WORKING PAPER: 7

Assessment of rural livelihoods in two lakeside communities, Mityana and Mukono District, Uganda

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Background

This Working Paper reports on two village level livelihoods studies, conducted as part of the HyCRISTAL rural livelihoods pilot (http://www.walker.ac.uk/research/projects/hycristal-integrating-hydro-climate-science-into-policy-decisions-for-climate-resilient-infrastructure-and-livelihoods/) under the FCDO/NERC-funded HyCRISTAL project. Detailed quantitative information was collected on the current livelihoods of households residing in two lakeshore communities in Uganda, one on Lake Wamala in Mityana district and one on Lake Victoria in Mukono district. The aims were twofold: to demonstrate the range of analytical output that can be derived from household economy studies using the Individual Household Method (IHM), and to understand the different capacities of households to adapt and diversify their livelihood activities in response to rapidly changing economic and climatic conditions. This baseline data will be used in pilot climate – livelihoods impact modelling exercises using the Integrated Database for African Policymakers (IDAPS; https://zenodo.org/record/3701722#.YGsaMS1Q3fY). IDAPS was co-developed by Evidence for Development and the Walker Institute as part of the HyCRISTAL rural livelihoods pilot.

The IHM was used to collect detailed household level information on assets, sources of food and cash income, household demography and education levels. Just under a year later, local members of the team were able to complement the quantitative IHM study with a broader enquiry in the Mukono study site, focusing on livelihood changes over time, people's perceptions of hazards and risk, access to enterprise finance, and livelihood options available to youth (Petty et al, 2017).

We worked with teams from the region who are familiar with the analytical tools used and have the capacity to lead further studies of this kind and to train others to take on this role in future.

Executive summary

Both sites in 2016, include mixed populations of fishers, farmers and households that combine both activities, along with others specialising in activities such as boat making and services (shops, bars, restaurants etc). The overall pattern of income distribution was similar in both sites, with high levels of inequality between the richest and poorest households. However, across the distribution average incomes were higher at the L. Victoria (Bulebi Sango village) site than at the L. Wamala (Nkonya village) site.

Income levels: In the lower half of the distribution, average incomes were approximately two thirds less in Nkonya than in Bulebi Sango, whist in the top half of the distribution they were on average around one third less. Only 1 household had insufficient income to meet WHO recommended food energy needs – this was in the poorest household in the L. Wamala sample. However at both sites, around 11% of households fell below the locally defined 'standard of living threshold'-these households had insufficient income, after meeting their food energy needs, to cover the cost of items needed to meet locally acceptable norms for 'social inclusion'[1]. This result was due mainly to

[1] See Appendix 1 for definition of terms used in IHM analysis.

the additional cost of housing at the L. Victoria site, which was an essential expenditure item for all poorer households. At the L. Wamala site, rental was not a necessary expenditure item.

Household characteristics: No single factor typified either poorer or better off households at either site. Female headed households were found across the income distribution[2]. Households made up of a single male (mainly although not exclusively fishermen) were over-represented in the top quintile at both sites but were also found at lower levels of income. In Bulebi Sango (L. Victoria), a smaller proportion of households were headed by women than in Nkonya (L. Wamala). However, two thirds of these were in the poorest 2 income quintiles, and only 1 in the top quintile. At both sites the top income quintile included farmers, fishers, service providers and households that combined one or more of these activities.

Household assets: Land and livestock assets were fairly even distributed in both lakeshore communities, although plots were generally small (around 1.5 acres). There was limited the scope for investment in land in the immediate lakeshore area, although some wealthier households at both sites had been able to accumulate land outside their villages.

In Bulebi Sango, a higher proportion of households owned rooms or houses for rent than in Nkonya, providing an additional income source. Bulebi Sango also had a higher proportion of boat owning households, and more of these households owned several boats. A few of the wealthier households in both sites owned solar panels and TVs although the proportion with solar panels was higher in Bulebi Sango than Nkonya. Bulebi Sango households owned proportionately more nets than Nkonya households, whereas Nkonya households had more agricultural tools (hoes, axes etc). Overall, asset ownership reflects the generally higher levels of income available to households in Bulebi Sango, although the proportion of households owning consumer goods at both sites was low.

Introduction

This report is an initial analysis of the findings of rural livelihood studies conducted in Uganda at selected lakeshore sites in the Lake Victoria basin: Nkonya village, situated on Lake Wamala in Mityana district[3] and Bulebi Sango village, situated on Lake Victoria in Mukono district[4]. The study is part of the HyCRISTAL (Integrating Hydro-Climate Science Into Policy Decisions for Climate-Resilient Infrastructure And Livelihoods In East Africa**)** project. HyCRISTAL is a multi-disciplinary and multi-agency FCDO (Foreign, Commonwealth and Development Office) and the UK Natural Environment Research Council (NERC) funded project under the Future Climate for Africa (FCFA) Programme. HyCRISTAL's main objective is to improve knowledge of East African climate change and its impacts to inform long-term decision-making in East Africa.

The report includes an analysis of income distribution and income sources in the two communities. This information provides (i) a measure of levels of household food security and the ability of

[2] In Nkonya, 7 female headed households fell in the poorest 2 income quintiles (Q1 and Q2) and 6 in the richest 2 (Q4 and Q5), with 5 in the middle quintile (Q3).
[3] Nkonya is about 40 minutes' drive from the district capital, Mityana town, and around 2 hours' drive from Kampala. The road from the village to Mityana is poor.
[4] Bulebi Sango is just under 2 hours' drive from the district capital, Mukono town. Mukono is around an hour's drive from Kampala. The feeder road from Bulebi Sango to the main road is extremely poor/

households to meet a basic standard of living; (ii) data on the diversity of income sources at different levels of income; (iii) analysis of the proportion of household income derived from crops, livestock, employment, fishing/wild foods and gifts from family and others; and (iv) data on household assets, together with a more detailed breakdown of income sources and basic household characteristics.

This quantitative analysis provides an account of the economic limitations that face many households in responding to multiple livelihood hazards and shocks, and adapting to change. In addition, it illustrates the way in which IHM data can be used to identify the sensitivity of different groups to specific hazards arising from climate change or other shocks, and provides a baseline for tracking actual changes over time.

Methodology

Data was collected from individual households, using the Individual Household Method (IHM); contextual information was collected from focus groups and key informants, using other standard participatory techniques.

The IHM is a relatively new approach to measuring and monitoring income at household level, and like the well-established Household Economy Approach (HEA) which is also used in the HyCRISTAL project, is grounded in Amartya Sen's theory of exchange entitlements (Sen 1981). The IHM allows users to disaggregate and quantify the contribution made by specific activities to a household's overall economic status. It can also be used to model the potential impact of a shock or change on household income and living standards. To minimise known sources of error (for example, under reporting of income) data is collected through a 'structured conversation', rather than standard questionnaire format. This allows interviewers to triangulate and cross check responses and enables interviewees to provide additional information in the course of the conversation.

The IHM methodology classifies all income as either '*food income'*, measured in kcals, or '*cash income*' measured in the local currency. OIHM (Open IHM) software designed by Evidence for Development (EfD), is used to calculate the proportion of the household's total food energy requirement met by food income and the cost of purchasing the outstanding requirement, based on the mid-year market price of the most commonly consumed local staple foods. Any money remaining from the household's cash income after it has purchased this food is described as 'disposable income' (DI):

Disposable income = Sum of all household cash income - ((Household food energy requirement [kcal] - Sum of all household food income [kcal]) × Price per kcal of staple diet)

Households that do not have sufficient income to meet the reference standard food energy requirement (WHO 1985) are considered to be below the food poverty line and to have a negative disposable income. To allow for comparison between households of different size and demography, income is further standardised by 'adult equivalent, giving disposable income per adult equivalent (DI/AE).

Finally, a '*standard of living threshold'* (SoLT) is set. This represents the cost of a basket of essential items that are required to meet the local norms for social inclusion. Items are identified in

consultation with groups of poorer women and men. Households that cannot afford the full set of items are described as being below the standard of living threshold.[5]

Data is generally collected for a twelve-month period covering the most recent 'agricultural year'. The agricultural year is established in consultation with the study community at the start of the assessment.

IHM studies in Nkonya and Bulebi Sango

The sample

Two rural study sites were purposively selected from localities in Uganda of interest to the HyCRISTAL project (Acidri, 2015) this included lakeshore communities around Lake Wamala, and lake shore communities around Lake Victoria. After consultation with other HyCRISTAL consortium members, Nkonya village on Lake Wamala and Bulebi Sango[6] village on Lake Victoria were selected.

At the start of the assessments, the study villages were mapped by the survey team with support from local community members. In Nkonya, all households resident in the village during the study year (Jan-Dec 2015) were included in the sample. 58 households were interviewed. 2 households were excluded from the analysis as the data they provided was incomplete. Bulebi is a larger village with over 200 households, and here it was necessary to carry out a sample survey, rather than a whole village assessment, due to time constraints. After mapping and numbering every household, a number was randomly chosen as the first selected household, then every 2nd household was systematically sampled. A total of 105 households were interviewed and all were included in the final analysis.

Data collection, checking and uploading

On the first day of field work, context information was collected in a series of focus groups with men and women of different ages. Data was collected on the main activities through which households generate food and cash income, and the returns from these activities; on the 'staple diet' – i.e. the basic food that a poorer household would buy when their own production had run out; and on the costs of essential items that households need to buy to reach the minimal 'standard of living' norms for their community. This provided the team with a rapid overview of the context in which the assessment was being conducted.

Over the following week, IHM household interviews were conducted. At the end of each day, data was checked and uploaded into the open-IHM software and households requiring call-backs were identified.

Findings

To illustrate the range of data relevant to policy interventions and future research tracking the impact of climate change on rural livelihoods, we have selected the following analysis.

[5] see Appendix 1 for definition of terms used in IHM analysis, and for more information go to http://efd.org/

[6] Referred to as 'Bulebi' locally, and throughout the remainder of this report

- Population breakdown
- Income distributions, including a breakdown of disposable income per adult equivalent by income quintiles and comparison between the two sites
- Characteristics of households at the extremes of the income distribution in both sites- poorest and richest 5%
- Analysis of the main sources of food income across the study populations (ie food produced by the household and retained for its own consumption)
- Analysis of the main sources of cash income across the study populations
- Analysis of main productive assets

Population

Nkonya village, L Wamala. 56 households were included in the Nkonya analysis, made up of 316 individuals (average household size 5.5).

Of these, 17 (just over 30%) were female headed: this includes grandmothers caring for younger children, widows, single and divorced women and 2 households in which the only adult male is over 80 years of age. The high proportion of female headed households may partly be explained by the very high prevalence of HIV/AIDS among lakeshore communities.

6 households were made up of single men. Of these, only 2 were migrant fishermen. The others included young, unmarried men, a single, divorced man and an elderly man, all of whom were engaged in farming.

Bulebi Village, L Victoria. A total of 105 households (520 individuals) were included in the Bulebi sample. The average household size was 5.1, slightly smaller than in Nkonya. There were fewer female headed households (around 10%, n 10). 9 households were made up of 1 or more single men (just under 9%). Of these 8 were reliant on fishing as their only source of income. One owned 0.5 acre of land and combined fishing with agriculture.

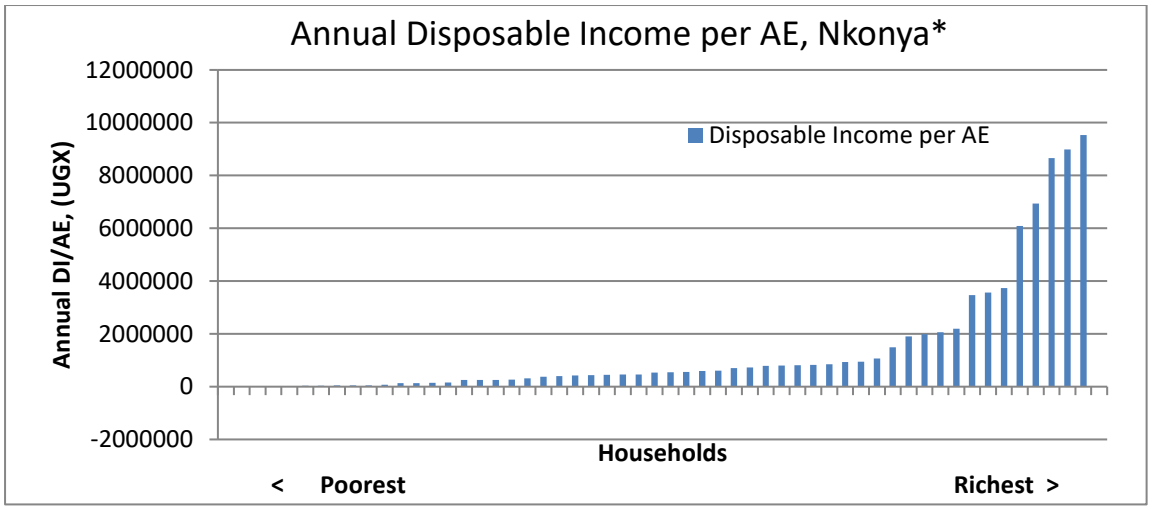
Income distribution

Figure 1 shows the distribution of income in Nkonya village (L. Wamala); Figure 2 shows income distribution in Bulebi village (L. Victoria). Each bar represents a household, with the poorest household on the extreme left and the richest on the extreme right. Households are displayed in order of '*disposable income'* (DI). This represents the amount of cash remaining after the household has met its food energy requirements[7], either through production, market purchase or –in most cases-a combination of both. The chart shows income standardised according to household size - 'per adult equivalent' (/AE) to allow households of different size and demography to be compared[8].

The richest household in Nkonya has been excluded for display purposes. This household has an income (DI per AE) of 13.181m UGX.

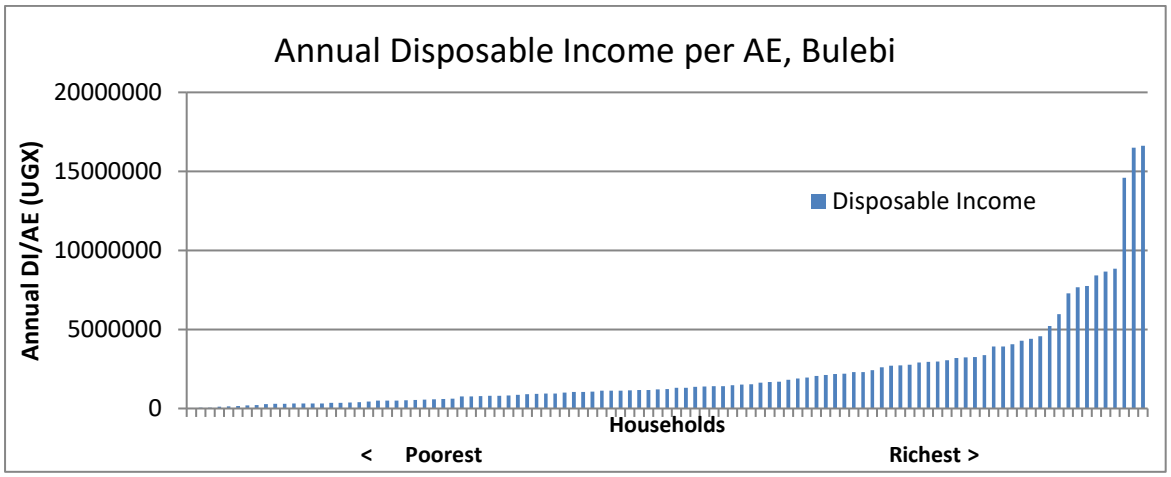
[7] Requirements are based on WHO reference standards
[8] See Appendix 1 for definition of terms used in IHM analysis

Figure 1. Nkonya, income distribution, Nkonya



*Richest household omitted

Figure 2. Income distribution, Bulebi Richest 2 households omitted for display purposes



The shape of the distribution is similar at both sites, with a substantial level of inequality between the richest and the poorest households. However, average incomes are substantially higher in Bulebi than in Nkonya in every income quintile.

Table 1. Disposable incomes per Adult Equivalent (AE) by quintile at the two study sites in Bulebi (L. Victoria) and Nkonya (L. Wamala) in Ugandan Shillings (UGX) and US Dollars (USD)

	Q1	Q2	Q3	Q4	Q5
UGX Nkonya	38,722	270,706	552,265	1,129,299	6,220,504
UGX Bulebi	217,240	698,266	1,246,941	2,330,333	6,938,493
USD Nkonya	11.3	79	161.3	330	1,817
USD Bulebi	63.4	204	364.2	681	2,027

Table 1 shows the average income/AE disaggregated by quintile at the two study sites. The greatest discrepancy is in Q1. The differences are progressively smaller as incomes rise and in the top quintile, average incomes are only 10% higher in Bulebi (L Victoria) than in Nkonya (L Wamala)[9]. The profound poverty of the poorest households was evident in Nkonya, and survey data was corroborated by discussions with the local head teacher, who spoke of many children coming to school hungry, with nothing to eat at mid-day, or at most some scraps from the previous night.

Assuming an average household size of around 5 people, the approximate absolute values (i.e. not standardised per adult equivalent) range from an annual income after meeting basic food needs of around $55 per *household* in the poorest quintile in Nkonya ; to $806 and $1,820 in the middle quintiles of Nkonya and Bulebi respectively; and around $10,137 in the richest quintile in Bulebi.

Standard of living

Wamala

As the very low levels of income in the poorest quintiles would suggest, in Nkonya half of all households in Q1 did not have sufficient income to purchase the basket of goods needed to meet the local minimum 'standard of living threshold'[10]. These items were identified by a focus group of poorer households, and included items such as soap, clothes, salt, fuel and primary school costs. The poorest household in Q1 also fell below the food poverty line i.e. they were not able to meet minimum (WHO) food energy requirements[11].

There is a disproportionate number of female headed households in the poorest quintile, data in Table 2 shows that being female headed does not in itself lead to extreme poverty. By contrast, male only households are found exclusively in the top 2 income quintiles. These households, like

[9] Nkonya incomes represent 18% (Q1) 39% (Q2) 44% (Q3) 50% (Q4) and 90% (Q5) of Bulebi DI/AE

[10] See Appendix 1 for definition of the 'standard of living threshold'. Items identified locally as essential for social inclusion are listed in Appendix 2.

[11] This is a female headed households with 5 children and 0.75 acres. They produce small quantities of cassava, maize and beans, all of which they consume and gain most of their income from agricultural work, paid in cash and in kind. They also receive some assistance in the form of food and small amounts of cash from relatives. However, as the demographic profiles indicate, no single characteristic can be used to identify the poorest households.

those in the poorest quintile, gain their income from a range of sources. Only two of the richest households are fishermen: two are successful farmers and one (an elderly man), is the largest local landlord.

Table 2. Household characteristics, Nkonya

Characteristics of households, Nkonya					
	n12	**n11**	**n11**	**n11**	**n11**
	Q1	**Q2**	**Q3**	**Q4**	**Q5**
Female headed	6	1	5	5	1
SIngle male households	0	0	1	0	5

Bulebi

Despite the significantly higher income levels at the L Victoria/Bulebi site, around half of all households the poorest quintile (11 out of 21) also fell below the standard of living threshold. This is due to the higher cost of living in Bulebi. Whilst basic items such as clothes and salt have a similar cost, in Bulebi all poorer households pay rent for their accommodation, whereas in Nkonya households did not have to pay rent.

Table 3. Household characteristics, Bulebi

Characteristics of households, Bulebi					
	Q1	**Q2**	**Q3**	**Q4**	**Q5**
Female headed	2	4	3	0	1
Male only households	1	1	1	3	3

10% of households in Bulebi are female headed. The poorest of these is a grandmother with grandchildren, who is entirely dependent on cash gifts from relatives; the second poorest is a single mother with 4 children who has a small kiosk but also depends on help from relatives. In the top income quintile, the only female headed household owns a hairdressing salon, she also owns a cow and sells milk, and has just has one child. The richest male only households in Bulebi include fishers, a fisher/farmer and a boat repairer/construction worker.

Income by source

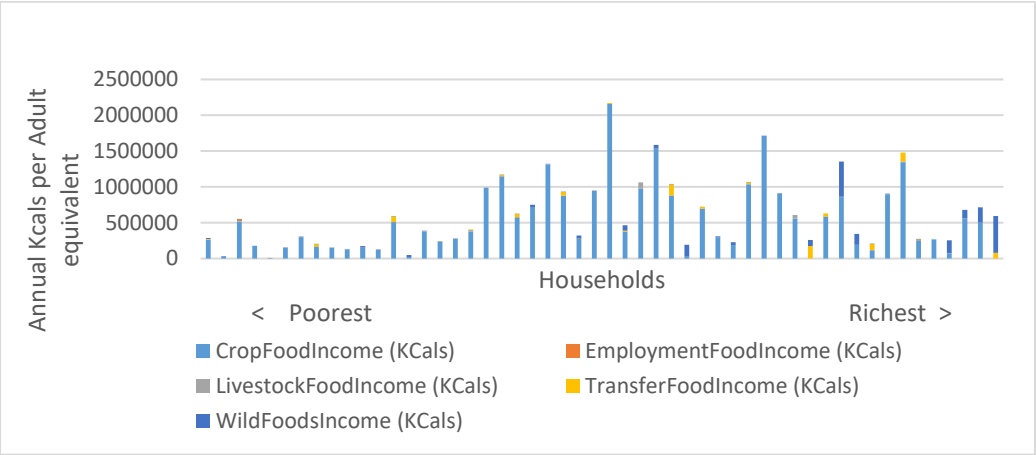
This section provides a breakdown of the main income source at the two sites.

Main sources of food income

The analysis of '*food income'* (food produced by, collected or gifted to the household and retained for its own consumption) provides a measure of the extent to which households depend on market

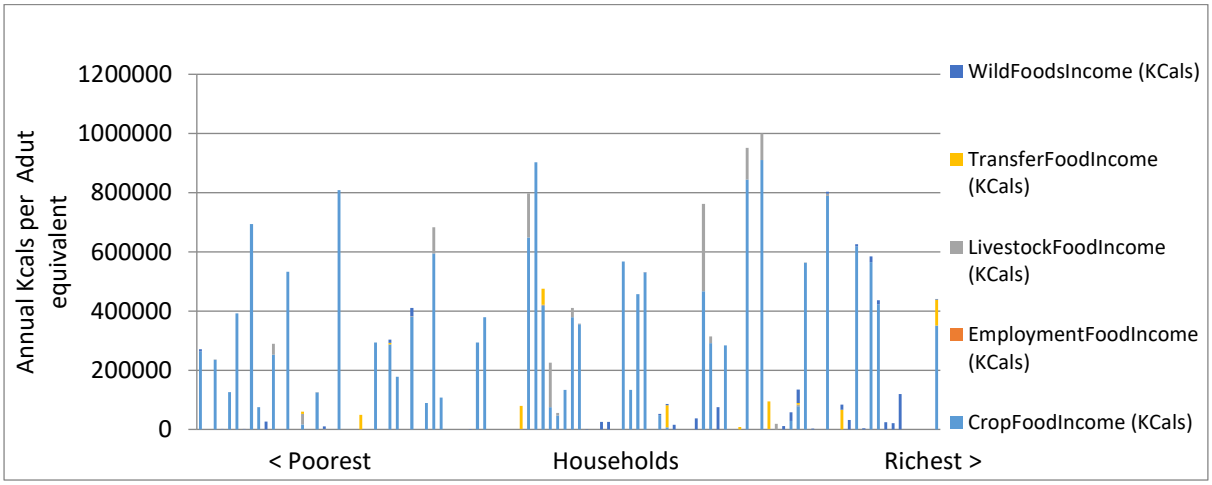
purchase, and is therefore an indicator of exposure to market price increases. Fig. 3 and Fig. 4 show the main sources of this 'food income' in the two study communities.

Figure 3. Main sources of food income (kcals), Nkonya



Around 18% of households meet their food energy needs[12] from their own production in Nkonya. The remaining 82% are partly or mainly dependent on market purchase. Most food income is derived from crops, whilst fish consumption is only significant among the richer fishing households at the top end of the income distribution.

Figure 4. Main sources of food income, Bulebi



In Bulebi, own food consumption provides a lower overall proportion of household energy requirements. Only 1 household produces sufficient food to cover its food energy needs - the remaining households are either partly or entirely dependent on market purchase to meet these requirements. However, a higher proportion of own livestock products are consumed here than in Nkonya.

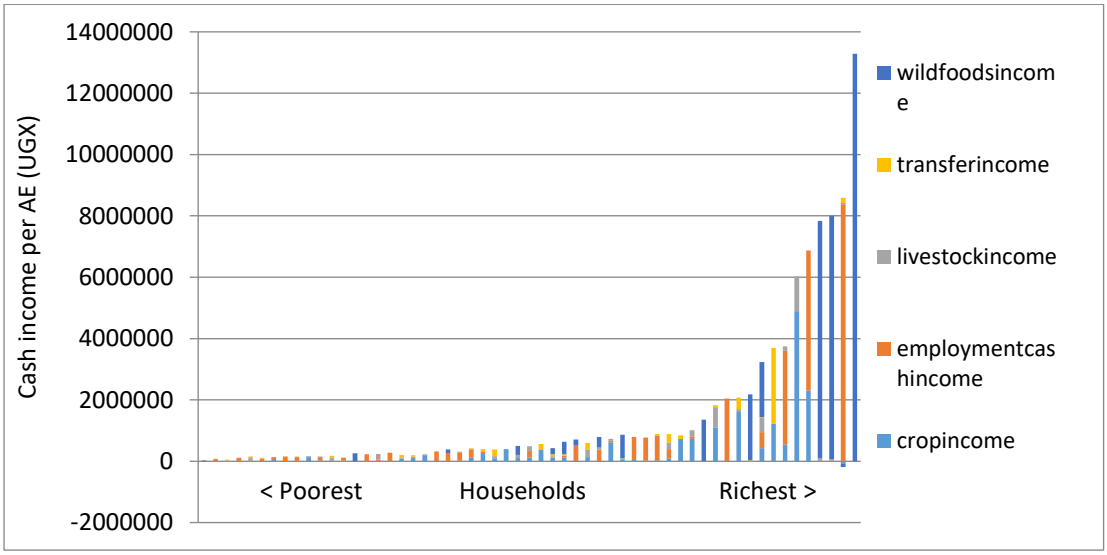
[12] Annual food energy requirements per adult equivalent: 949,000 kcals (WHO, 1985)

Main sources of cash income

This section shows the main sources of cash income in the two study sites.

In Nkonya (Fig. 5) fish sales, classified as wild foods income[13], are the dominant source of cash income in the richest quintile. However, employment (including self-employment) also generates significant levels of income in this group. Activities include boat repair, hairdressing and other retail businesses. Although income from crop sales is generally low, two of the top 6 income earners make a significant profit from selling vegetables, including tomatoes, as well as maize and cowpeas.

Figure 5. Main sources of cash income, Nkonya

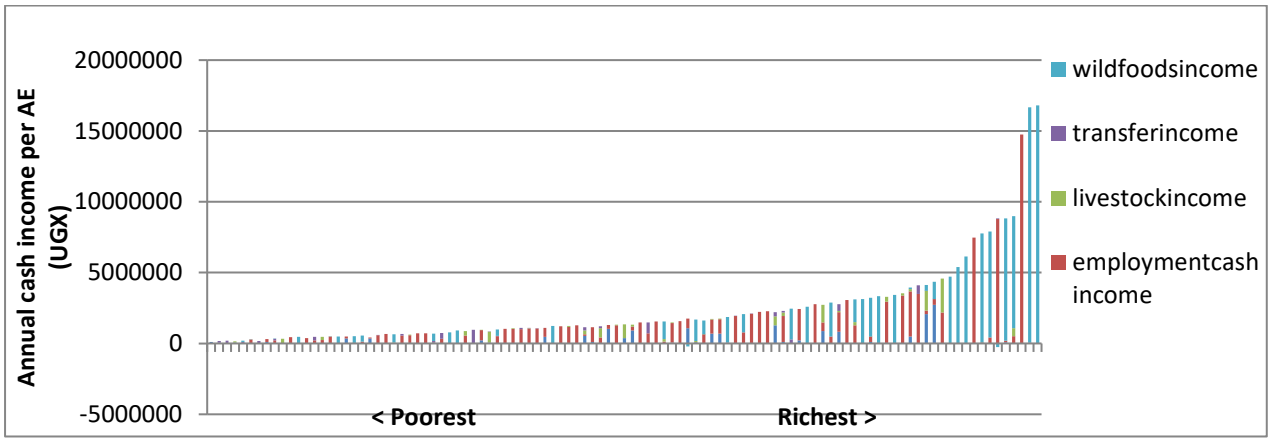


Most households in the poorest quintile earn their income from cash employment, primarily in low paid agricultural work. None of the poorest households in Nkonya derive their cash income from fishing (wild food income). Livestock income is mostly from the sale of a pig or goat to raise cash for day to day expenses. Some members of this group also receive small cash gifts from relatives. Over half of these poorest household also receive cash gifts from relatives.

In Bulebi, income from fish provides most of the income of the richest households, although employment income is also important in this group. As in Nkonya, boat repair and retail services including shops and a hairdressing salon are prominent.

Figure 6. Main sources of cash income, Bulebi per Adult Equivalent (AE)

[13] IHM studies classify all foods collected or caught from the wild, rather than cultivated or 'farmed' as wild foods.

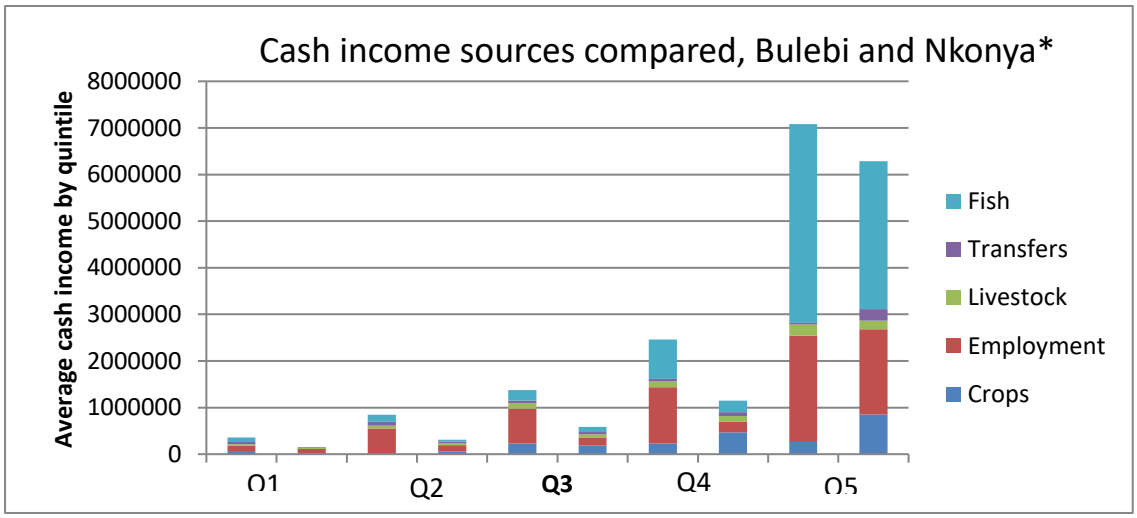


In Bulebi, no single source of income dominates in the poorest quintile. Employment, including agricultural work, unskilled construction work, hawking and lakeshore work such as repairing nets is important, as well as fishing. Cash is also generated from the sale of livestock including pigs and poultry. In this group, cash gifts from relatives are also important for some households.

Overview of cash income sources

Average incomes across the entire distribution are higher in Bulebi than Nkonya. Livestock earnings are comparable in the middle and upper income groups, but the highest earning group in Nkonya received more income transfers than any other group in either site.[14] This was made up of cash sent back to elderly parents from children who were working in salaried professions.

Figure 7. Comparison of average cash income from main income sources



*For each quintile, the first bar represents Bulebi data, the second bar Nkonya data

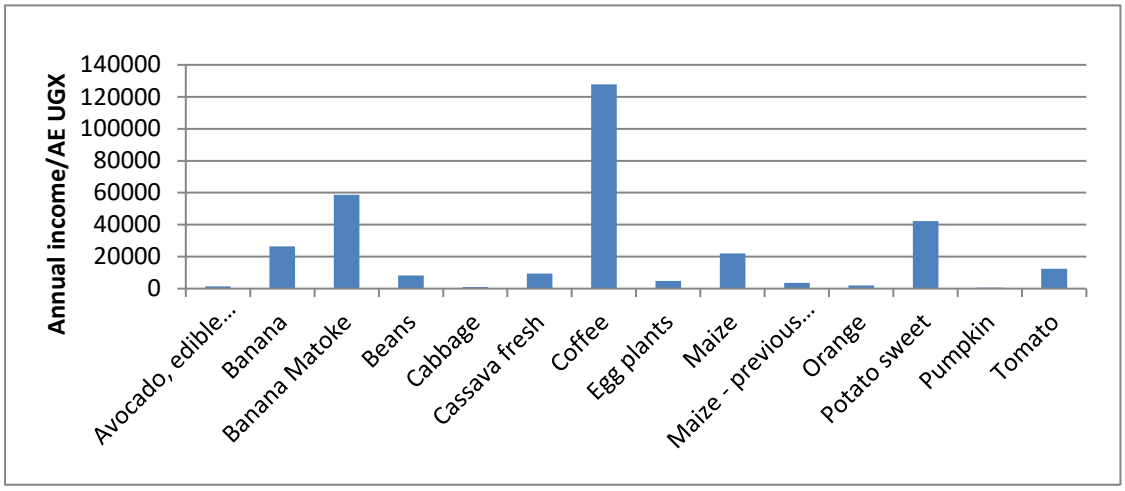
The quantitative data in this section provides a level of analysis that could be used by policy makers to design and budget for a broad-based social protection programme. However, to understand the potential impact of a specific hazard or shock and to build resilience to this, a more detailed

[14] These are mainly made up of gifts received by one household that had invested heavily in education and whose children were in well paid employment outside the village.

breakdown of income sources, including their contribution to household income at different levels across the wealth distribution, is needed. Examples of the more detailed analysis is shown in the following section.

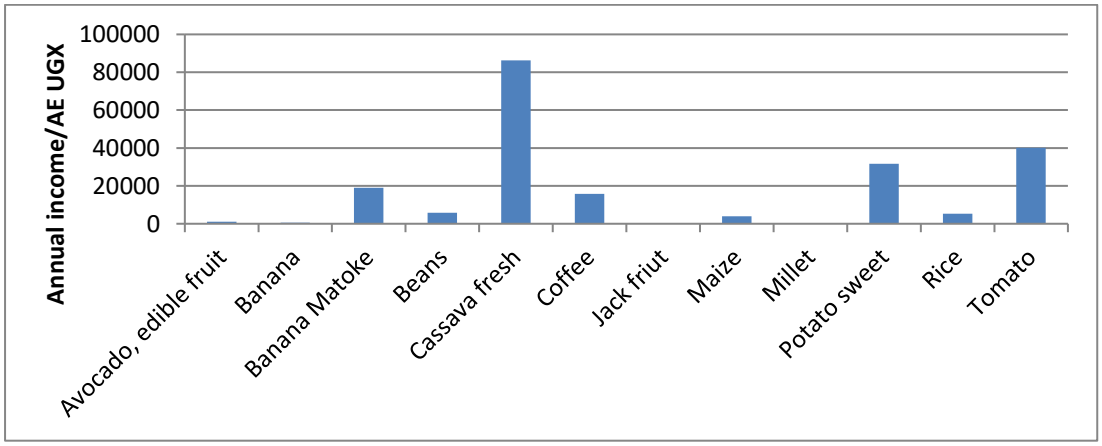
Income from specific crops

Figure 8. Average cash income from crops produced, Nkonya



Matoke, coffee and sweet potatoes generated the most cash income in Nkonya. In Bulebi, Cassava, sweet potatoes and tomatoes produced the highest value of sales.

Figure 9. Average cash income from crops produced, Bulebi



With information of this kind, climate information and agricultural extension services can be made more relevant to local communities, as can value chain and other market development programmes. For example, cassava and tomatoes are both important cash crops in Bulebi. The IHM database, which will form part of the IDAPS platform described earlier, may provide a resource for farmers to identify shifts in local production and market opportunities. Equally, it could be used by policy

makers to understand why some households are responding well to these opportunities, and the constraints that are preventing others from adapting and profiting from change.

Income from fish

Just as income from specific crop types can be identified at household and community level, the average annual cash income from different fish types can also be shown. For regulatory and governance purposes, it would be useful to understand the potential impact on household economy of enforcing limits on catches from different types of fish, in order to take steps to mitigate this. The data could also be used as a baseline in developing climate-livelihoods impact scenarios, to identify the sensitivities of different species to both changes in lake temperatures and water levels and to assess the potential impact on household income

These examples give a break-down of income from fish (standardised per adult equivalent) at the two lakes.

Figure 10. Average cash income from fish, Nkonya

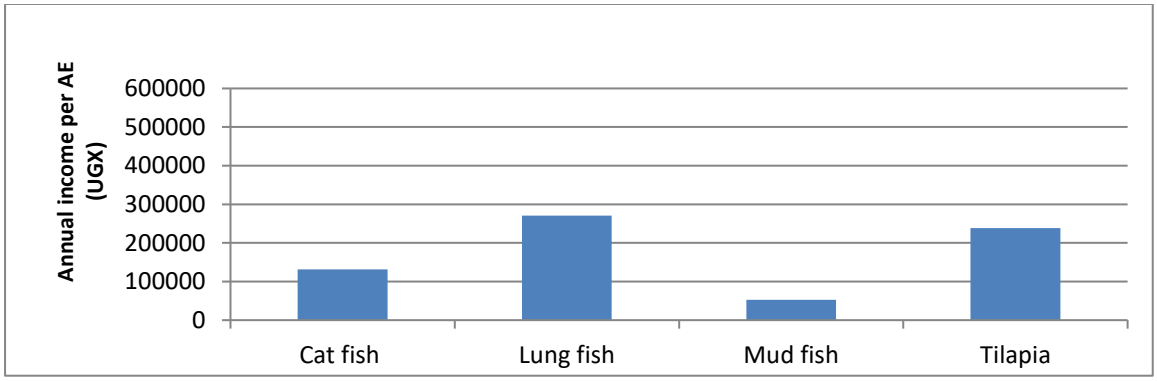
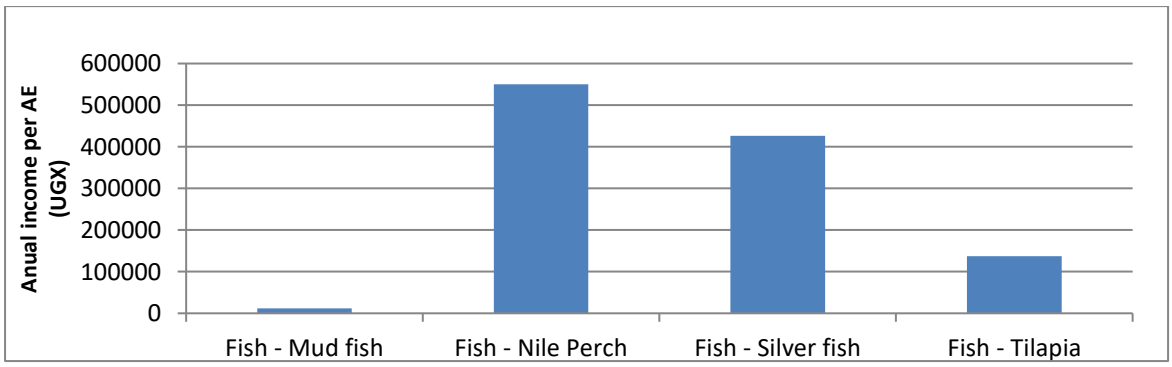


Figure 11. Average cash income from fish, Bulebi



Assets

The availability of land and other productive assets and their distribution across the community can provide some indication of the scope for new investment and adaptation. This short section summarises land and livestock assets in the two communities and concludes that there is currently

little scope for increasing returns from either land or livestock assets, without external investment in transport and other infrastructure to improve access to markets and generate local employment.

Landholding

In Nkonya, households across the income distribution have access to land although the size of plots is not large (around 1-2 acres). Two households rent in small additional parcels of upland. Only one household has irrigated land and two own wetland. By contrast, 4 of the richest households are landless: these are all fishers, some of whom have permanent homes and families away from Nkonya. The richest group includes a customary landlord, who owns 20 acres of forest (not cultivated) and 620 acres of upland, most of which is not cultivated. 3 of the richest households also have small parcels (0.5 acres) of wetland

As in Nkonya, landholding in Bulebi is spread fairly evenly across the income distribution and the average size of holdings is small. A smaller proportion overall has access to land and a higher proportion of land is rented in by households in Bulebi. This may reflect the market for higher value vegetables (mainly tomatoes) that households in Bulebi can access.

Livestock

In both communities, livestock ownership includes pigs, cattle, sheep and chickens. The proportion of households owning livestock is smaller in Bulebi than in Nkonya and whilst there is potential for livestock rearing across both communities, availability of land for grazing is a major constraint on developing this sector. Other issues influencing livestock holdings in both Bulebi and Nkonya include very poor transport infrastructure which adds to both the time and cost of reaching markets.

Discussion: Opportunities for income diversification

This study describes and quantifies the household economies of two lakeshore communities, including the proportion of income gained from different sources and the way in which this income is distributed across the community. Low levels of disposable income limit the options for income diversification for most households, as the cost of investing in even the smallest enterprises (for example, around 2m UGX for a temporary kiosk) is well beyond the saving capacity of the majority of households. The studies show that in the year for which data was collected (identified as being 'neither better nor worse than other recent years) only households in the top half of the income distribution had sufficient disposable income to service loans or save for start-up costs that would allow them to diversify or invest. The accompanying report (Petty et al., 2017) provides further details of the way in which one of the study communities (Bulebi) has adapted to changing climatic, environmental and economic circumstances over recent decades, and the obstacles that currently hinder entrepreneurship and development. This study uses conventional social science methods to gain a qualitative understanding of social, governance and historical considerations that also influence people's choices and their ability to adapt to changing circumstances.

Together, the studies illustrate the range of analytical insights that can be derived from household economy studies using the Individual Household Method (IHM) and the value of combining

quantitative and qualitative research to understand the different capacities of households to adapt and diversify their livelihood activities in response to rapidly changing economic and climatic conditions.

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Annex 1: Definition of terms and concepts as used in IHM analysis

Household: A group of people sharing pooled resources and eating from a common pot.

Household food energy requirement: The sum of the food requirement of each individual in the household, according to their sex and age[15] and time present in the household during the study period.

The staple diet (and price per kcal of the staple diet): The staple diet consists of the foods that form the basis of the local diet purchased by poor households after their own food production (including gifts and transfers) has run out. This is identified in consultation with local key informants. A weighted price per kilocalorie is calculated[16] based on the average (or mid-year) local market price of that diet during the study year. After taking account of food energy already derived from the household's consumption of own-produced food, the price per kcal of the staple diet is used to calculate the cost of purchasing the remaining calories needed to make up the household's total annual household food energy requirement. Analysis in each of the assessment locations used the mid-year market price for that location.

Cash income: All cash income from all sources (i.e. crop sales, sale of livestock and livestock products, employment/self-employment, cash transfers, and the sale of wild foods). Note that production and input costs are deducted from cash income. Where income is derived from petty trade, commerce, the sale of livestock or other sources, the amount recorded represents the profit made by the household after production or input costs are deducted. This means that a 'negative' income can be recorded if, for example, animals are sold at a loss.

Food income: All sources of income as food consumed (e.g. from crops, livestock products, payment in kind, food gifts and transfers and wild foods). Recorded in kilocalories (kcal).

Disposable income: The cash remaining to each household after it has met its total food energy needs, based on WHO reference standards[17]. This can be a negative value, if the household is unable to meet its full food energy needs with its available income.

Equation 1: Disposable Income

$$Disposable\ Income = \sum Household\ Cash\ Income - [(Household\ Food\ Energy\ Requirement, kcal - \sum Household\ Food\ Income, kcal) \times Price\ per\ kcal\ of\ staple\ diet]$$

[15] Food energy requirements derived from 1985 WHO reference standards: 'Energy and protein requirements', *Report of a Joint FAO/WHO/UNU Expert Consultation* (1985), World Health Organization Technical Report Series 724. Available online at http://www.fao.org/docrep/003/aa040e/aa040e00.HTM

[16] For example, if the diet is 90% maize at 20 shillings per kg (with 3,630 kcal per kg) and 10% beans at 50 shillings per kg (with 5,600 kcal per kg), the price of the diet (per kcal) = ((20 / 3,630) x 0.9) + ((50 / 5,600) x 0.1).

[17] Food energy requirements derived from 1985 WHO reference standards (see above).

The relationship between food income, cash income and disposable income: Disposable income (DI) is an outcome measure. It represents the money that remains to a household after the household's food and cash incomes have been allocated to meet its members' basic food energy (kcal) needs[18]. In the model, cash income is used to 'buy' the required kilocalories not covered by food aid or own production, in order to meet the household's basic food energy needs. The detailed information collected on the different types of food and cash income can be used to model impacts of changes in the prices, production or values of any income source(s) as well as changes to other defined variables

Adult Equivalents: Disposable incomes and other figures can be standardised to take account of variation in household size by dividing them by the number of 'adult equivalents' in each household. The number of adult equivalents is calculated as the total household energy requirement divided by the energy requirement of a young adult (2,600 kcal per day)[19]. The standard IHM income distribution chart shows 'disposable income per adult equivalent' (DI/AE).

The food poverty line: Households that cannot access their basic food energy requirements[20] – either through own production, transfers, food purchase using cash income, or a combination of these – are described as being 'below the food poverty line'. Data for these households appears below the *x* axis (as negative *y* axis values) on the disposable income charts. The income deficit shown on the chart is equivalent to the cost of purchasing the quantity of food required to meet reference food energy standards, based on the cost of the cheapest staple(s) that form the local staple diet, established with key informants.

Quantiles: Data from individual households can be grouped into 'quantiles' (essentially equal-sized data subsets) to allow for grouped analysis and to identify, where possible, trends and characteristics of households at similar income levels. This can be useful for targeting purposes, or to test assumptions concerning a particular section of the community or social category (for example people with disabilities, or female-headed households). To retain a reasonable degree of disaggregation, some of the data in this report is sub-divided into five equal (or almost-equal[21]) '**quintiles**', grouped and presented in ascending order of 'disposable income per adult equivalent' – with the poorest households starting at the bottom of quintile 1, and the richest households located at the top of quintile 5. Within each quintile the **median value** (i.e. the numerical value separating the higher half of the dataset from the lower half) is sometimes indicated, along with the range of values for that quintile.

OIHM: Individual household data is analysed using OIHM software developed by Evidence for Development.

[18] Food energy requirements derived from 1985 WHO reference standards (ibid).
[19] Food energy requirements derived from 1985 WHO reference standards (ibid).
[20] Food energy requirements derived from 1985 WHO reference standards (ibid).
[21] Where total numbers of households do not divide equally between the 5 quintiles, decisions must be made about which quintile(s) should include an extra household. There are no fixed rules, but in general the first extra household has been added to the poorest quintile, with further additions to other quintiles depending on the total number of odd households.

Annex 2: Items included in the standard of living calculation

Nkonya

Description	Scope	Gender	Cost/year
Clothes child [4-14 years]	Person	Female	6500.00
Clothes child [4-14 years]	Person	Male	6500.00
Clothes man [15-101 years]	Person	Male	11000.00
Clothes woman [15-101 years]	Person	Female	14000.00
Kerosene	Household	All	14000.00
Lotion	Household	All	12800.00
Matches	Household	All	4800.00
Primary school cost [6-14 years]	Person	Female	5200.00
Primary school cost [6-14 years]	Person	Male	5200.00
Salt	Household	All	9000.00
Soap	Household	All	12000.00

Bulebi

Description	Scope	Gender	Cost/year
Clothes child [4-14 years]	Person	Female	6000.00
Clothes child [4-14 years]	Person	Male	6000.00
Clothes man [15-101 years]	Person	Male	100000.00
Clothes woman [15-101 years]	Person	Female	100000.00
House rent	Household	All	240000.00
Kerosene	Household	All	52000.00
Lotion	Household	All	18000.00
Matches	Household	All	5200.00
Primary school cost [6-14 years]	Person	All	15000.00
Salt	Household	All	6000.00
Soap	Household	All	208000.00