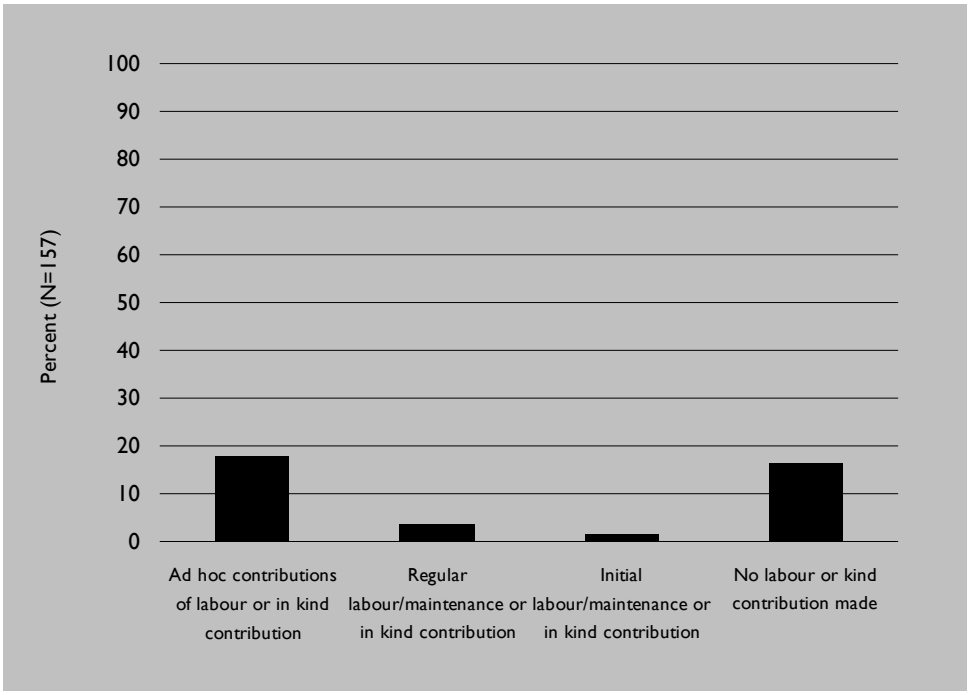
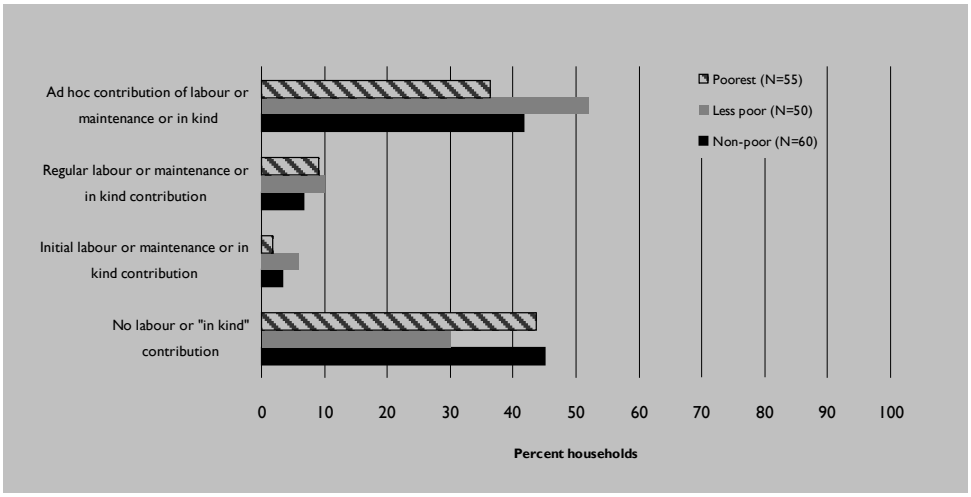


Figure 50. Payment in kind for irrigation water in the dry season, by well-being category



Livestock watering

In principle, no payments are made for use of open water sources – which are formally considered open access – for watering livestock during the dry season. In reality, however, parts of the Kafue floodplain is subject to a customary system whereby influential Ila clan leaders control access to grazing areas and dambos and other water sources within them. Access to these areas may be gained through kinship and social networks, or by giving a head of cattle, providing labour or similar. This system is discrete and rarely spoken of in public, and is not covered by the current household survey (see Haller 2007 for a description of the Ila clan system in Namwala). The following data therefore relate only to groundwater sources of livestock water, such as boreholes or wells.

Figure 51. Payment of cash for water use to water stock in the dry season (groundwater sources)

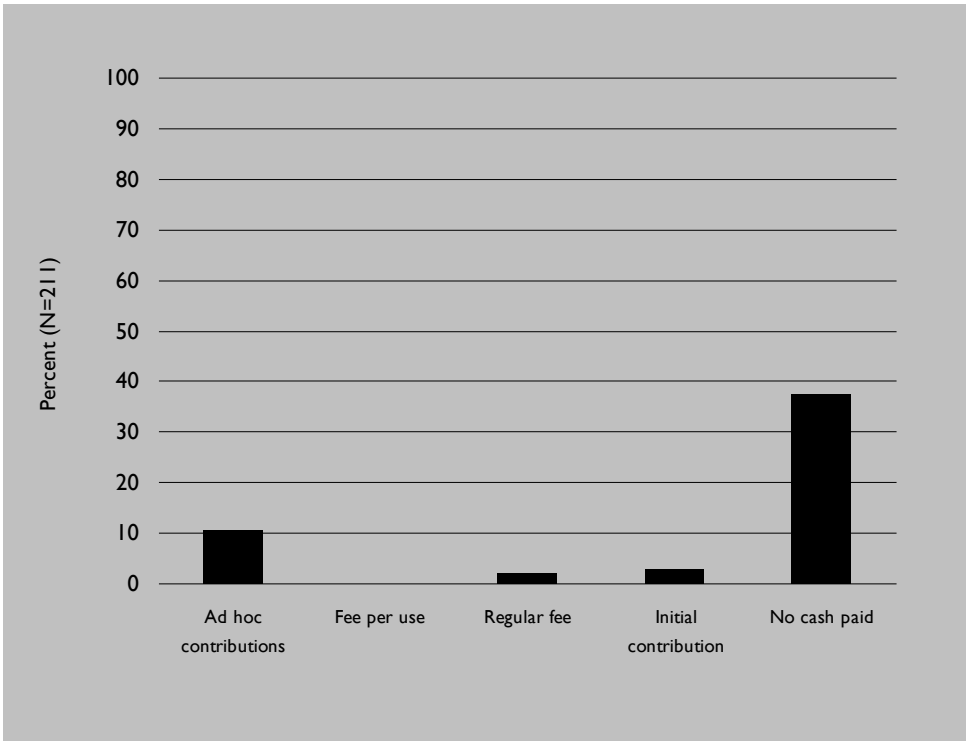


Figure 52. Cash payment for livestock water in the dry season, by well-being category (groundwater sources)

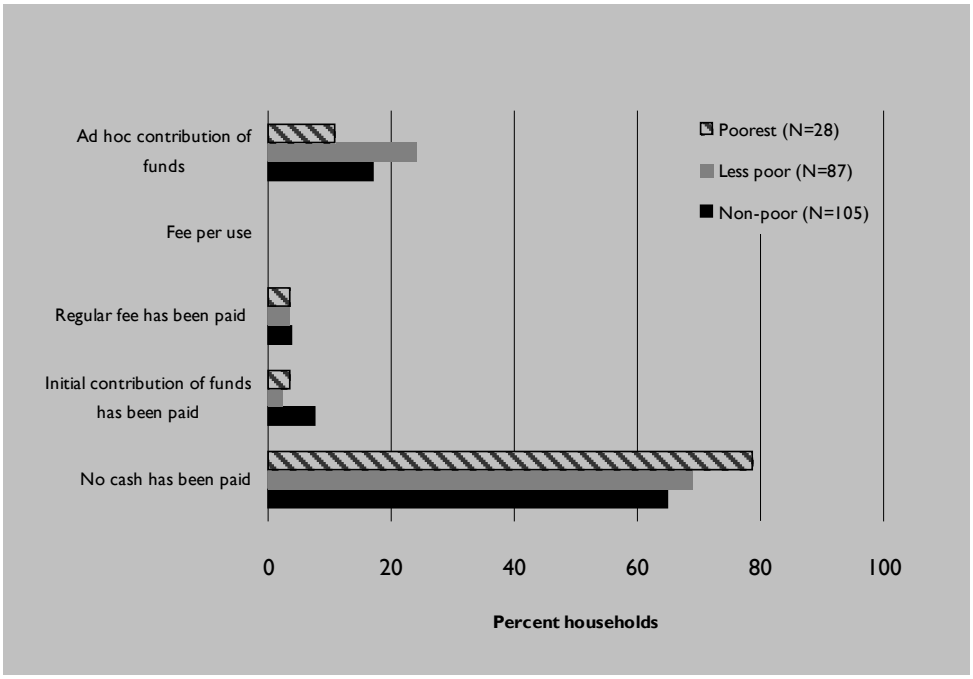
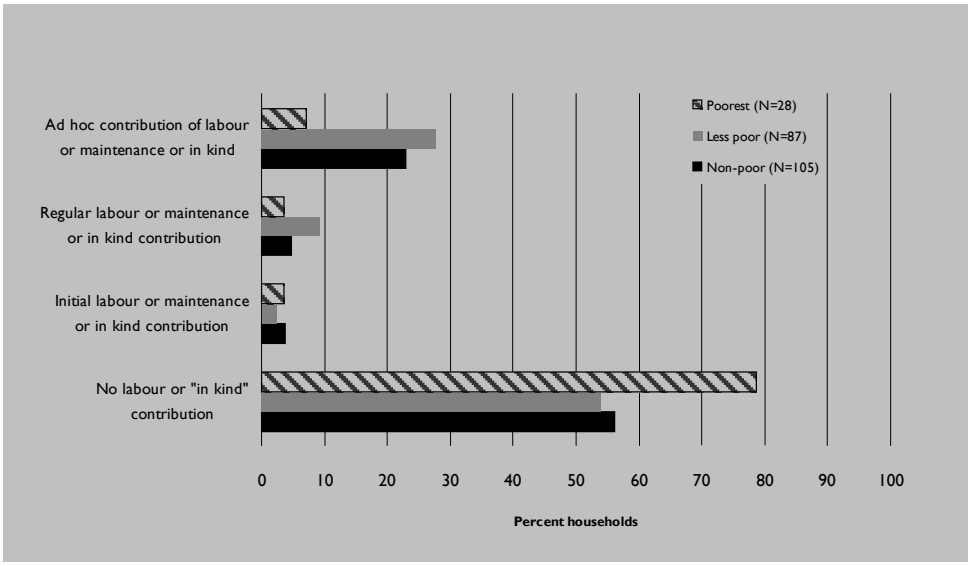


Figure 53. Payment in kind for livestock in the dry season, by well-being category (groundwater sources)



5.7 Perceived problems of productive water use

Irrigation

Perceived problems of water use were listed and ranked by households. Results show that the two most cited problems of water for crop irrigation were distance to get water, followed by maintenance of the water point. The timing and use of water by other users was also considered a problem by some households, as was water pollution.

Figure 54. Perceived problems related to irrigation water during the dry season

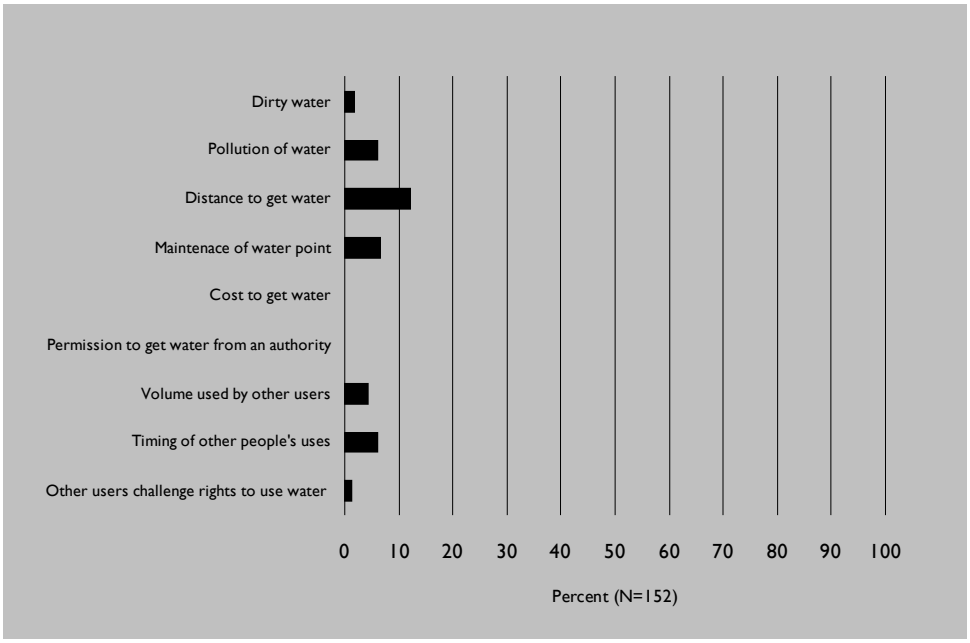
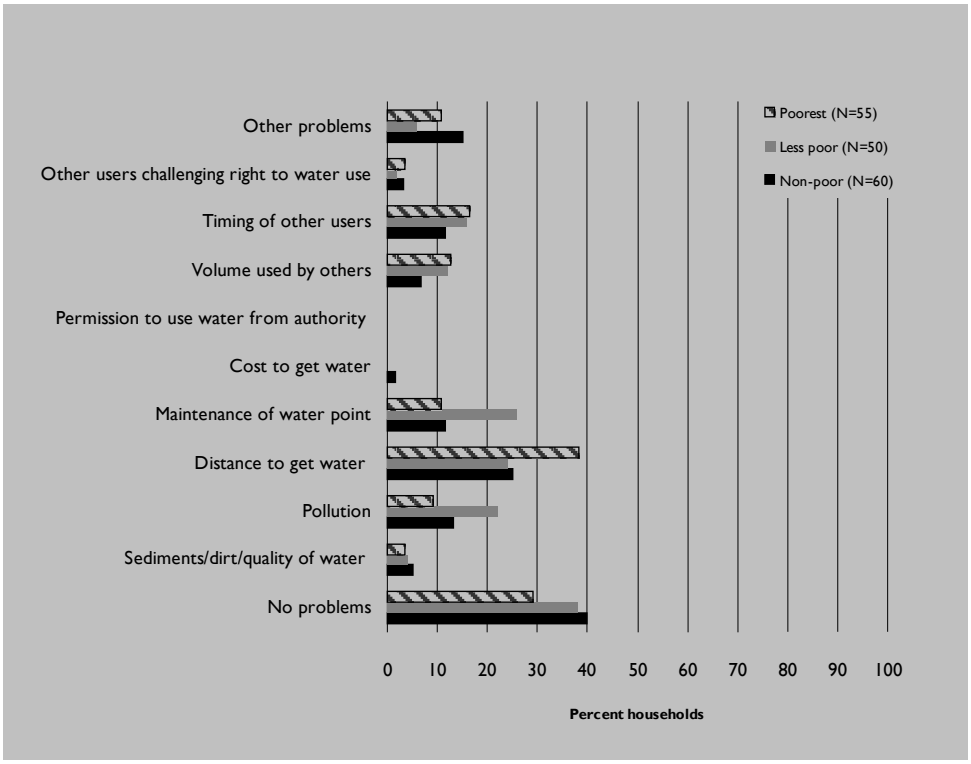


Figure 55. Perceived problems related to irrigation water during the dry season, by well-being category



These problems were cited as particularly prominent during the dry season. During the rainy season, in-depth interviews done as part of the wider study showed concerns of failing or increasingly erratic rainfall patterns.

Livestock watering

Results for perceived problems of water for stock watering in the dry season show that distance to get water for stock is considered an important problem, followed by the timing of other people's uses and poor quality of water. Households that watered stock at public boreholes and wells in particular cited the timing of other people's uses as an important problem. Pollution was typically explained as a result of clothes washing, watering of cattle and erosion from upstream gardens and fields. Only a few households cited use of agricultural chemicals as a pollution problem. This is in accordance with samples of water quality made by central government authorities along this stretch of the Kafue River.

Figure 56. Perceived problems related to livestock water during the dry season

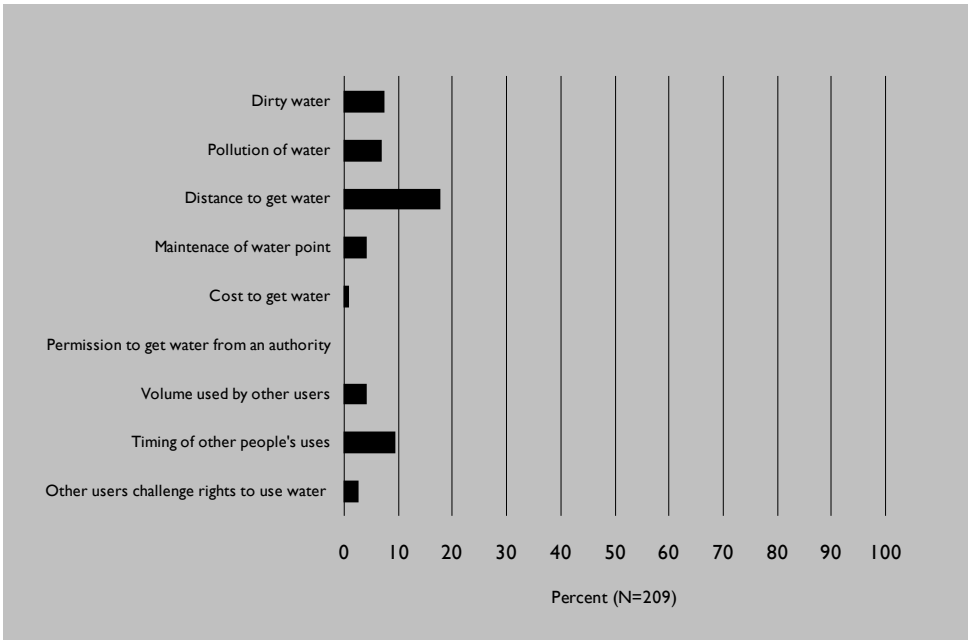
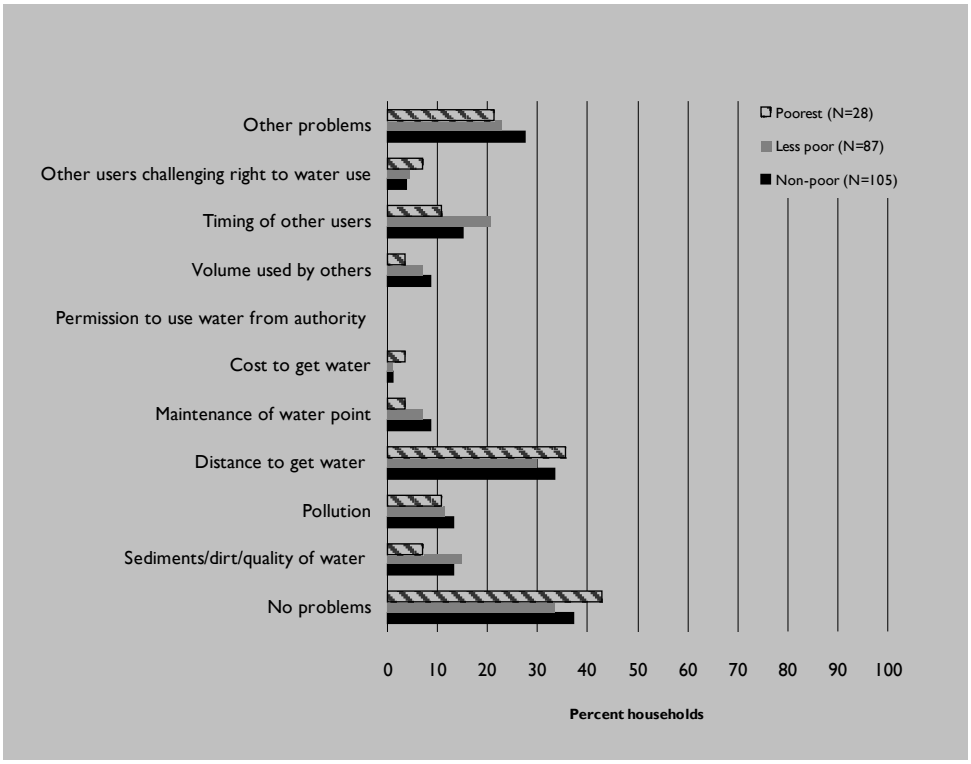


Figure 57. Perceived problems related to livestock water during the dry season, by well-being category



5.8 Reasons for use of most important water sources

Irrigation

During the dry season, many households cited the reliability of water as a key reason for choosing to use a particular source of water for irrigation, tied in closely with the proximity of the water source, the openness of access and/or the fact that it was the only available option.

Figure 58. Reasons for use of most important sources of irrigation water during the dry season

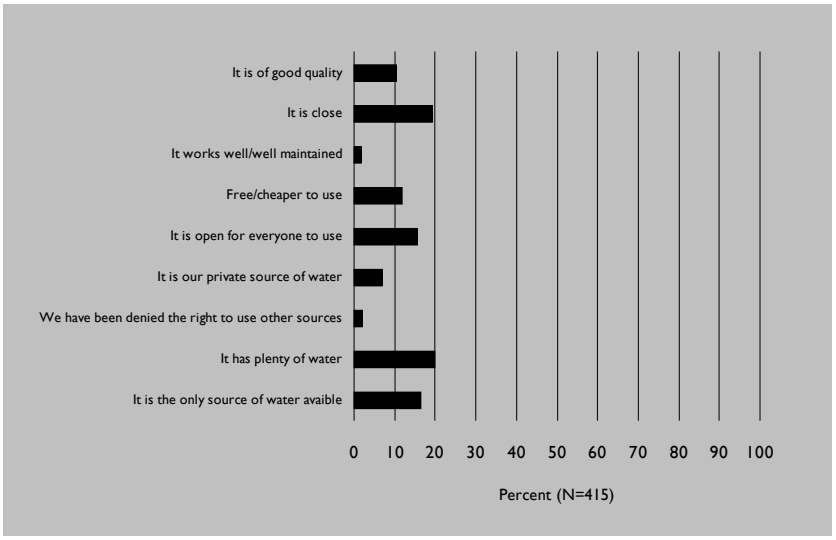
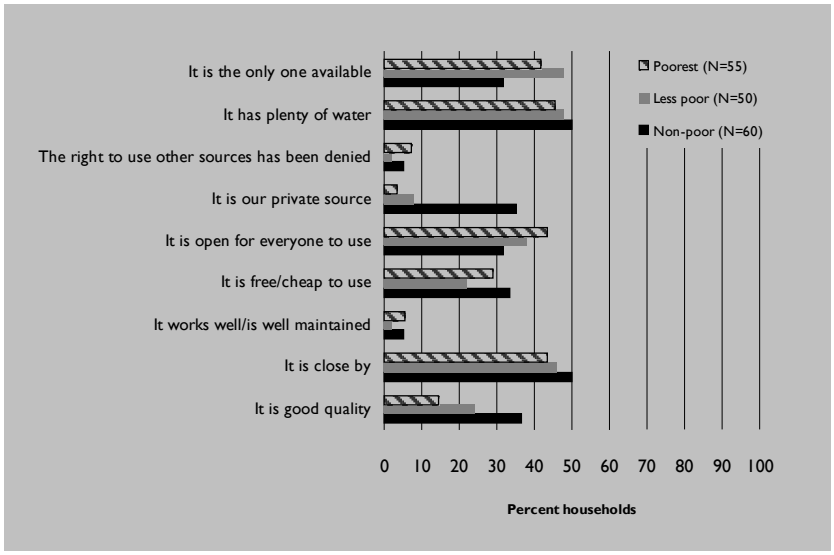


Figure 59. Reasons for use of most important sources of irrigation water during the dry season, by well-being category



Livestock watering

Water sources for livestock watering are also to a large extent based on the security of supply. Open access and free use are also considered important features, along with proximity.

Figure 60. Reasons for use of most important sources of livestock water during the dry season

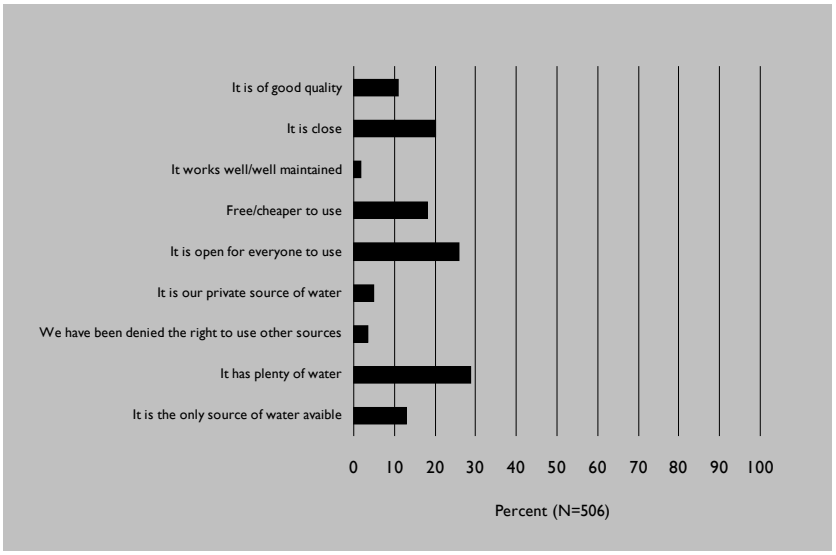
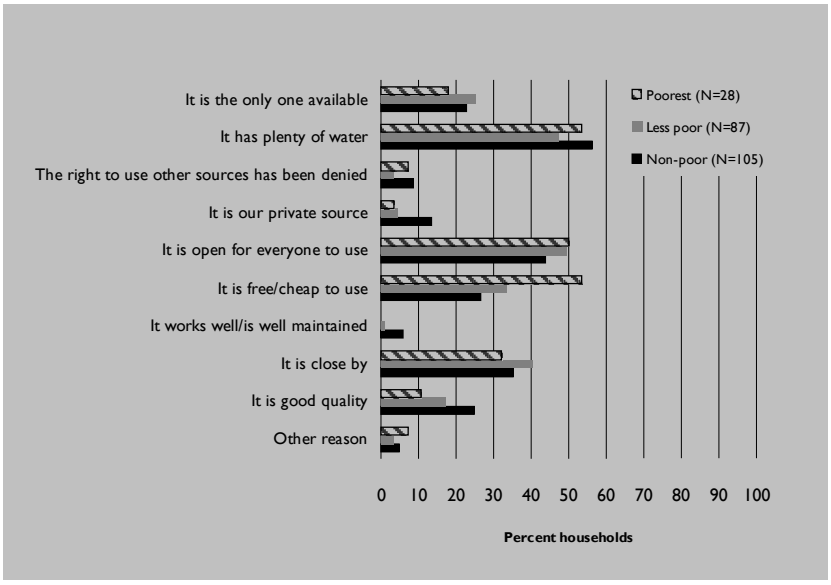


Figure 61. Reasons for use of most important sources of livestock water during the dry season, by well-being category



5.9 Number of water sources

Irrigation

The large majority of those who irrigate crops during the dry season use only one source of water. Only a few use other sources, typically in situations where water availability and/or access is not fully reliable.

Figure 62. Number of water sources used for irrigation during the dry season

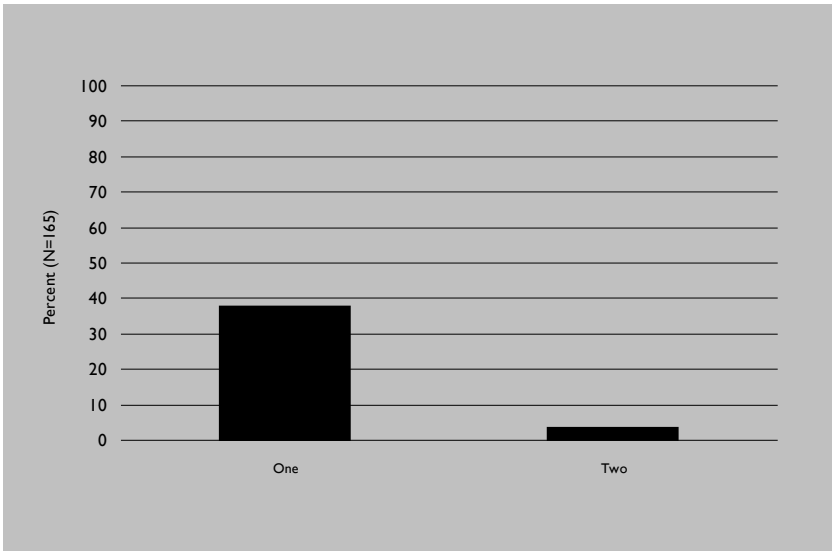
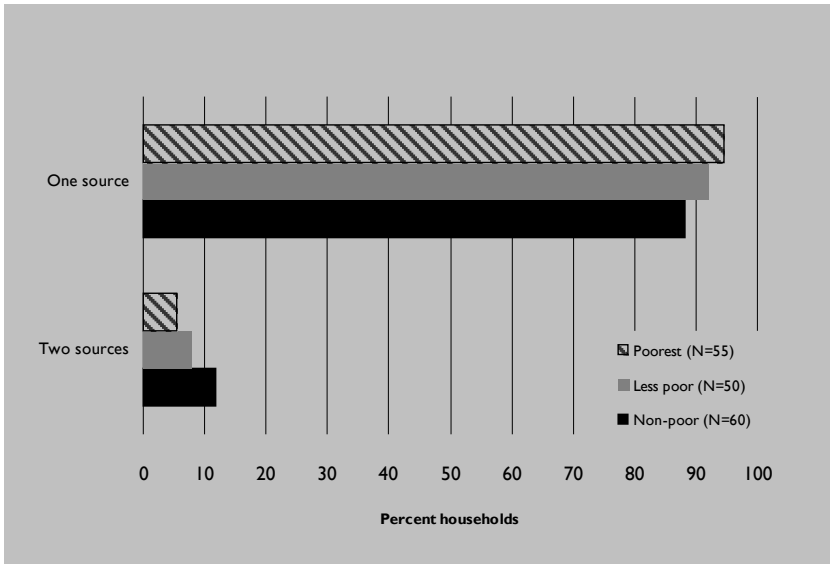


Figure 63. Number of water sources used for irrigation during the dry season, by well-being category



Livestock watering

The data for livestock watering also showed a tendency to focus on a particular source, especially during the dry season when the open water sources of the flood plains or local wells and boreholes are used. The pattern for the rainy season (not shown) is largely the same, although a few more households resorted to multiple sources as a result of the greater availability of water sources during this time.

Figure 64. Number of livestock water sources during the dry season

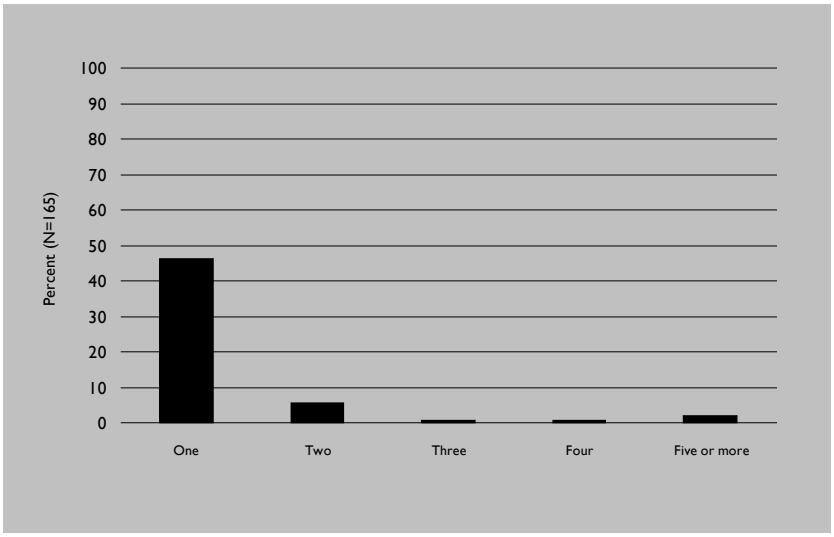
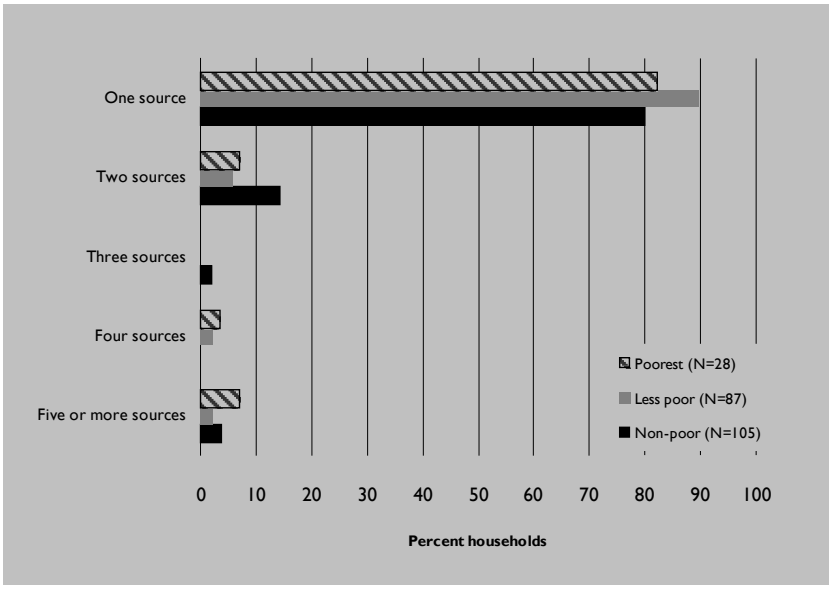


Figure 65. Number of livestock water sources during the dry season, by well-being category



6. CONCLUDING DISCUSSION

Findings of the household questionnaire survey have pointed to areas of water access in rural areas often ignored or neglected in the process of planning and implementation of new water resources, and the regulation of ownership and access.

The burden of walking longer distances to access water for domestic uses are usually borne by households of middle and low levels of well-being as compared to households in the highest levels of well-being. This situation has serious implications on economic productivity, because a substantial amount of time is spent away from home searching for water by women and children. Other activities such as gardening and crafts become secondary in time allocation, and achieving substantial output is minimal.

Households in the high level of well-being highly depend on privately-owned sources of water for domestic uses. They however also draw on communally-owned water sources to supplement this. By contrast, the poorest households are to a large extent dependent on water resources that they do not control individually, such as community boreholes, shallow wells in open access river beds or wells owned by relatives or neighbours. This means that the poorest households are more vitally dependent on water sources with multiple stakeholders and interests, where collaboration, negotiation and possibly conflict are involved. This is not necessarily a problem, but it must be noted that poor households also tend to be those who possess the least assets and means of influencing both collaborative and conflictive processes. If their interests are not well represented, this may lead to marginalisation and exclusion of the poorest from communal water points (see e.g. Funder & Mweemba 2010, Mweemba & van Koppen 2010). The tendency for many poor households to use shallow wells (compared to the better-off households) is thus not only a result of lacking funds to invest in private wells, but also in some cases a result of being pushed away from communally-owned water sources such as boreholes.

Cash and in-kind payments are fairly widely used as payment for access to domestic water in Namwala, mostly in relation to the infrastructure (mainly boreholes) needed to access groundwater. However, during interviews households also often expressed a discontent with the fact that boreholes continued to break down even after payments had been made for good construction and/or maintenance and repairs. This included the poorest for whom cash or in-kind payments are relatively more costly than for better-off groups, and who do not have the option of reverting to their own covered wells, as the wealthy households do. Ensuring sustainable technologies and supplies of spares is therefore not only a technical issue but also has skewed impacts on different well-being groups.

The ability to engage in crop production during the dry season by many people is mostly constrained by the lack of the water resource which is an import input to production. While there is much willingness to uplift livelihoods by cultivating crops for sale during the dry season, there is not much water available to sustain the production, which in most cases lasts for a short time, because most of the sources depended upon dry out before the crops mature. In the case of Namwala (and Zambia generally) the water is actually available in the ground, but the lack of infrastructure, such as boreholes, means that accessible resources are scarce. This in turns puts pressure on the remaining water resources, and can lead to conflict over access when new water infrastructure is developed.

In Namwala, communal boreholes and wells are used for both domestic and productive uses. This is a particular problem for the poorest who in many cases do not own cattle or small vegetable plots, and whose main priority is therefore water. It may also lead to conflicts between men who prioritise cattle, and women who prioritise domestic water uses. It is however debatable whether it is realistic and feasible in practice to use a particular source of water for only one use. In many cases it may therefore make more sense to ensure that access is regulated among users and that efforts are made to ensure that domestic users have unbiased places to express grievances if these become relevant. In some sites in Namwala, local community members and authorities have developed such systems on their own account.

The data also suggest that users draw on water sources which have a variety of different types of ownership, including both "open access" sources, public water supply, community-owned sources, privately-owned sources and "borrowed" access to sources owned by others. This may furthermore vary across seasons, as illustrated by the difference between ownership patterns of livestock watering sources in the rainy and the dry seasons. This has implications for any efforts to support institutionalization of access, which need to make sure that efforts to e.g. formalize rights or introduce new payment schemes do not become too rigid. This is also the case in terms of ensuring water access for the poorest, who in times of particular need may need the option of resorting to alternative water sources, such as wells owned by their relatives.

Ensuring equitable water access is thus not only done by investing in and implementing boreholes and other means of rural water supply. Successful development of such infrastructure needs to based on an understanding of the particular livelihood- and water access strategies of local communities, as well as the patterns of ownership and access to both old and new water sources.

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