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Recovery in Northern Uganda: Findings from a panel study in Acholi and Lango sub-regions (2013, 2015, & 2018)

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Executive Summary

The Secure Livelihoods Research Consortium (SLRC), Uganda panel data set is a unique opportunity to go beyond a snapshot in time, and to generate information and evidence about changes in the population *over time* and the specific trajectories that individuals and their households follow. This report focuses on the data and findings coming out of northern Uganda from three rounds of data collection following the same households from 2013 to 2018. Acholi and Lango sub-regions were selected given that they were the most affected by the 20 years of conflict between the Lord's Resistance Army (LRA) and the Government of Uganda (GoU). Fieldwork was conducted in January and February 2013, 2015, and 2018 in 90 different survey locations with 1,756 household heads. In 2015 and 2018 we re-interviewed 1,553 and 1,506 of those households.

The temporal trends in food security, wealth, and access to services show that, although frequently perceived as such, recovery is not a linear process and also indicates that household resilience is consistently upended by idiosyncratic and covariate shocks. Food insecurity, specifically, is extremely volatile, responding to even the smallest shocks. While all three time periods of data collection took place in years with minimal food insecurity (according to the Integrated Food Security Phase Classification, or IPC), households experienced great variability in their food insecurity. On a population level, this variability appears to be primarily driven by price hikes of staple cereals. On an individual level, variability in food insecurity correlated strongly to livelihood shocks and changes in the household's primary livelihood. Most importantly, we found that receiving livelihood assistance was significantly correlated with improvements in household food security and appears to partially stabilize some of the observed household temporal variability. However, livelihood assistance programs did not target the most vulnerable.

While most of the outcome variables oscillate from year to year, school attendance plummeted from 2013 to 2018 by almost 20 percentage points. Attendance for both boys and girls correlated significantly to household livelihood diversification – as households took on more and different livelihood opportunities, it appears that part of that additional labor came from pulling children out of school. This is an important point because it underscores that not all diversification is equal or good. While attendance dropped for both boys and girls, girls' attendance correlated with additional changes in the household such as the loss of a job or moving from having a male to female headed household, indicating that girl's attendance might be more sensitive to household composition and changes in labor.

Finally, despite the cessation of conflict in 2007, the effects of the LRA/GoU war in northern Uganda remain. Almost half of the households have at least one household member that reported suffering a war crime or crime against humanity during the war. The long-lasting impact affects household food insecurity as well as the households' or individuals' overall health quality and access to health care. Thus, it is essential to continue to invest in this region with special attention to the legacy of the decades long war.

1. Introduction

In 2013, the Secure Livelihoods Research Consortium (SLRC) designed and implemented the first round of a panel survey in Uganda, generating data on livelihoods and food security, access to and experience of basic services, and exposure to war crimes, crimes against humanity, and shocks in a region highly affected by the 20-year war between the Lord's Resistance Army (LRA) and the Government of Uganda (GoU). The same households were then tracked and re-interviewed again in 2015 and 2018 providing two more waves of panel data. For greater detail regarding the background of the survey, how it is situated within the broader SLRC agenda, and the analytical framework used to design and analyze the survey data, please refer to the synthesis paper (Sturge *et al.*, 2017).

The study took place in Lango and Acholi, the two sub-regions in northern Uganda most affected by the civil war. Despite hundreds of millions of dollars in aid and numerous post-war development programs, the region continues to face challenges in recovery from a conflict that ended over a decade ago (in approximately 2007). Over a million people were displaced by the LRA/GoU conflict, and even those who were not displaced have faced a long and difficult path re-establishing their lives and livelihoods. The war destroyed schools, health centers and other infrastructure, and killed and displaced teachers, medical personnel and other essential service providers. These sub-regions remain among the poorest and most marginalized areas of the country. The SLRC survey allows us to better understand if and how the sub-regions might be recovering and how programs and policy can best support this process.

The panel survey results present an opportunity to go beyond cross-sectional analysis, generating information about changes in sampled populations over time, and the specific trajectories of households and respondents over the course of the study period. Specifically, the survey allowed us to look at changes over time in the household livelihood portfolio, overall wellbeing (food security and wealth), access to services (health and school), and access to external support (livelihood assistance and social protection). The three waves of panel data allow us to better understand the dynamics and determinants of household outcomes across these categories. Where the data raised specific questions or issues, additional qualitative research was undertaken, such as around rotating savings groups (Marshak *et al.* 2017) and girls and boys school attendance (Atim *et al.* 2019).

The structure of this report is as follows: the next section presents the methodology, focusing on timing and location, data collection procedures, sampling, and analysis. We follow this with a section on findings, focusing on the key outcome indicators in this study: household wellbeing, access to services, and external support. Finally, we discuss our findings and present policy and programming recommendations.

2. Methods

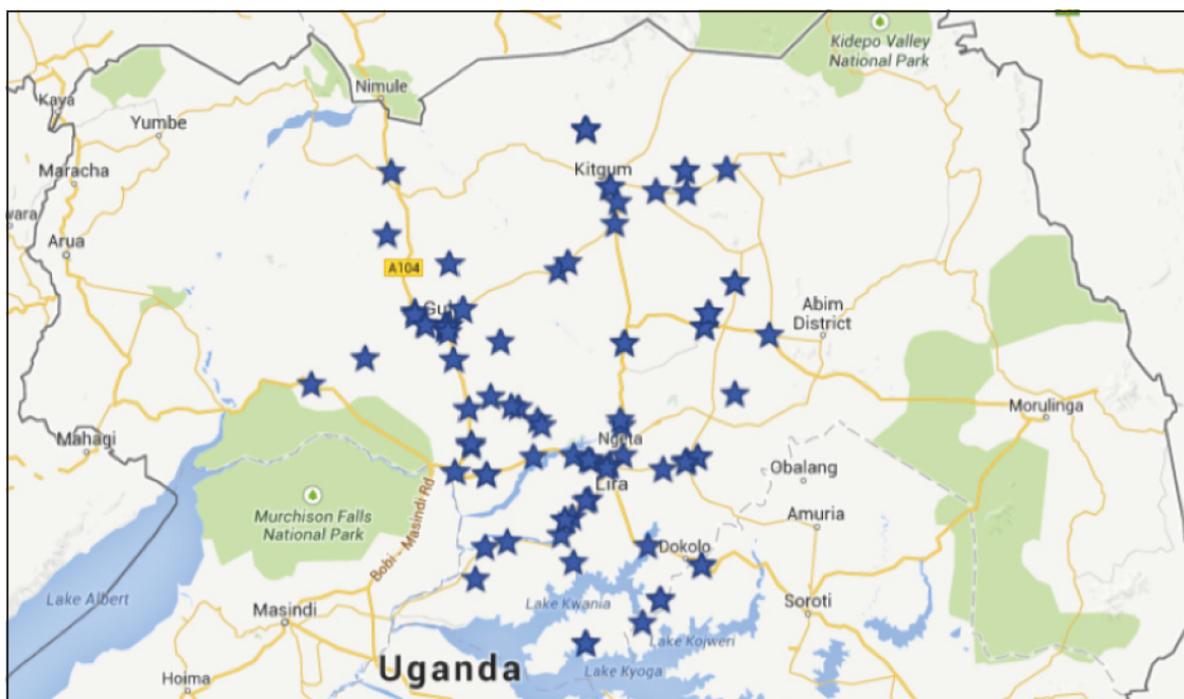
Data was collected on the same households across three time periods (2013, 2015, and 2018), providing information on changes and trajectories over time. A particular advantage of this design is that it allows us to directly study within-household change over time, rather than just a snap-shot in time or population averages. The Uganda survey is part of the larger SLRC study that was designed and implemented in five conflict-affected countries and generated sub-regional data with the goal of assessing the long-term impacts of conflict on livelihoods and access to services. Each survey contained core modules with additional data collection on context specific information. In Uganda, we collected data on livelihood sources and activities, food security, assets and livestock, shocks, basic services, social protection, and livelihood assistance. The 2013 survey included an additional module on the household's experience of war crimes and crimes against humanity.

In this section we describe the timing and location of the survey, the data-collection process, sampling and weighing for non-response, and the analytical method.

2.1 Timing and location

The three waves of data collection in Uganda occurred in January and February 2013, 2015, and 2018. In both waves 2 and 3 additional time was taken (through April) to track households that were missing in order to reduce the level of overall attrition across panels. The sample is representative of approximately 1.5 million people in Acholi and 2.1 million people in Lango, for a total of 3.6 million people covering the two sub-regions (Figure 1).

Figure 1. Map of surveyed data



2.2 Data collection process

In January and February 2013, a team of 42 enumerators conducted interviews in the two survey sub-regions. In the same months of 2015, a group of 40 enumerators and four team leaders carried out the second wave of data collection. The same enumerator and supervisor breakdown applied to the final data collection in 2018. We retained as many of the enumerators across the three periods of data collection as possible.

At the start of each round, preparation for the data collection consisted of a five-day training, the purpose of which was to familiarize enumerators with the objective of the survey, the content of the survey instrument, and the use of electronic tablets for data collection. The survey instrument ran on the application Kobo Collect¹ which allows enumerators to collect data offline and then upload via internet connection to the server (hosted on the ONA platform²).

One of the main challenges we faced with second- and third-wave data collection was the likelihood of attrition – the loss of at least some of our original sample population for a variety of reasons. Attrition poses a threat to the internal validity of a panel survey, so there is a need to keep it as low as possible. Information from the baseline survey, such as addresses, phone numbers (for a few respondents), and the household roster helped us track down some of the respondents in waves 2 and 3. We calculated the sample size in 2013 to be equal to 120% of what was needed to achieve statistical significance. This meant that in the second and third wave it was necessary to find approximately 83% of the original respondents in order to maintain statistical power at those levels. We were able to meet this benchmark by collecting data on 88% of the respondents in wave 2 (compared to wave 1) and 86% of respondents in wave 3 (compared to wave 1).

2.3 Sampling and weighing for non-response

In 2013, the team collected data from 1,756 households with a household head. In 2015 we re-interviewed 1,553 of those households and in 2018 we were able to re-interview 1,506 households (Table 1). Not all respondents had an equal probability of being selected in wave 1. This is because sub-counties were sampled using the probability proportional to size systematic sampling method (PPS, whereby larger sub-counties have a higher likelihood of selection, therefore equalizing the probability of being selected as a respondent, regardless of subcounty). To account for unequal probabilities of selection, we assigned a design weight to all the respondents based on the probability of a respondent being selected from a certain sub-region, given the number of sub-counties sampled in that sub-region, and the population of that sub-county. In addition, given that between 14 and 17% (depending on the wave) of the sample ‘dropped out’ (meaning that the original proportions of the sample are no longer the same), the design weight was adjusted to account for the non-randomness of attrition. To do so, we multiplied the design weight by the non-response adjustment to restore the proportions of the original sample. The result is that the households remaining in the sample take on a greater weight, the more similar they are to those households that have dropped out.

¹ <http://www.kobotoolbox.org/>

² <https://ona.io>

Table 1: Sample size by wave

Wave	Year	Sample Size
Wave 1	2013	1,756
Wave 2	2015	1,553
Wave 3	2018	1,506

2.4 Analytical methods

We used two models to analyze the data, namely fixed and random effects. We used the fixed effects model for all the time-variant variables (such as wealth, food security, etc.) and the random effects model for the time invariant variables (region, experience of serious crimes, etc.). Depending on the distribution of the data we used a linear, logistic, or negative binomial model. Where necessary we used log transformations on the outcome. In addition to the regressions, we also drew on extensive descriptive statistics as well as how individual households might have moved between relative quartiles in outcomes across the duration of the data collection. Only relationships with a p-value less than 0.10 are described as significant.

3. Findings

In this section, we present findings across all three time periods, starting with a description of the shocks and how differences in the three periods might explain the observed variability in outcomes across time, including basic population characteristics, changes in food security and wealth, changes in access to key services (health and education), and access to external support in the form of livelihood assistance and social protection.

3.1 Conditions across the three waves and household characteristics

Shocks

Compared to wave 2, households were significantly more likely to report experiencing several shocks in wave 3: disease of crop or livestock, bad weather, inflation and price hikes, and land disputes (Table 2). The total number of shocks reported by each household on average also slightly but significantly increased between wave 2 and wave 3 from 3.1 to 3.4.

Table 2: Shocks across waves

Type of shock ^a	Wave 1	Wave 2	Wave 3
Disease of crop or livestock	69%	71%	89%***
Bad weather	79%	79%	89%***
Fire in house	13%	12%	13%
Sudden health problem or accident	28%**	33%	26%***
Long term health problem	25%	26%	25%
Death of a family member	20%***	13%	12%
Inflation and price hikes	60%**	54%	65%***
Loss of job or a household member	3%	3%	3%
Land disputes	23%	23%	25%**
Total number of shocks	3.2*	3.1	3.4***

^a Significance is in relation to Wave 2

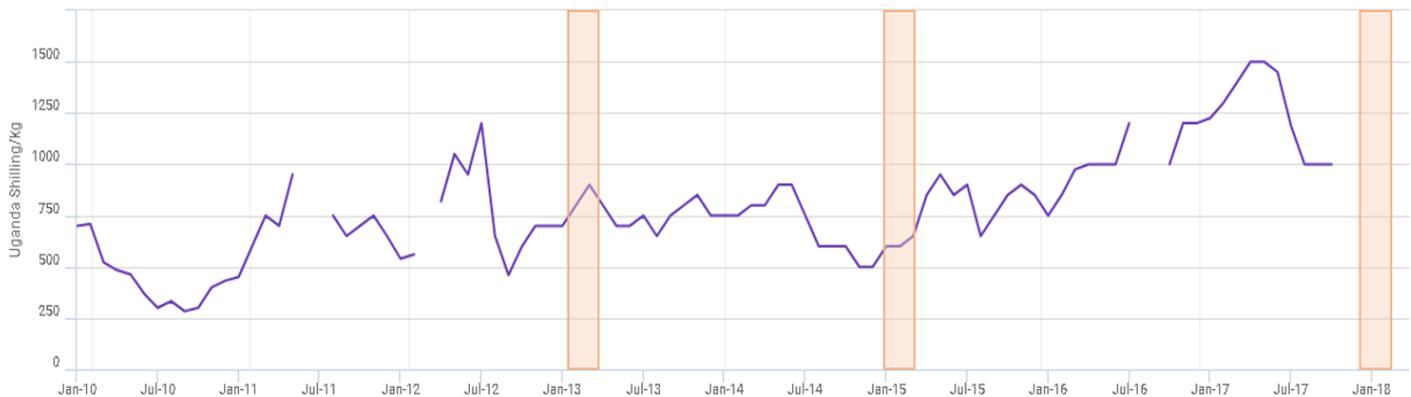
To get a better sense of the population level shocks, we looked at whether Acholi and Lango sub-regions were classified as food insecure using the Integrated Phase Classification (IPC) over the duration of the study periods (2013-2018). The only time the IPC identified the area as under any kind of stress was in 2017 (between waves 2 and 3) at IPC level 2, indicating “that households in the region have, on average, minimally adequate food consumption but are unable to afford some essential non-food expenditure without engaging in stress-coping strategies”³ (Figure 9 in Annex A). More specifically, the IPC analysis identifies that in Acholi, 16% of the population is in IPC level 2 (stressed) and 8% is in IPC level 3 (crisis); in Lango, 13% of the population is in IPC level 2 and 0% is in IPC level 3.⁴ Thus, the average distinction observed between the three years when data was

³ <http://fews.net/IPC>

⁴ https://reliefweb.int/sites/reliefweb.int/files/resources/1_IPC_Uganda_AcuteFI_2017Nov.pdf

collected reflects changes in food insecurity around the average (according to the IPC data), rather than extremely poor or good years. We also looked at market level data from Lira (the biggest town in Lango) as a secondary indicator of population level shocks and as a proxy for harvest conditions. We found that the greatest increase (across our study period) in maize retail prices in Lira occurred in 2017, immediately prior to our wave 3 data collection (Figure 2). This price increase for a staple food corresponds to the significant increase of households reporting price shocks or inflation.

Figure 2: Maize retail price in Lira



Source: FAO Price Tool; orange rectangles indicate periods of SLRC data collection.

Demographics and sample characteristics

It is not surprising that the sample significantly aged over the five years of the study considering we were following the same households over time. Specifically, we see a significant reduction in household members age five or younger from 17.4% (CI: 16.7 to 18.1%) to 12.6% (CI: 11.9-13.3%). The result is that while we find a small, yet still significant ($p < 0.01$) decrease in household size, the effect is a significant ($p < 0.01$) and large reduction in the household dependency ratio (Table 3). The aging of the sample is an important distinction from non-panel data (where population averages are slower to move) and thus might be one of the drivers of changes in our outcomes (i.e. perhaps older households have greater food insecurity). Thus, we control for age of the household head, gender of the household head, and the dependency ratio across all of our regressions.

About 15% of the study population is from an urban area⁵. This proportion did not significantly change over time. A little over a quarter of our households are female headed. An extremely large proportion of households said they had experienced a household crime⁶ in the past three years or between the data collection time periods and that proportion significantly increased across the three waves. It is also important to note that the sampled population was heavily affected by the civil war, resulting in almost half of all households reporting that a household member experienced a war crime or crime against humanity⁷. Of those households that did

⁵ While the proportion of households from urban areas did not significantly change, we do see a steady decline. This is likely due to the greater difficulty in tracking the same households when residing in urban areas.

⁶ Household crimes captured in the survey include: verbal threats, theft, house breaking (burglary), abduction or disappearance of household members, murder, theft of livestock, serious harm to a child, land grabbing/dispossession, sexual assault or rape, physical attack/assault, witchcraft, or poisoning of a family member.

⁷ The following were categorized as experiences of war crimes when they were perpetrated by parties of the conflict: destruction and/or looting of property; abduction; forced recruitment; forced disappearance; severe beating or torture;

experience a war crime or crime against humanity, on average four household members per household had experienced such a crime. The war crime and crime against humanity data was only collected in wave 1 and thus is only reported for one time period in Table 3 above; however, in the regression analysis we extracted the war crime and crime against humanity data across time periods so we can better understand how it affects household outcomes across waves 1, 2, and 3.

Table 3: Sample characteristics over time

Variable	Wave	Mean	95% CI	
Age of population*** n=29,615	wave 1	20.36	20.04	20.68
	wave 2	20.92	20.56	21.27
	wave 3	22.58	22.2	22.96
Age of household head*** n=4691	wave 1	43.13	42.22	44.04
	wave 2	45.32	44.36	46.28
	wave 3	48.94	47.92	49.97
Female headed household	wave 1	28.3%	25.6%	31.0%
	wave 2	25.9%	23.0%	28.7%
	wave 3	28.8%	25.8%	31.8%
Household size*** n=4721	wave 1	6.07	5.93	6.22
	wave 2	6.02	5.85	6.2
	wave 3	6	5.82	6.17
Dependency ratio*** n=4721	wave 1	51%	50%	53%
	wave 2	53%	51%	55%
	wave 3	47%	46%	49%
Urban	wave 1	15.6%	6.9%	24.3%
	wave 2	14.9%	6.3%	23.5%
	wave 3	13.4%	5.4%	21.3%
Experienced a crime in the past year***	wave 1	57.4%	54.6%	60.2%
	wave 2	58.4%	55.0%	61.7%
	wave 3	65.9%	62.5%	69.3%
Someone in household experienced a serious crime		42.0%	36.6	47.5%
Average # of serious crimes/households if experienced a serious crime		4.5	4.1	4.9
Fixed effects model on wave: *** significant at p-value<0.01; ** significant at p-value<0.05; * significant at p-value<0.01				

being deliberately set on fire or put in a building on fire; being a victim of and surviving a massacre; being attacked with a hoe, panga or axe; sexual abuse; returning with a child born due to rape; being forced to kill or seriously injure another person; being seriously wounded by a deliberate or indiscriminate attack; and suffering emotional distress that inhibits functionality due to experiencing or witnessing the above. These crimes were recorded if they were perpetrated by parties to armed conflict, which included government forces, militias, LRA rebels, and Karamojong raiders.

Livelihoods

Over the five years of the study, households experienced significant changes in their livelihoods. Looking at individual reported livelihoods for household members (over the age of five), we find that for all activities except participation in the private sector, public sector, or paid domestic work (which were all below 3% of all reported individual activities) there was a significant ($p < 0.01$) increase in household members participating in these activities from 2013 through 2018 (Table 8 in Annex A). The largest increases were a 17-percentage point increase in a household member reporting livestock activity from 57% (CI: 54-60%) in 2013 to 74% (CI: 71-77%) in 2018. However, these additional activities did not replace previous activities, but rather were added on. For example, the proportion of household members who reported own cultivation, while taking a small dip in 2015, increased from 74% (CI: 72-76%) in 2012 to 79% (CI: 77-82%) in 2015.

The increase in livelihood activities is apparent when we look at individual livelihood diversity (using the household roster). In 2012, the average household member (over the age of five) reported doing 1.74 activities (CI: 1.66-1.82). But by 2018, that significantly ($p < 0.01$) increased to 2.30 (CI: 2.20-2.40). The entire increase came between 2015 and 2018, as previously 2015 levels of household activities were comparable to 2013. While the increase in individual livelihood activities is partially a product of the aging sample (significant increase in the age of the population and respondent) and hence significant decline in the dependency ratio, the change over time in individual livelihood activities remained significant even when controlling for age and household dependency ratio (Table 9 in Annex A).

We also looked at livelihood diversity within the household. We found that the number of different livelihoods practiced by different household members significantly increased ($p < .01$) by one whole livelihood activity from 3.50 (CI: 3.39 to 3.61) in 2013 to 4.17 (CI: 4.06 to 4.28) in 2015 and 4.51 (CI: 4.33 to 4.67) in 2018. The survey also asked respondents to list their *most important* livelihood activity. At the household level, own cultivation remains the most important source of food or income for food across the three years, hovering at around 80%. However, the prominence of livestock as the *second* main livelihood has significantly ($p = 0.02$) increased from 43.22% (CI: 39.9 to 46.5) in 2013 to 46.99% (CI: 43.78 to 50.19). Migration also significantly increased ($p < 0.01$) across the three time periods from 3.6% (CI: 2.5 to 4.7%) in 2013 to 6.3% (CI: 4.7 to 7.8%) in 2018.⁸

Thus, while households are reporting a far more diverse profile of livelihood activities, the importance of ‘own cultivation’ as a main livelihood activity, with respect to other ‘main’ rather than individual livelihoods has remained constant despite the rising importance of livestock rearing as a secondary main livelihood.

3.2 Changes in household wellbeing and what drives it

This section examines the changes in two wellbeing indicators, food security and wealth, over time and the factors that appear to be driving these changes.

⁸ In 2018, we conducted qualitative fieldwork in Gulu, Pabbo, and Kampala to investigate rural to urban migration of youth from rural areas in the Acholi sub-region. See Stites et al. 2019.

Food insecurity

To capture food insecurity, we use the reduced Coping Strategies Index (rCSI). The rCSI is a tool for measuring current access to food and food quantity: the higher the score on the index, the more food insecure (or worse off) the household, while the lower the score the more food secure (or better off) the household (Maxwell and Caldwell, 2008). Five coping strategies and their relative severity have been identified to be generally internationally applicable and are proxies for food insecurity (Maxwell and Caldwell, 2008). We calculated the overall rCSI for each household by multiplying the number of times in the previous week that each coping strategy had been used by the pre-assigned weight of that strategy and summing the products.

Food insecurity significantly declined from 2013 to 2015 ($p < 0.01$), and then significantly increased from 2015 through 2018 ($p < 0.01$). However, food insecurity in 2018 was still significantly lower ($p < 0.01$) than in 2013 (Figure 3). Specifically, with respect to 2013, food insecurity fell by 30% in 2015 and then increased again by almost 30% from 2015 to 2018. The observed shift at each point in time was for the population, rather than just for specific individuals.

However, there was a high level of churning (meaning changes within the household over time, as well as a change in position between which households are doing poorly and which

households are doing well) of households across different quantiles of food insecurity (worst, second worst, second best, best) with only 26.8% of households (for whom we had observations every year) reporting being in the same category of food insecurity in each wave. For example, a little over one-third of households that had the best food security in 2013 still had the best food security in 2018, while 16.97% fell to having the worst-food security (Figure 4: left). While a quarter of households that had the worst food security in 2013 still had the worst food security in 2018 and only 19.67% moved up to having the best food security in 2018. Furthermore, the variability in food-insecure households experience across years (within-household standard deviation is 4.15) is comparable to the variability in any given year between households (between-household standard deviation is 4.21). While the movement across categories implies a high level of volatility in household food security, there also appears to be the most 'stickiness' for households that started out in the best category compared to any other category.

Figure 3: Food-insecurity over time (distribution with means)

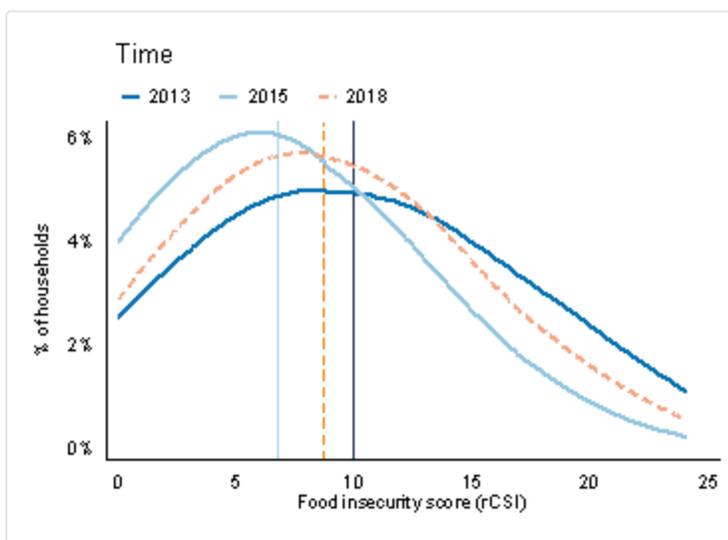
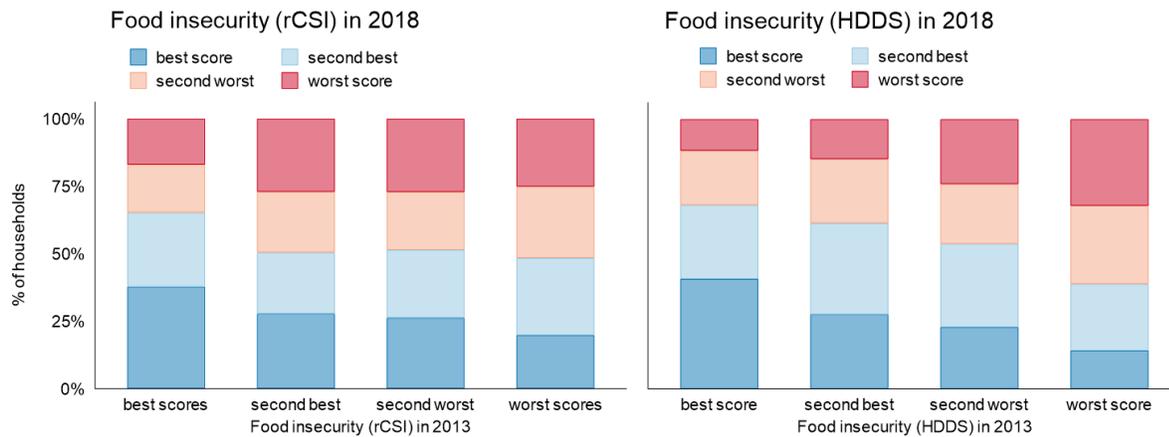


Figure 4: Food-insecurity quartile in 2018 by food-insecurity quartile in 2013: rCSI left and HDDS right



We further wanted to confirm that the churning we are seeing in the rCSI proxy for food insecurity is replicated with other food insecurity proxies. The SLRC survey also collected information on household dietary intake using the Household Dietary Diversity Score (HDDS). The HDDS collects information on the frequency with which households consumed certain food groups in the past seven days. We find that the within-household temporal variability in HDDS mimics what we see with the rCSI, strengthening our overall conclusion of churning in food insecurity (Figure 4: right). Only 26.6% of households were in the same quartile category of HHDS across wave 1 and wave 3, with approximately one-third (31.9%) of households of households in the best food security category in 2013 remaining in that category in 2018.

Next, we look at what is correlated to food security and changes in household food security across the three time periods (Table 10 in Annex A). Several household level characteristics were correlated with changes in food security. Households that went from not receiving to receiving livelihood assistance⁹ significantly decreased their food insecurity. Specifically, receiving support in the form of extension services or seed money for a revolving fund had the greatest impact on improving food security (13% and 10% higher food security respectively). More so, if a household went from not receiving to receiving these services, their food security rose (15% and 8% improvement in food insecurity respectively for the two types of services). However, we wanted to take a deeper dive into the role of livelihood assistance. Our exploration of the topic in the wave 2 analysis identified that the increased use of rotating savings groups in wave 2 was driven more by increased resources from a good harvest that allowed households to participate, rather than the intervention having been targeted at households in need.¹⁰ Thus, we replicated our food security regression where we exclude

⁹ The livelihood assistance variable included the reported provision of seeds, fertilizer, pesticides, and tools; agricultural extension services, including training and marketing; seed money for revolving funds (savings and credit); non-agricultural services, including training and marketing; and, other projects intended to help with livelihoods such as mosquito nets, borehole support, secondary education support, tree planting, and provision of livestock.

¹⁰ For more detail see: Marshak, Anastasia, Dyan Mazurana, Jimmy Hilton Opio, Rachel Gordon* and Teddy Atim, 2017, *Tracking change in livelihoods, service delivery and governance: Evidence from a 2013-2015 panel survey in Uganda*, Working paper 59, Overseas Development Institute, London, available at <https://securelivelihoods.org/wp-content/uploads/2.-Tracking-change-in-livelihoods-service-delivery-and-governance-panel-survey-in-Uganda-2.pdf>

participation in rotating savings groups from our livelihood assistance variable to see if that changes the result, thus only capturing true external assistance (Table 12 in Annex A). The proportion of households receiving any livelihood assistance using this new definition drops from 18.3% of households (across all three waves) to 12.2% of households. We find that while the impact of livelihood assistance drops somewhat when excluding households participating in saving groups (from 16% to 12% improvement using the random effects model and from 12% to 9% using the fixed effects model) it remains significant and one of the largest contributors to an improvement in household food security. Thus, even when excluding participation in savings groups, households who received any type of livelihood assistance, on average, had an rCSI score 12% higher than those who did not receive livelihood assistance, and households who went from not reporting receiving livelihood assistance to receiving it improved their rCSI by 9%.

Changes in the household's main livelihood were also strongly associated with changes in food security. Households that switched into casual (non-agricultural) labor decreased their food security by 22%, while households that switched to business (home or shop) significantly improved their food security by 16% and 23% respectively. Experience of livelihood-related shocks also affected changes in food security. Households that reported experiencing crop or livestock disease reduced their food security by 11%. Inflation and price hikes were also associated with a significant decrease in food security by approximately 5%.

Some household level characteristics were also associated with worse food security (though not with household level changes in food security). Households with a higher dependency ratio all had higher levels of food insecurity. Not surprisingly, household wealth was associated with better food security. The random effects model also found that households that practiced a greater number of livelihood activities tended to have better food security, but the fixed effects model showed that if a household *changed* the number of livelihood activities practiced, they did not improve their food security. Thus, it appears that households increase their livelihood activities as a coping strategy and not necessarily as a means of improving long-term food insecurity.

Finally, the random effects model also highlighted that households who experienced even one war crime or crime against humanity during the conflict in Uganda (despite the cessation of fighting in 2007) had significantly lower food security. If at least one member of the household experienced a war crime or crime against humanity, their food insecurity increased by 5% (CI: 0.18% to 9.90%) (Table 11 in Annex A). Experience of each additional war crime or crime against humanity in the household worsened food security by 1% (CI: 0.35% to 1.52%). The role of war crimes likely relates to the physical and mental consequences that impact a household member's ability to carry out livelihood activities and their increased health care needs. Both can add an undue burden on the household as a whole even for members who did not themselves report experiencing war crimes.¹¹

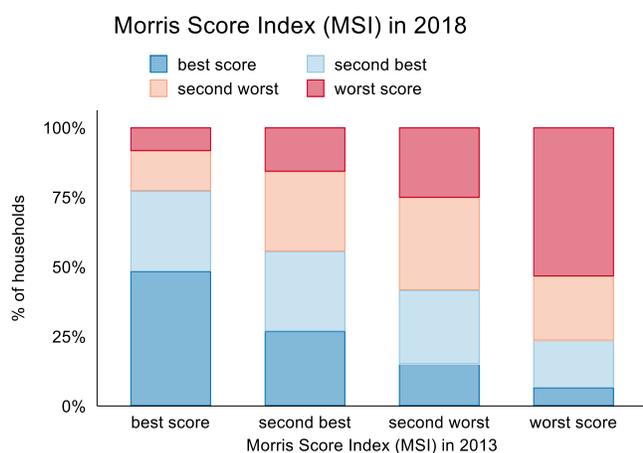
¹¹ For more detail see: Dyan Mazurana, Anastasia Marshak, and Teddy Atim. 2019. "The state of the war-wounded in northern Uganda". Feinstein International Center, March 2019; Teddy Atim, Anastasia Marshak, Dyan Mazurana, and Jordan Farrar. 2018. "The Effects of the Lord's Resistance Army's Violence on Victims from Northern Uganda in Prosecutor vs Dominic Ongwan. Feinstein International Center, October 2018; Teddy Atim, Dyan Mazurana, and Anastasia Marshak. 2018. "Women survivors and their children born of wartime sexual violence in northern Uganda." *Disasters* 42(S1): S61-78; and Dyan Mazurana, Anastasia Marshak, Rachel Gordon, Jimmy Hilton Opio, Teddy Atim, and Bret McEvoy. 2016. "Disability and recovery from war in Northern Uganda." *Third World Thematics: A TWQ Journal*: 1-17.

Wealth

To measure household wealth, we used the Morris Score Index (MSI), which examines household assets and has been shown to be a good proxy of household wealth in rural Africa (Morris *et al.*, 2000), and countries in transition like Albania (Hagen-Zanker and Azzarri, 2010). The MSI weights each durable asset owned by a household by the share of households within a sample that own that asset. Thus, households are considered better off if they own assets not owned by most of the households in the sample. The MSI includes all productive household and livestock assets within the survey (Table 13 in Annex A).

Unlike the fluctuations in food security, wealth has continued to steadily but significantly ($p < 0.01$) increase on average every year. This is even more apparent when looking at the individual assets that make up the Morris Index (Table 1 in Annex A). A significant increase is observed in almost all assets except tools for digging (but almost all households already own those), bicycles or wheelbarrows, carts for donkey or oxen (less than one percent of households ever reported owning these carts), and generators. The most surprising and largest increase was in the reported ownership of solar panels from 5.3% of households in 2013 to one-third of households in 2018.

Figure 5: Wealth quartile in 2018 by wealth quartile in 2013



In addition to the general and consistent improvement in wealth, we also see less churning when it comes to household wealth (Figure 5). For example, almost half of all households that had the highest wealth in 2013 still had the highest wealth in 2018. Similarly, a little over half of those that had the worst score in 2013, remained in that category in 2018. Thus, we can conclude that wealth is far more stable over the waves of the study when compared to food security.

Next, we looked at what was correlated with wealth and what was correlated with changes in wealth (Table 14 in Annex A). When it came to wealth, the fixed

effects model identified (just as with food security) that households that started receiving livelihood assistance or diversified their livelihoods also increased their asset wealth. An increase in the dependency ratio correlated with a reduction in wealth. Some correlation with changes in livelihoods was also observed. Households that switched into livestock as their main source of income increased their wealth. The experience of a regular crime was correlated with a fall in wealth, which likely is capturing the reduction in assets due to the loss of those assets in the crime.

In addition, some variables were associated with differences in wealth across the population, but not changes in wealth. Households that reported casual labor (both agriculture and non-agriculture) as their main source of income had significantly lower wealth than those in own cultivation. Those who owned their own shop or worked for the government tended to be wealthier. In addition, having someone in the household migrate was associated with greater wealth, but households who went from not having a family member migrate to having one migrate, did *not* improve their wealth.

3.3 Changes in services: health and education

Health services: quality and access

To better understand household access to and quality of health services, we look at several measures, including distance (in minutes) to facilities, access for routine problems, access for serious problems, whether the health center has the medications and services the respondent needed, and a binary variable that captures whether the health center meets all three latter criteria (we exclude distance).

Each of the health variables oscillates across the three time periods, with the best performance in 2015 (Table 4), this corresponds to the year with also the best food security. When it comes to access for routine health services, using a fixed effects model we find a significant improvement ($p=0.01$) in access between 2013 and 2015, but comparable values for 2013 and 2018. The changes in access to health services for serious health problems, while oscillating across the three time periods, do not change with significance across the waves. Where we do see stability in improvement is a) when it comes to distance traveled (in minutes) and b) whether the health center always has needed medications and services. For these variables, 2015 and 2018 are both significantly higher than 2013 ($p=0.01$), although there is no change between these two latter years.

Table 4: Health quality and access by wave

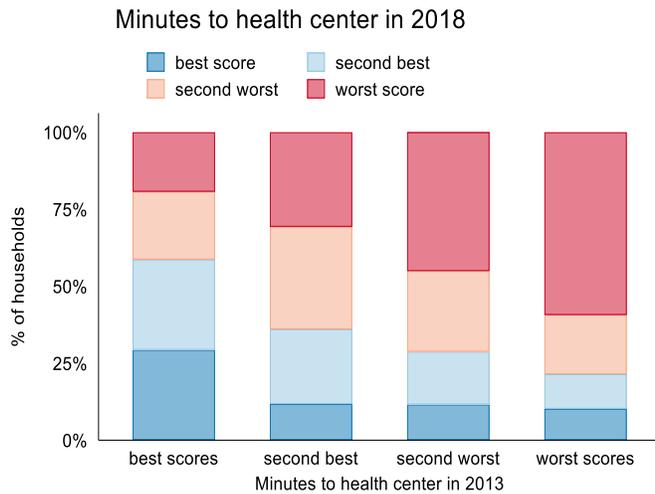
Health quality and access	Wave	%	95% CI	
Can access health services for routine problems	wave 1	12.6%	10.0%	15.2%
	wave 2	15.1%	11.8%	18.4%
	wave 3	12.2%	10.1%	14.3%
Can access health services for serious health problems	wave 1	11.2%	8.6%	13.8%
	wave 2	9.8%	7.4%	12.1%
	wave 3	10.0%	8.1%	12.0%
Health center always has the medications and services you need***	wave 1	14.5%	12.0%	17.0%
	wave 2	21.3%	18.3%	24.4%
	wave 3	20.1%	17.2%	23.1%
Minutes to health center***	wave 1	126.2	113.3	139.0
	wave 2	94.5	83.6	105.4
	wave 3	100.3	88.7	111.9
Can access health services for routine and serious health problems AND the services and medications the households needs are available	wave 1	7.6%	5.5%	9.8%
	wave 2	8.6%	6.4%	10.9%
	wave 3	7.1%	5.5%	8.7%

Fixed effects model on wave: *** significant at $p\text{-value}<0.01$; ** significant at $p\text{-value}<0.05$; * significant at $p\text{-value}<0.01$

When we combine the three variables on quality of health care, we find that only about 8% of the population reported access for both routine and serious health problems and available medications and services. Notably, this proportion did not significantly change from 2013 to 2018.

We also wanted to understand change in reported distance to health centers over time (Figure 6). Being in the ‘worst score’ category, or bottom quartile (i.e. bottom 25% of the sample), shows the most amount of ‘stickiness’ compared to any other outcome indicator in this study. To illustrate, 59% of households who had to travel the farthest distance in 2013 still have to travel the farthest distance to a health center in 2018. The same cannot be said for the ‘best score’ category, or top quintile, which shows a lot more downward mobility, with only 30% of households who were in the top in 2013 remaining there in 2018. This finding implies that few new health centers were established in the vicinity of the study locations, and that some of the existing centers ceased operation or is a reflection of access to transportation or cash to cover the cost of transportation.

Figure 6: Minutes to health center in 2018 by 2013 breakdown



We looked at what correlates to distance to a health center¹², access for routine services, and our combined variable on health quality (Table 15, 16, and 17 in Annex A). The fixed and random effects models show that household food security changes in the same way as reported distance to a health center. Households with poorer food security tended to be farther from a health center. The model also shows that households that reported a long-term health problem tended to live farther from a health center. Households that went from not reporting a long-term health problem to reporting one also reported increased distance to the health facility over the same time period. This result could be a function of perception, slower walking pace due to the health issue, and/or problems in accessing cash for transportation. Interestingly, changes in remittances and having a household member migrate (which could increase the probability of receiving remittances) are correlated with decreased reported distance to a center, which could also be an indicator of access to cash for transportation. We also find that the more war crimes and crimes against humanity a household experienced, the farther they reported living from a health center. We believe this is due to the fact that the more war crimes a household experiences the more vulnerable it is (in particular it has a greater level of household member disability) and so might live farther away or take longer to reach it due to the health issue itself.

When it comes to access to a health center for routine health problems, type of livelihood and changes in livelihoods were associated with changes in access (Table 16 in Annex A). Households that switched into casual agricultural labor, started their own business (home or shop), or began working for the government (as

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¹² Given that distance to a health center was highly skewed to the right (meaning only a couple of observations of extremely long travel times, while most observations clustered around one to one and a half hours), first we did a log transformation so that the variable has a normal distribution and then ran a random and fixed effects model using the log transformed variable.

compared to own cultivation) all reported improving their access to health services for routine problems. Not surprisingly, if a household reported having to increase the distance travelled to a health center, they also reported worsening access. Experience of inflation or an increase in prices was also correlated with households changing their response from having access to not having access to care for routine problems. Given the type of livelihoods and shocks associated with changes in this outcome variable, we hypothesize that access to cash or a cash income plays an important role in whether a household can access health services for regular health problems. Similar relationships were observed when running the regression on the combined ‘health quality’ variable. Specifically, households that reported switching into business (shop or home) or working for government reported an improvement in the overall quality of health care. Importantly, households that had at least one household member experience a war crime or crime against humanity had an 18% smaller probability of saying that they can access services for routine and serious health problems and the services they need are there.

Education services: access and utilization

As with health services, we use multiple variables to try to understand changes in school services and their utilization; specifically, we look at whether households that had school aged children reported that their girls attend school every day, whether their boys attend school every day, and minutes to reach the school (Table 5). Unlike all of the other outcome variables, which fluctuated or stay relatively stable, the education variables show a clear negative trend over time. Across the three waves, households were significantly less likely to report that girls attend school every day, significantly less likely to report that boys go to school every day, and report a small but significant increase in travel time. The fall in attendance is quite striking: 16 percentage points for girls and 18 percentage points for boys. Enrollment and attendance decreased for girls after age eight and for boys after age 13.¹³ While we know that our cohort has aged five years during the duration of the research, including the average age of children in the 7-18 (inclusive) age category (the mean age is 11.7, 11.8, and 12.0 in the three waves respectively, showing a significant increase over time) the change is not large enough to explain an almost 20 percentage point decline in attendance. It is worth noting that using a paired t-test, we find that households are significantly more likely to report that girls attend school every day compared to boys within the same households (2013: no difference; 2015: p-value=0.02; 2018: p-value<0.01) and that the difference between their attendance increases over time.

To understand how much individual households improve over time relative to each other we compared the quartiles in minutes to school in 2013 against the quartiles of minutes to school in 2018 and found a similar relationship to what we see with minutes to a health center – extreme stickiness for the bottom quartile (Figure 7). In other words, if you had the greatest distance (or bottom 25%) to travel to a school in 2013 you were extremely likely to remain in the bottom quartile in 2018. We find that 62.2% of households remained in the bottom quartile across 2013 and 2018 and 36.7% remained in the top quartile across the two years. This implies that relatively few new schools are being established or existing schools are being closed down.

¹³ Atim, Teddy, Dyan Mazurana, and Anastasia Marshak 2019. Why northern Uganda’s girls and boys are not getting an education and what to do about it, Secure Livelihoods Research Consortium, London, available at: https://securelivelihoods.org/wp-content/uploads/201908_SLRC-Uganda-education-working-paper_web.pdf

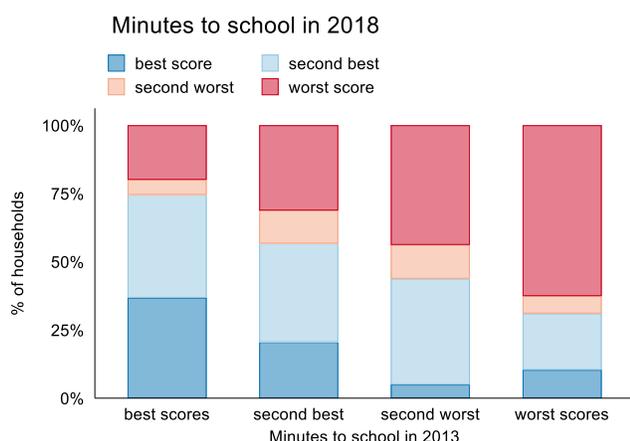
Table 5: School utilization and access by wave

School utilization and access	Wave	%	95% CI	
Girls attend school every day***	wave 1	79.6%	76.2%	82.9%
	wave 2	74.2%	69.9%	78.6%
	wave 3	63.7%	59.6%	67.7%
Boys attend school every day***	wave 1	79.0%	75.8%	82.3%
	wave 2	72.6%	68.1%	77.1%
	wave 3	60.9%	56.8%	65.0%
Minutes to school**	wave 1	51.7	44.9	58.6
	wave 2	51.9	44.9	59.0
	wave 3	53.9	47.6	60.1

Fixed effects model on wave: *** significant at p-value<0.01; ** significant at p-value<0.05; * significant at p-value<0.01

Considering the dramatic drop in attendance, we wanted to look at what variables were associated with this drop and whether they were different for boys versus girls (Table 18 and 19 respectively in Annex A). For girls, a fall in attendance was correlated with their household becoming headed by a female, the increasing age of the

Figure 7: Minutes to school quartiles in 2018 by quartiles in 2013



household head, the loss of a job in the past year by a member of a household, increasing livelihood diversity, and the experience of a crime by the household. For boys, the associations were quite similar, particularly the role of increased livelihood diversity or experience of a crime associated with declining attendance.

We conclude that northern Uganda is seeing a dramatic and worrying drop in attendance of school for its boys and girls. Most notably, a shock that affects household income, as well as increasing the diversity of household income sources, were primarily associated with pulling girls and boys out of school.

3.4 Changes in access to external support: livelihood assistance and social protection services

This section examines the type of livelihood assistance and social protection services households reported receiving and correlations to the receipt of these services.

The receipt of some livelihood support services (including the distribution of seeds, fertilizers, and other agricultural inputs and agricultural extension services) follows the expected inverse pattern of food security. In other words, the fewest respondents reported receiving these services in 2015 (the least food insecure year of the three waves) and the most received in 2013 (the most food insecure year) or 2018 (about average food insecurity) (Table 6). Seed money for revolving funds, on the other hand, follows the opposite pattern: more households reported having access to it in 2015 (the least food secure year), followed by 2018, and the lowest

proportion in 2013. It is worth noting that while NGOs helped set up the revolving savings groups, they are self-funded and individual communities were responsible for keeping them going.¹⁴ When we delved into this livelihood support a bit more following the 2015 analysis, we found that it was not about external support, but household ability to take part in the revolving funds (Marshak et al. 2015). In better years (at least from a harvest and food security perspective) households had greater access to cash and hence increased their participation and reporting of this activity.

The proportion of households that reported receiving any individual type of assistance is extremely low (between three and seven percent) even in the year of highest food insecurity. However, on the whole, we do see a significant increase in the proportion of households that received at least some type of livelihood support from 15% in 2013 to almost 20% in 2018; this increase was mainly driven by an increase in non-agricultural services and household participation in revolving funds. There is no change in the number of different type of support across the three waves, with the majority of households only reporting one of the mentioned types of livelihood support.

Table 6: Type of livelihood support by wave

Livelihood	Wave	%	95% CI	
Seeds, fertilizer, pesticides, and tool distribution	wave 1	6.7%	5.4%	8.0%
	wave 2	3.1%	2.2%	4.0%
	wave 3	5.9%	4.4%	7.4%
Agricultural extension, including training and marketing	wave 1	6.5%	5.1%	8.0%
	wave 2	5.2%	3.8%	6.7%
	wave 3	6.5%	5.0%	8.1%
Seed money for revolving fund (saving and credit)**	wave 1	6.0%	4.1%	7.8%
	wave 2	11.1%	8.4%	13.9%
	wave 3	8.2%	6.4%	9.9%
Non-agricultural services, including training and marketing**	wave 1	1.1%	0.6%	1.6%
	wave 2	2.8%	2.0%	3.6%
	wave 3	2.7%	1.7%	3.6%
Other projects to help with livelihoods**	wave 1	3.0%	2.2%	3.9%
	wave 2	2.8%	2.0%	3.6%
	wave 3	1.7%	1.0%	2.4%
Received any livelihood support***	wave 1	15.3%	12.9%	17.8%
	wave 2	19.7%	16.9%	22.4%
	wave 3	19.8%	17.4%	22.1%
Average number of difference types of support received if received support	wave 1	1.52	1.42	1.62
	wave 2	1.29	1.23	1.36
	wave 3	1.25	1.19	1.32

Fixed effects model on wave: *** significant at p-value<0.01; ** significant at p-value<0.05; * significant at p-value<0.01

While fewer households reported receiving social protection (between 3% and 11% depending on the year) in comparison to livelihood assistance (Table 7), the proportion of households receiving these services increased almost across the board, with the exception of school feeding (less than one percent of all households reported

¹⁴ Marshak et al. 2017. "Tracking change in livelihoods, service delivery and governance: Evidence from a 2013-2015 panel survey in Uganda, Working paper 59." Overseas Development Institute, London.

receiving it) and feeding patients in hospitals. Furthermore, unlike with livelihood assistance programming, we find that receipt of social protection is either stable (not changing from year to year) or improving, with little oscillation based on our ‘harvest quality’ designation for each wave (see shock section above).

Next, we look at the household characteristics associated with changes in whether someone receives any form of livelihood support or social protection assistance (Table 20 and 21 in Annex A respectively). Receipt of livelihood support correlates to increased wealth and lower food insecurity. Given that it is difficult to say whether households with increased wealth and lower food insecurity were more likely to receive the support in the first place with this regression, we ran a second regression (fixed effects only) on how wealth, food security, and receiving livelihood assistance in the previous year of data collection might be correlated to receiving livelihood support services (Table 22 in Annex A). We found no relationship with wealth or previous receipt of livelihood support and a negative relationship with food insecurity, meaning the more food secure a household was in the previous data collection the *more* likely they were to receive livelihood support in the following year of data collection, which corresponds to the 2015 findings that identified participation in revolving funds (a large component of our livelihood assistance variable) as driven by the respondents ability to save, rather than external support to the most vulnerable (Marshak et al. 2015).

Table 7: Social protection by wave

Social protection	Wave	%	95% CI	
Free food aid or free household items***	wave 1	1.4%	0.7%	2.0%
	wave 2	1.2%	0.6%	1.9%
	wave 3	4.7%	3.5%	5.8%
School feeding programme	wave 1	0.4%	0.1%	0.7%
	wave 2	0.2%	0.0%	0.5%
	wave 3	0.3%	0.0%	0.7%
Old age pension (e.g. Senior Citizen Grant)***	wave 1	0.7%	0.1%	1.2%
	wave 2	3.3%	1.6%	4.9%
	wave 3	4.5%	2.9%	6.1%
Feeding patients in hospitals	wave 1	0.5%	0.1%	0.8%
	wave 2	0.3%	0.0%	0.6%
	wave 3	0.0%	0.0%	0.2%
Retirement pension**	wave 1	0.3%	0.1%	0.6%
	wave 2	0.7%	0.2%	1.1%
	wave 3	1.1%	0.6%	1.7%
Any other money payment from the government or organizations***	wave 1	0.5%	0.1%	0.8%
	wave 2	2.1%	1.2%	3.0%
	wave 3	1.7%	0.8%	2.6%
Received any type of social protection***	wave 1	3.8%	2.8%	4.8%
	wave 2	7.4%	5.3%	9.4%
	wave 3	10.7%	8.4%	13.0%
Average number of different types of support received if received support***	wave 1	1.04	0.98	1.10
	wave 2	1.10	1.04	1.16
	wave 3	1.16	1.10	1.22

Fixed effects model on wave: *** significant at p-value<0.01; ** significant at p-value<0.05; * significant at p-value<0.01

Receipt of livelihood assistance was, not surprisingly, correlated with several livelihood related variables. On average, households that switched from own cultivation to casual agricultural labor lost their livelihood support. However, households that experienced crop or livestock disease or increased their household livelihood diversity were more likely to report receiving livelihood support if they had not received it before. Thus, while it does appear that livelihood support is targeted towards households that have experienced a livelihood related shock (crop or livestock disease, inflation/price hikes, or a crime), the households that receive this livelihood support appear to have been better off in the first place (at least in regard to food security in the previous data collection).

Social protection services seem to be more targeted (compared to livelihood assistance) to the most vulnerable households (Table 23 in Annex A). Households with older household heads and larger dependency ratios were more likely to receive social protection, as were households that reported a recent health problem, lost job, or experience of a crime. Households that received social protection were also significantly more likely to report receiving livelihood support.

4. Discussion of Program and Policy Implications

In this section we discuss some of the major thematic findings in more depth and the associated policy and programming implications.

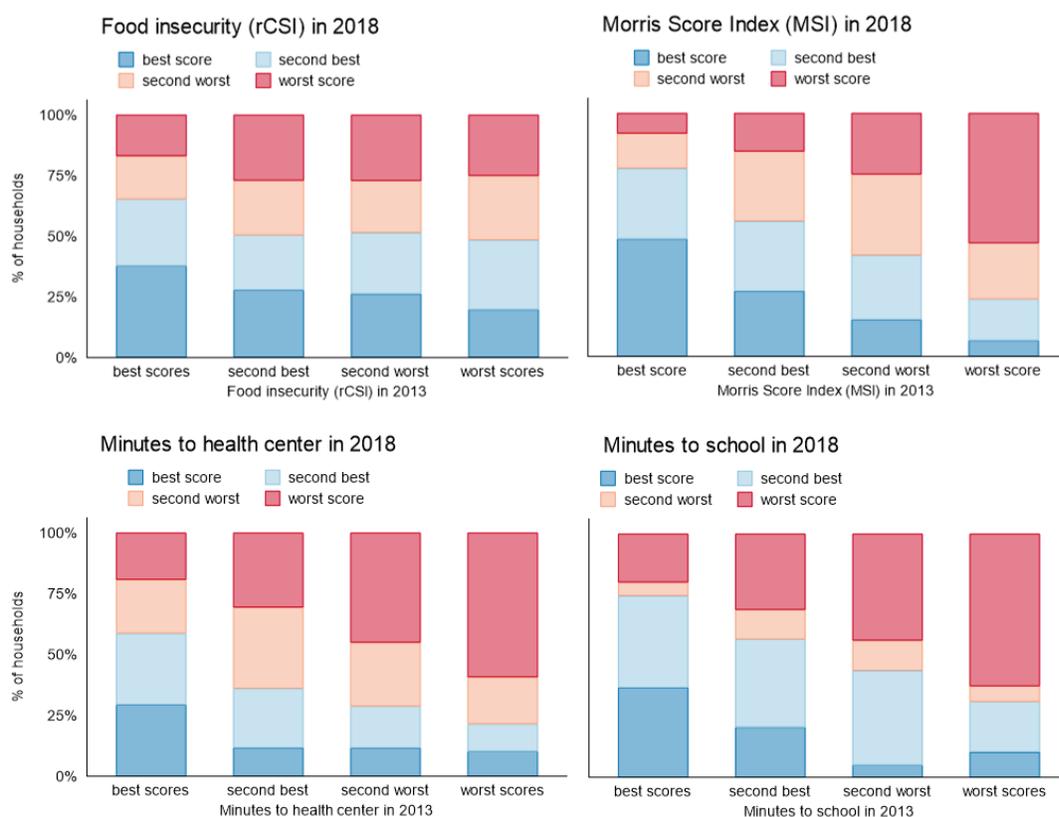
4.1 The volatile state of food security

Food security, as measured by the rCSI, in Acholi and Lango sub-regions is characterized by a high level of volatility beyond what is normally associated or attributed to large covariate shocks. Despite being in Integrated Phase Classification (IPC) level 1 (meaning no to minimal food insecurity) in 2013, 2015, and 2018, food security reported by the study population varied significantly across all three years (Figure 3) improving by 30% from the first to second wave and then deteriorating by 30% in the third wave. The difference in mean food security between the three years reflects movements around the average, rather than extremely poor or good years. The difference between years does partially correspond to variations in price data of staple crops (Figure 2) and is reflected in the self-reported shock data on inflation and price hikes. Our primary candidate to explain the across-year population-level variability in food security is the cost of staple crops, such as maize, as well as the possible cumulative effect of slightly worse harvests in the years preceding the 2013 and 2017 data collection (2015 significantly better than 2013 and 2018).

While we see within-household variability across all the outcome indicators, the level of churning observed with food security is far greater than that of wealth or the distance to services variables (Figure 8). As you can see in the graph on food insecurity in Figure 8, only about a quarter (26.8%) of households remained in the same category of food security across all four years, compared to over one-third (36.3%) that were in the same category for minutes to a health center, 40.7% that were in the same category for wealth, and 45.9% that were in the same category for minutes to a school. Another way to illustrate the extent of this churning is that, on average, a household had the same variability across years as we found between households within the same year (meaning the difference we observe between the least and most food-secure household in the population is the same difference we observe, on average, in any one household between 2013 and 2018).

Despite the absence of severe covariate shocks, the mobility and short-term rapid fluctuation observed in food security is obscured by cross sectional data or in single period estimates. In other words, only by following specific households over time is the extreme inconsistency in household food security apparent. These findings imply that food security is not a static indicator; treating it as such can obscure the experience of food security at the household level across time and space.

Figure 8: Churning of households across outcome indicators (food security, wealth, min. to health center, min. to school)



4.2 Livelihood assistance helps stabilize food insecurity

Food security outcomes (as measured by the rCSI) were also strongly related to household livelihoods. Households that switched into casual (non-agricultural) labor decreased their food security by 22%, while households that switched to business (home or shop) significantly improved their food security by 16% and 23% respectively. Households that reported experiencing crop or livestock disease decreased their food security by 11%. Wealth, on the other hand, while associated with higher food security (random effects model), was not associated with improvements in food security over time (fixed effects model). Wealthier households are more food secure, but increasing household wealth was not associated with changes in food security. Thus, while we found that wealth, on average, increased across the three time periods, this growth did not correspond with improving food security.

Thus, it is not surprising that livelihood assistance was a robust predictor of improved food security. A household that went from not receiving livelihood assistance in one year, but receiving it in another year, improved, on average, their food security by 15% (in other words, their rCSI declined by 15%). Of the individual livelihood assistance services, access to extension services or seed money for a revolving fund had the greatest impact on food security. More so, if a household went from not receiving to receiving extension services their food security rose by 15%; similarly, if a household went from not reporting to reporting having seed money for a revolving fund their food security rose by 8%.

Importantly, the qualitative research indicates that participation in a revolving fund occurred primarily through people's own joining of savings groups (Marshak et al 2017) and corresponds directly to the dip in food security – households were more likely to use this resource/participating in a savings group in worse food secure years and had less need for it in the more food secure years. Importantly, when comparing the within-household variability in food security (which we know is extremely high) for households who received livelihood assistance versus those that did not, we find that it is much smaller for households that had livelihood support (1.93 within-household standard deviation versus 3.98 in rCSI) meaning livelihood assistance might help stabilize household food security across time. However, it is important to note that livelihood assistance did not go to the most vulnerable: while households that experienced a livelihood-related shock were more likely to receive this assistance, they were also more likely to have better food security to start with in the previous round of data collection.

The proportion of households receiving any kind of livelihood support has significantly increased from 15.3% in 2013 to 19.8% in 2018, however given the consistent positive role it plays in supporting household food security, an increase in this percentage may lead to broader improvements in food security.

4.3 Rapid falling attendance for both boys and girls in northern Uganda

While all the outcome indicators showed high levels of variability across the three years of data collection, 2015 corresponded to an improvement in food security, wealth, and travel time to a health center. The only outcomes that this was not the case for were boys' and girls' regular attendance at school which showed a consistent decline across the five years, dropping almost 20 percentage points from 2013 to 2018, with no associated rebound in 2015 (as with the other outcome variables). While our respondents did significantly age (given that it is a panel dataset) over the five years of data collection, the average age of children in the household stayed relatively constant (from 11.7 mean age in 2013 to 12.0 mean age in 2018). Thus, while we expect some decline in school enrolment and attendance as children transfer from primary to secondary school over the course of five years, the paltry difference in mean age between 2013 and 2018 does not on its own explain the 20 percentage point drop in attendance.

For both boys and girls, the fall in attendance was strongly correlated to household livelihood diversification. By 2018, for every additional livelihood activity a household took on between the three points of data collection, the odds of a boy attending school regularly significantly dropped by 14% (CI: 4 to 22%) and the odds of a girls attending school regularly significantly dropped by 10% (CI: 1 to 20%). This is particularly worrying considering that every year there was a significant expansion in both household and individual livelihood diversity. And while livelihood diversity was correlated with both greater wealth and increased wealth, this did not translate into *changes* in food security, indicating that the strategy of increased livelihood diversification, partially through reliance on increased labor from children, might be more about coping rather than improving food security. Livelihood assistance, on the other hand, was actually correlated to household improvements in food security over time.

While boys and girls saw a similar drop in attendance, there is some evidence that girls' education might be more precarious than boys' education. For both boys and girls, the attendance-drop was correlated with increased livelihood diversification, increased age of the household head, and the experience of a crime. However, girls were also less likely to attend school every day if the household suddenly became female headed

or a household member lost their job. More so, in 2015, the relationship between livelihood diversity and attendance was only observed for girls (Marshak et al 2017). One hypothesis is that as adult members of the household move into additional labor opportunities, girls in particular are required to expand their responsibilities at home. This could translate into lower frequency of attendance by girls in school. A qualitative exploration into this phenomena revealed several potential drivers, including the high cost of education, the desire of households to utilize available child labor to meet short-term household needs (like acquiring more assets), changes in the social fabric, such as loss of communal values of parenting and guidance and peer pressure to acquire status through wealth (Atim et al 2019).

4.4 Long lasting impact of the experience of war crimes and crimes against humanity

Access to adequate health care and treatment is extremely poor throughout Acholi and Lango sub-regions, with at most 8% of the population reporting they can access health services for both routine and serious health issues and that the services and medications they need are available. Some improvements were seen in 2015, which corresponds (and is significantly correlated) with improved food security; indicating similar drivers, such as price shocks. However, this minor improvement was not sustained, except in the case of households reporting that the ‘health center has the medications and services you need.’ Despite some improvements, the proportion of households having access to quality health services for both routine and serious health problems with the medications they need remains extremely and worryingly low.

Households that had a member who experienced a war crime or crime against humanity during the conflict had the worst access to health services and were significantly less likely to report that they could ‘access health for both routine and serious health problems and that the services and medications they needed were there.’ These households made up almost half of our sample and had an 18% lower probability of being able to access quality health services. Considering that health services are already extremely low for the general population, the significantly worse access experienced by households that experienced war crimes and crimes against humanity is a matter of serious concern.

Experience of war crimes and crimes against humanity by parties to the LRA/GoU war also continues to negatively impact food security, despite more than a decade having passed since the conflict ended. If a household reported that at least one member experienced a war crime or crime against humanity, their food security was, on average, 5% lower. Each additional war crime or crime against humanity experienced worsened food security, on average, by 1%. The causal pathway might be due to the high level of disability associated with households that experienced these crimes and the likely impact of disabilities on livelihood activities (Mazurana et al 2014).

4.5 Programmatic and policy recommendations

The SLRC data provides a rare opportunity not offered by traditional cross-sectional surveys to better understand trajectories in household well-being. The rich data-set offers insight into the heterogeneity of the conflict-affected population in Acholi and Lango sub-regions and the complexity of what it means for households and a population to recover from conflict. Based on our findings, we offer the following programmatic and policy recommendations:

- More support needs to be available and accessible to households in years with both inadequate and adequate food security, given the high fluctuation or instability of food security, irrespective of the presence of large covariate shocks. Appropriate safety-nets need to be in place in order to allow households to stabilize and improve their food security over time in relation to smaller idiosyncratic shocks, such as a death in the family or price fluctuations.
- Seed funding for savings groups and agricultural extension services are specific livelihood assistance program that our data demonstrates are associated with better food security. Efforts should be made to expand these specific livelihood services, however more qualitative exploration is necessary.
- Targeting for livelihood services needs to reoccur every year considering the high intra-household variation in food security status from year to year. This targeting should aim to specifically identify households that have experienced idiosyncratic shocks such as crop or livestock disease.
- Households that had at least one person experience a war crime or crime against humanity are consistently worse off in terms of food security and need to be targeted for social protection, food aid, and livelihood services that correspond to the high level of disability and dependents in these households.
- Efforts need to be made to ensure that families continue to prioritize keeping both their girls and boys in school and attending school regularly. At present, the data show that households take children out of school to cope with shocks and/or to diversify livelihoods. Given the greater precariousness of girls' education, there should be extra efforts made to keep girls enrolled in and regularly attending school.
- More investment in reducing or supplementing school user fees and associated costs in primary and secondary is necessary, particularly to keep girls enrolled and attending school.
- Greater investment needs to be placed on improving the availability and quality of health services and treatments.
- Greater focus and investment is needed on providing the necessary support and services for physical and emotional disabilities related to the 20-year conflict. Support for accessing these services for disabled individuals is needed.
- Given that cross-sectional surveys, by definition, cannot pick up within-household volatility in key outcomes, more investment is needed in panel surveys, both across and within-years.

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Annex A: Additional Tables and Figures

Figure 9: IPC for Uganda February 2017

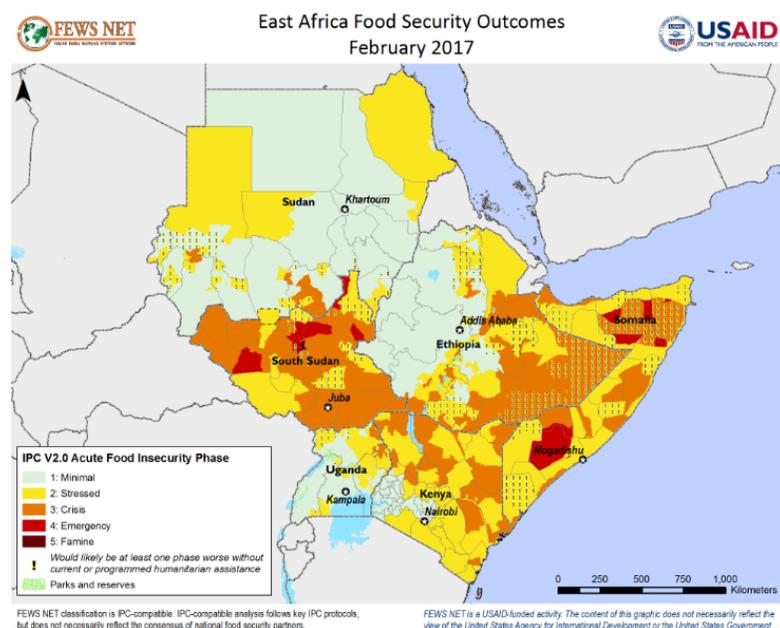


Table 8: Individual livelihood activities by wave (age>5 years)

Livelihood	Wave	%	95% CI	
own cultivation	wave 1	74%	72%	76%
	wave 2	70%	67%	72%
	wave 3	79%	77%	82%
own livestock	wave 1	57%	54%	60%
	wave 2	59%	55%	62%
	wave 3	74%	71%	77%
own fishing	wave 1	3%	2%	4%
	wave 2	3%	2%	4%
	wave 3	5%	3%	6%
casual labor (agr)	wave 1	32%	29%	36%
	wave 2	33%	30%	35%
	wave 3	38%	35%	41%
casual labor (non-agr)	wave 1	11%	9%	13%
	wave 2	13%	12%	15%
	wave 3	17%	14%	19%
sale of bush	wave 1	15%	12%	17%
	wave 2	20%	18%	22%

products	wave 3	29%	26%	32%
own	wave 1	10%	8%	12%
business	wave 2	11%	9%	12%
(home)	wave 3	14%	13%	16%
own	wave 1	2%	1%	3%
business	wave 2	2%	2%	3%
(shop)	wave 3	4%	3%	5%
public	wave 1	2%	2%	3%
sector	wave 2	2%	2%	3%
	wave 3	2%	2%	2%
private	wave 1	1%	1%	1%
sector	wave 2	1%	1%	2%
	wave 3	1%	1%	2%
paid	wave 1	2%	1%	3%
domestic	wave 2	2%	1%	2%
work	wave 3	2%	2%	2%
other	wave 1	8%	6%	9%
	wave 2	6%	5%	6%
	wave 3	8%	7%	10%
nothing	wave 1	20%	19%	22%
	wave 2	21%	20%	23%
	wave 3	13%	11%	15%
someone	wave 1	3.6%	2.5%	4.7%
in hh	wave 2	6.1%	4.8%	7.5%
migrated	wave 3	6.3%	4.7%	7.8%

Table 9: Mixed Effects Regression on Individual Livelihood Diversification Controlling for Household ID (n=29,615)

Variable	Coefficient	p-value	95% CI	
wave	0.19	0.00	0.17	0.21
age	0.05	0.00	0.05	0.05
dependency ratio	-1.14	0.00	-1.25	-1.04
constant	1.05	0.00	0.97	1.13

Table 10: Random and fixed effects model for food insecurity (n=4328)

Variable	Random effects				Fixed effects			
	coef	p-value	95% CI		coef	p-value	95% CI	
female household head	0.81	0.00	0.39	1.22	0.91	0.04	0.07	1.76
age of household head	0.02	0.00	0.01	0.03	-0.03	0.06	-0.06	0.00
dependency ratio	1.76	0.00	1.02	2.49	0.78	0.17	-0.33	1.89
Morris Score Index	-0.02	0.00	-0.03	-0.01	-0.01	0.33	-0.02	0.01
social protection	-0.35	0.30	-1.00	0.31	-0.32	0.46	-1.14	0.51
<i>Livelihood assistance (can report more than one)</i>								
seeds, fertilizer, tools	0.05	0.89	-0.72	0.83	0.00	1.00	-0.98	0.98
agricultural extension services	-1.06	0.01	-1.81	-0.31	-0.82	0.08	-1.73	0.09
seed money for revolving fund	-1.32	0.00	-1.94	-0.69	-1.53	0.00	-2.30	-0.76
non-agr. Services	0.65	0.31	-0.59	1.89	0.11	0.88	-1.36	1.58
Other	0.30	0.58	-0.76	1.36	0.03	0.96	-1.26	1.33
<i>Shocks (can report more than one)</i>								
crop or livestock disease	1.45	0.00	1.00	1.90	1.12	0.00	0.55	1.69
bad weather	-0.42	0.09	-0.91	0.07	-0.58	0.07	-1.19	0.04
house fire	0.65	0.01	0.15	1.16	0.17	0.62	-0.50	0.84
sudden health problem	0.05	0.78	-0.33	0.44	-0.01	0.97	-0.50	0.48
long-term health problem	0.20	0.33	-0.20	0.60	-0.13	0.63	-0.64	0.39
inflation/price hikes	0.12	0.53	-0.24	0.48	0.47	0.05	0.01	0.93
job loss	-0.26	0.63	-1.34	0.81	0.01	0.99	-1.36	1.38
land dispute	-0.16	0.46	-0.58	0.26	-0.03	0.92	-0.57	0.51
<i>Livelihood (reference: own cultivation)</i>								
Own livestock	-1.11	0.02	-2.00	-0.21	-1.03	0.07	-2.15	0.09
Own fishing	-3.04	0.18	-7.47	1.39	-2.87	0.35	-8.87	3.14
Casual labor (agr)	0.40	0.46	-0.66	1.45	-0.55	0.39	-1.82	0.72
Casual labor (non-agr)	1.98	0.02	0.37	3.58	2.20	0.04	0.13	4.26
bush products	2.01	0.03	0.17	3.85	1.63	0.17	-0.67	3.93
home business	-1.37	0.01	-2.33	-0.40	-1.62	0.01	-2.91	-0.33
shop business	-3.14	0.00	-4.68	-1.61	-2.38	0.03	-4.49	-0.27
Government	-2.05	0.00	-3.25	-0.84	-0.56	0.56	-2.47	1.34
private sector	-2.51	0.00	-4.05	-0.96	0.26	0.81	-1.90	2.42
paid housework	-0.50	0.81	-4.59	3.59	-0.67	0.78	-5.45	4.11
other economic activity	0.31	0.68	-1.15	1.76	0.43	0.65	-1.41	2.26
Remittances	0.36	0.86	-3.75	4.47	-4.18	0.11	-9.22	0.87
other assistance	0.88	0.52	-1.77	3.53	0.17	0.93	-3.48	3.82
hh livelihood diversity	-0.17	0.00	-0.28	-0.05	-0.11	0.14	-0.26	0.04
someone in hh migrated	-0.50	0.22	-1.30	0.29	0.34	0.52	-0.68	1.35
hh experienced crime	0.13	0.48	-0.23	0.50	0.00	0.98	-0.48	0.47
hh experienced a serious crime	0.08	0.00	0.03	0.13				
urban	1.08	0.37	-1.28	3.44	-0.54	0.77	-4.21	3.14
control for sub-county								
Constant	5.05	0.00	3.20	6.90	9.48	0.00	7.78	11.17

Table 11: Random effects model on food insecurity with binary war crimes variable (n=4,373)

	coef	p-value	95% CI	
female household head	0.83	0.00	0.41	1.24
age of household head	0.02	0.00	0.01	0.03
dependency ratio	1.72	0.00	0.99	2.45
Morris Score Index	-0.02	0.00	-0.03	-0.01
social protection	-0.34	0.31	-0.99	0.31
livelihood assistance	-1.09	0.00	-1.53	-0.65
<i>Shocks (can report more than one)</i>				
crop or livestock disease	1.42	0.00	0.98	1.87
bad weather	-0.39	0.12	-0.87	0.10
house fire	0.60	0.02	0.09	1.10
sudden health problem	0.04	0.85	-0.35	0.42
long-term health problem	0.20	0.34	-0.20	0.60
death in the family	0.62	0.01	0.15	1.08
inflation/price hikes	0.13	0.49	-0.23	0.49
job loss	-0.32	0.56	-1.39	0.76
land dispute	-0.21	0.33	-0.63	0.21
<i>Livelihood (reference: own cultivation)</i>				
Own livestock	-1.02	0.02	-1.91	-0.14
Own fishing	-2.88	0.20	-7.32	1.55
Casual labor (agr)	0.33	0.54	-0.71	1.38
Casual labor (non-agr)	2.28	0.01	0.69	3.87
bush products	2.42	0.01	0.60	4.23
home business	-1.39	0.00	-2.34	-0.43
shop business	-3.13	0.00	-4.67	-1.59
Government	-2.06	0.00	-3.27	-0.86
private sector	-2.34	0.00	-3.88	-0.81
paid housework	-0.50	0.81	-4.59	3.59
other economic activity	0.22	0.76	-1.23	1.68
Remittances	0.44	0.82	-3.42	4.29
other assistance	0.95	0.48	-1.71	3.60
hh livelihood diversity	-0.15	0.01	-0.26	-0.04
someone in hh migrated	-0.51	0.20	-1.31	0.28
hh experienced crime	0.13	0.48	-0.23	0.50
hh experienced a serious crime	0.43	0.04	0.02	0.85
urban	0.88	0.47	-1.49	3.25
control for sub-county				
Constant	4.94	0.00	3.08	6.80

Table 12: Random (n=4373) and fixed effects (n=4373) on rCSI with livelihood assistance excluding rotating savings groups

	Random effects				Fixed effects			
	ceof	p-value	95% CI		ceof	p-value	95% CI	
female household head	0.85	0.00	0.44	1.27	0.88	0.04	0.04	1.72
age of household head	0.02	0.00	0.01	0.03	-0.03	0.09	-0.06	0.00
dependency ratio	1.74	0.00	1.01	2.47	0.77	0.17	-0.34	1.87
Morris Score Index	-0.02	0.00	-0.03	-0.01	-0.01	0.35	-0.02	0.01
social protection	-0.37	0.27	-1.02	0.28	-0.27	0.52	-1.09	0.55
livelihood assistance	-0.80	0.00	-1.31	-0.28	-1.06	0.00	-1.71	-0.42
<i>Shocks (can report more than one)</i>								
crop or livestock disease	1.40	0.00	0.95	1.85	1.08	0.00	0.51	1.65
bad weather	-0.38	0.12	-0.87	0.10	-0.52	0.09	-1.13	0.09
house fire	0.60	0.02	0.10	1.11	0.13	0.71	-0.54	0.79
sudden health problem	0.01	0.96	-0.37	0.40	-0.10	0.70	-0.58	0.39
long-term health problem	0.20	0.32	-0.20	0.60	-0.13	0.62	-0.64	0.38
death in the family	0.59	0.01	0.12	1.06	0.76	0.01	0.17	1.36
inflation/price hikes	0.15	0.41	-0.21	0.51	0.47	0.04	0.02	0.93
job loss	-0.28	0.61	-1.36	0.80	0.06	0.93	-1.31	1.44
land dispute	-0.24	0.26	-0.66	0.18	-0.14	0.60	-0.68	0.39
<i>Livelihood (reference: own cultivation)</i>								
Own livestock	-1.05	0.02	-1.93	-0.16	-0.78	0.17	-1.88	0.32
Own fishing	-2.83	0.21	-7.27	1.61	-2.73	0.37	-8.74	3.28
Casual labor (agr)	0.44	0.41	-0.60	1.49	-0.54	0.40	-1.79	0.72
Casual labor (non-agr)	2.25	0.01	0.66	3.84	2.60	0.01	0.55	4.64
bush products	2.42	0.01	0.60	4.24	2.24	0.05	-0.01	4.49
home business	-1.44	0.00	-2.40	-0.49	-1.76	0.01	-3.05	-0.48
shop business	-3.10	0.00	-4.64	-1.56	-2.35	0.03	-4.46	-0.24
government	-2.15	0.00	-3.35	-0.94	-0.74	0.44	-2.62	1.13
private sector	-2.36	0.00	-3.90	-0.83	0.21	0.85	-1.91	2.33
paid housework	-0.41	0.85	-4.50	3.69	-0.46	0.85	-5.25	4.32
other economic activity	0.29	0.70	-1.17	1.75	0.51	0.59	-1.33	2.35
remittances	0.54	0.79	-3.32	4.40	-3.31	0.17	-8.00	1.38
other assistance	1.05	0.44	-1.61	3.70	0.18	0.92	-3.47	3.83
hh livelihood diversity	-0.17	0.00	-0.28	-0.06	-0.11	0.15	-0.26	0.04
someone in hh migrated	-0.50	0.21	-1.30	0.29	0.36	0.49	-0.65	1.37
hh experienced crime	0.11	0.57	-0.26	0.47	-0.03	0.91	-0.49	0.44
hh experienced a serious crime	0.07	0.01	0.02	0.12	0.00			
urban	1.04	0.39	-1.32	3.39	-0.36	0.85	-4.03	3.32
control for sub-county								
Constant	4.91	0.00	3.06	6.77				

Table 13: Asset ownership over time

Asset	Wave	%	95% CI	
Mobile phone***	wave 1	53.0%	48.8%	57.2%
	wave 2	58.4%	54.2%	62.7%
	wave 3	65.0%	61.6%	68.3%
Generator	wave 1	1.8%	1.1%	2.5%
	wave 2	1.9%	1.1%	2.7%
	wave 3	1.1%	0.4%	1.7%
Radio**	wave 1	57.1%	53.9%	60.4%
	wave 2	56.2%	52.1%	60.3%
	wave 3	52.9%	49.5%	56.4%
Mattress***	wave 1	73.2%	70.0%	76.4%
	wave 2	81.3%	78.1%	84.4%
	wave 3	86.5%	84.0%	89.0%
Solar panel***	wave 1	5.3%	4.2%	6.4%
	wave 2	14.5%	12.3%	16.6%
	wave 3	33.0%	30.5%	35.5%
Small livestock***	wave 1	75.7%	71.7%	79.8%
	wave 2	69.7%	76.3%	83.1%
	wave 3	79.7%	76.9%	82.5%
Medium sized livestock***	wave 1	60.1%	56.2%	64.0%
	wave 2	61.5%	57.6%	65.4%
	wave 3	65.0%	61.8%	68.2%
Large sized livestock***	wave 1	33.0%	29.2%	36.8%
	wave 2	37.8%	33.4%	42.2%
	wave 3	42.0%	37.8%	46.2%
Tools for digging	wave 1	93.9%	91.6%	96.1%
	wave 2	93.7%	91.5%	95.8%
	wave 3	94.0%	92.2%	95.9%
Tools for cutting***	wave 1	71.8%	69.5%	74.2%
	wave 2	78.5%	76.1%	80.9%
	wave 3	80.4%	77.9%	82.9%
Plough***	wave 1	17.4%	14.9%	19.9%
	wave 2	21.1%	17.9%	24.2%
	wave 3	23.4%	20.0%	26.7%
Bicycle or wheel-barrow	wave 1	53.0%	49.3%	56.6%
	wave 2	57.0%	53.5%	60.5%
	wave 3	54.2%	50.7%	57.6%
Donkey cart	wave 1	0.3%	0.0%	0.6%
	wave 2	0.2%	0.0%	0.4%
	wave 3	0.4%	0.1%	0.8%

Fixed effects model on wave: *** significant at p-value<0.01; ** significant at p-value<0.05; * significant at p-value<0.01

Table 14: Random and fixed effects negative binomial regression on wealth (n=4373)

Variable	Random effects				Fixed effects			
	Coefficient	p-value	95% CI		Coefficient	p-value	95% CI	
female hh head	-0.24	0.00	-0.29	-0.19	-0.08	0.04	-0.15	0.00
age of hh head	0.00	0.09	0.00	0.00	0.00	0.08	0.00	0.00
dependency ratio	-0.32	0.00	-0.40	-0.24	-0.18	0.00	-0.28	-0.08
Food insecurity (rCSI)	-0.01	0.00	-0.02	-0.01	-0.01	0.00	-0.01	-0.01
social protection	0.03	0.33	-0.03	0.10	0.05	0.21	-0.03	0.12
livelihood assistance	0.10	0.00	0.06	0.14	0.07	0.00	0.03	0.12
<i>Shocks (can report more than one)</i>								
crop or livestock disease	0.18	0.00	0.13	0.23	0.17	0.00	0.12	0.22
bad weather	0.05	0.04	0.00	0.10	0.04	0.19	-0.02	0.09
house fire	-0.05	0.07	-0.10	0.00	-0.02	0.47	-0.08	0.04
sudden health problem	-0.02	0.36	-0.06	0.02	-0.02	0.39	-0.06	0.02
long-term health problem	0.01	0.56	-0.03	0.05	0.02	0.30	-0.02	0.07
inflation/price hikes	0.00	0.80	-0.04	0.03	-0.01	0.77	-0.05	0.03
job loss	0.02	0.78	-0.09	0.12	-0.07	0.28	-0.19	0.06
land dispute	0.04	0.08	0.00	0.08	0.02	0.42	-0.03	0.07
<i>Livelihood (reference: own cultivation)</i>								
Own livestock	0.10	0.02	0.02	0.19	0.09	0.06	0.00	0.18
Own fishing	0.29	0.17	-0.12	0.70	0.27	0.29	-0.22	0.76
Casual labor (agr)	-0.11	0.04	-0.22	0.00	-0.06	0.35	-0.17	0.06
Casual labor (non-agr)	-0.15	0.09	-0.32	0.02	-0.14	0.16	-0.34	0.05
bush products	-0.08	0.40	-0.28	0.11	-0.07	0.53	-0.28	0.14
home business	0.00	0.96	-0.10	0.10	0.00	0.98	-0.12	0.12
shop business	0.20	0.01	0.05	0.35	0.06	0.53	-0.12	0.24
government	0.24	0.00	0.12	0.36	0.12	0.13	-0.04	0.28
private sector	-0.06	0.49	-0.22	0.10	-0.14	0.18	-0.33	0.06
paid housework	0.09	0.64	-0.30	0.49	0.16	0.47	-0.27	0.58
other economic activity	0.08	0.28	-0.07	0.23	0.11	0.21	-0.06	0.28
remittances	-0.08	0.71	-0.53	0.36	0.21	0.41	-0.28	0.70
other assistance	0.08	0.58	-0.21	0.37	0.30	0.08	-0.04	0.64
hh livelihood diversity	0.06	0.00	0.05	0.07	0.04	0.00	0.03	0.06
someone in hh migrated	0.11	0.00	0.04	0.19	0.05	0.30	-0.04	0.13
hh experienced crime	-0.05	0.01	-0.09	-0.01	-0.07	0.00	-0.11	-0.03
hh experienced a serious crime	0.00	0.22	0.00	0.01	0.01	0.57	-0.01	0.02
urban	-0.10	0.54	-0.42	0.22	-0.36	0.00	-0.54	-0.18
control for sub-county								
Constant	1.80	0.00	1.56	2.04	1.73	0.00	1.57	1.89

Table 15: Random and fixed effects model for log transformed minutes to health center (n=4315)

	Random effects				Fixed effects			
	co-efficient	p-value	95% CI		co-efficient	p-value	95% CI	
female household head	0.01	0.72	-0.05	0.08	-0.15	0.03	-0.28	-0.02
age of household head	0.00	0.25	0.00	0.00	-0.01	0.01	-0.01	0.00
dependency ratio	0.02	0.79	-0.10	0.13	-0.01	0.88	-0.19	0.16
Morris Score Index	0.00	0.01	0.00	0.00	0.00	0.48	0.00	0.00
Food insecurity (rCSI)	0.02	0.00	0.01	0.02	0.02	0.00	0.01	0.02
social protection	0.08	0.14	-0.02	0.18	0.01	0.86	-0.12	0.14
livelihood assistance	0.00	0.90	-0.07	0.07	0.01	0.90	-0.08	0.09
<i>Shocks (can report more than one)</i>								
crop or livestock disease	0.06	0.10	-0.01	0.13	0.01	0.85	-0.08	0.10
bad weather	0.11	0.01	0.03	0.18	0.15	0.00	0.06	0.25
house fire	0.00	0.98	-0.08	0.08	-0.03	0.56	-0.14	0.07
sudden health problem	0.03	0.26	-0.03	0.10	0.07	0.10	-0.01	0.14
long-term health problem	0.09	0.01	0.02	0.15	0.10	0.02	0.02	0.18
inflation/price hikes	0.02	0.52	-0.04	0.07	0.00	0.89	-0.08	0.07
job loss	0.04	0.62	-0.13	0.21	-0.12	0.26	-0.33	0.09
land dispute	0.02	0.59	-0.05	0.08	0.04	0.41	-0.05	0.12
<i>Livelihood (reference: own cultivation)</i>								
Own livestock	-0.08	0.28	-0.22	0.06	-0.08	0.38	-0.25	0.10
Own fishing	0.45	0.20	-0.24	1.14	0.41	0.39	-0.52	1.34
Casual labor (agr)	0.13	0.11	-0.03	0.30	0.10	0.33	-0.10	0.29
Casual labor (non-agr)	-0.18	0.15	-0.43	0.07	-0.10	0.52	-0.42	0.21
bush products	-0.08	0.58	-0.36	0.20	-0.13	0.47	-0.48	0.22
home business	0.01	0.93	-0.14	0.16	0.06	0.59	-0.15	0.26
shop business	-0.22	0.07	-0.46	0.02	-0.07	0.70	-0.39	0.26
government	-0.11	0.27	-0.30	0.08	0.00	0.99	-0.29	0.29
private sector	-0.06	0.64	-0.30	0.19	-0.07	0.69	-0.40	0.27
paid housework	-0.21	0.52	-0.85	0.43	-0.12	0.75	-0.86	0.62
other economic activity	0.02	0.88	-0.21	0.25	0.01	0.95	-0.28	0.30
remittances	-0.97	0.00	-1.61	-0.33	-1.28	0.00	-2.05	-0.51
other assistance	-0.30	0.15	-0.72	0.11	-0.01	0.98	-0.57	0.56
hh livelihood diversity	-0.03	0.00	-0.04	-0.01	-0.04	0.00	-0.07	-0.02
someone in hh migrated	-0.18	0.00	-0.30	-0.06	-0.16	0.04	-0.32	0.00
hh experienced crime	0.00	0.88	-0.05	0.06	0.01	0.77	-0.06	0.08
hh experienced a serious crime	0.01	0.00	0.01	0.02				
urban	-1.14	0.00	-1.52	-0.76	-0.39	0.18	-0.96	0.18
control for sub-county								
Constant	4.44	0.00	4.14	4.74	4.49	0.00	4.22	4.76

Table 16: Random (n=4220) and fixed effects (n=1104) logit model on access for routine problems'

	Random effects				Fixed effects			
	co-efficient	p-value	95% CI		co-efficient	p-value	95% CI	
female household head	-0.07	0.55	-0.31	0.16	0.26	0.40	-0.34	0.85
age of household head	0.01	0.13	0.00	0.01	0.01	0.45	-0.01	0.03
dependency ratio	0.07	0.76	-0.36	0.50	-0.44	0.28	-1.25	0.36
Morris Score Index	0.00	0.17	0.00	0.01	0.00	0.72	-0.01	0.01
Food insecurity (rCSI)	-0.07	0.00	-0.09	-0.05	-0.07	0.00	-0.09	-0.04
Minutes to a health center	-0.31	0.00	-0.42	-0.21	-0.38	0.00	-0.54	-0.21
social protection	-0.17	0.40	-0.58	0.23	-0.53	0.07	-1.09	0.04
livelihood assistance	0.30	0.02	0.04	0.56	0.09	0.64	-0.29	0.47
<i>Shocks (can report more than one)</i>								
crop or livestock disease	0.21	0.12	-0.06	0.47	-0.04	0.82	-0.41	0.33
bad weather	-0.38	0.01	-0.64	-0.11	-0.16	0.38	-0.52	0.20
house fire	0.23	0.15	-0.08	0.54	0.61	0.02	0.11	1.11
sudden health problem	-0.08	0.53	-0.31	0.16	-0.07	0.68	-0.42	0.27
long-term health problem	0.28	0.02	0.05	0.52	0.26	0.14	-0.08	0.60
inflation/price hikes	-0.35	0.00	-0.56	-0.14	-0.35	0.03	-0.66	-0.03
job loss	-0.15	0.62	-0.76	0.45	0.14	0.73	-0.65	0.93
land dispute	-0.35	0.01	-0.61	-0.08	-0.18	0.33	-0.54	0.18
<i>Livelihood (reference: own cultivation)</i>								
Own livestock	0.01	0.97	-0.49	0.51	0.10	0.79	-0.59	0.78
Own fishing	0.00				-14.63	0.99	-2386.63	2357.36
Casual labor (agr)	0.25	0.44	-0.38	0.87	1.19	0.02	0.20	2.19
Casual labor (non-agr)	-0.12	0.81	-1.06	0.83	0.21	0.75	-1.10	1.51
bush products	0.13	0.80	-0.89	1.15	-0.28	0.67	-1.56	1.00
home business	0.72	0.00	0.26	1.18	1.52	0.00	0.67	2.37
shop business	0.88	0.01	0.22	1.53	1.21	0.03	0.11	2.32
government	0.59	0.04	0.03	1.16	1.37	0.03	0.15	2.60
private sector	0.87	0.01	0.21	1.52	0.59	0.29	-0.50	1.69
paid housework	1.22	0.17	-0.51	2.96	0.19	0.87	-2.05	2.44
other economic activity	0.22	0.57	-0.54	0.98	0.10	0.86	-1.00	1.20
remittances	0.07	0.95	-2.21	2.35	0.04	0.98	-2.78	2.86
other assistance	0.51	0.46	-0.84	1.86	1.43	0.15	-0.51	3.38
hh livelihood diversity	-0.03	0.36	-0.10	0.04	-0.05	0.36	-0.15	0.05
someone in hh migrated	0.54	0.01	0.13	0.96	0.01	0.97	-0.60	0.62
hh experienced crime	-0.22	0.04	-0.44	-0.01	-0.11	0.49	-0.43	0.20
hh experienced a serious crime	0.00	0.76	-0.02	0.03	0.00			
urban	0.85	0.15	-0.31	2.00	12.50	0.99	-1557.13	1582.13
control for sub-county								
Constant	-0.19	0.74	-1.32	0.93				

Table 17: Random and fixed effects (n=680) logit model on combined 'health quality' variable

	Random effects				Fixed effects			
	co-efficient	p-value	95% CI		co-efficient	p-value	95% CI	
female household head	-0.11	0.47	-0.42	0.19	-0.33	0.40	-1.11	0.45
age of household head	0.01	0.04	0.00	0.02	0.01	0.49	-0.02	0.04
dependency ratio	0.36	0.20	-0.19	0.91	0.32	0.53	-0.67	1.32
Morris Score Index	0.00	0.15	0.00	0.01	0.00	0.74	-0.01	0.01
Food insecurity (rCSI)	-0.05	0.00	-0.08	-0.03	-0.04	0.01	-0.08	-0.01
Min. to a health center	0.00	0.00	-0.01	0.00	0.00	0.09	-0.01	0.00
social protection	-0.26	0.35	-0.79	0.28	-0.87	0.03	-1.63	-0.10
livelihood assistance	0.37	0.03	0.04	0.70	0.13	0.61	-0.36	0.62
<i>Shocks (can report more than one)</i>								
crop or livestock disease	0.09	0.59	-0.24	0.42	-0.11	0.64	-0.59	0.36
bad weather	-0.26	0.12	-0.60	0.07	-0.11	0.63	-0.56	0.34
house fire	0.26	0.21	-0.14	0.66	0.30	0.42	-0.43	1.03
sudden health problem	-0.12	0.46	-0.42	0.19	0.05	0.83	-0.40	0.50
long-term health problem	0.33	0.03	0.03	0.63	0.18	0.43	-0.26	0.61
death of a family member	0.10	0.61	-0.28	0.47	-0.20	0.46	-0.73	0.33
inflation/price hikes	-0.45	0.00	-0.72	-0.18	-0.26	0.18	-0.65	0.12
job loss	0.03	0.95	-0.72	0.77	0.16	0.75	-0.82	1.14
land dispute	-0.48	0.01	-0.84	-0.12	-0.18	0.45	-0.65	0.29
<i>Livelihood (reference: own cultivation)</i>								
Own livestock	0.31	0.31	-0.29	0.90	-0.07	0.87	-0.91	0.77
Own fishing								
Casual labor (agr)	0.19	0.67	-0.70	1.08	1.08	0.12	-0.30	2.46
Casual labor (non-agr)	0.41	0.43	-0.61	1.44	1.21	0.14	-0.40	2.82
bush products	-0.45	0.56	-1.95	1.05	-0.61	0.48	-2.30	1.08
home business	0.74	0.01	0.18	1.29	1.62	0.00	0.56	2.67
shop business	1.03	0.01	0.29	1.78	1.12	0.05	0.02	2.23
government	0.82	0.01	0.17	1.47	1.21	0.09	-0.17	2.59
private sector	0.92	0.02	0.18	1.66	0.66	0.33	-0.65	1.97
paid housework	2.10	0.03	0.26	3.94	1.17	0.43	-1.70	4.04
other economic activity	-0.36	0.53	-1.48	0.76	-0.28	0.76	-2.06	1.51
remittances	0.84	0.48	-1.50	3.19	0.14	0.93	-2.75	3.03
other assistance	1.35	0.06	-0.08	2.78	16.41	0.99	-2455.64	2488.47
hh livelihood diversity	-0.06	0.15	-0.15	0.02	-0.10	0.18	-0.24	0.04
someone in hh migrated	0.43	0.12	-0.11	0.97	-0.47	0.24	-1.26	0.32
hh experienced crime	-0.24	0.09	-0.51	0.03	-0.18	0.39	-0.57	0.22
hh experienced a serious crime	-0.32	0.03	-0.61	-0.03				
urban	0.84	0.38	-1.05	2.74	13.46	0.99	-3719.46	3746.38
control for sub-county								
Constant	-2.76	0.00	-4.37	-1.14				

Table 18: Random (n=2308) and fixed effects(n=916) logit model on girls attendance

	Random effects				Fixed effects			
	co-efficient	p-value	95% CI		co-efficient	p-value	95% CI	
female household head	-0.23	0.06	-0.48	0.01	-0.91	0.01	-1.62	-0.21
age of household head	0.00	0.77	-0.01	0.01	-0.06	0.00	-0.09	-0.02
dependency ratio	0.36	0.14	-0.12	0.85	-0.08	0.87	-0.98	0.83
Morris Score Index	0.01	0.12	0.00	0.01	0.01	0.27	-0.01	0.04
Food insecurity (rCSI)	-0.04	0.00	-0.06	-0.02	-0.01	0.53	-0.04	0.02
Minutes to a school	0.00	0.00	-0.01	0.00	0.00	0.03	-0.01	0.00
social protection	0.22	0.28	-0.17	0.61	0.26	0.40	-0.34	0.85
livelihood assistance	0.09	0.47	-0.16	0.35	-0.15	0.47	-0.54	0.25
<i>Shocks (can report more than one)</i>								
crop or livestock disease	0.00	1.00	-0.28	0.28	-0.13	0.56	-0.56	0.30
bad weather	0.26	0.10	-0.05	0.57	0.15	0.54	-0.32	0.61
house fire	0.21	0.16	-0.08	0.49	0.48	0.04	0.02	0.94
sudden health problem	-0.01	0.91	-0.24	0.22	-0.10	0.60	-0.47	0.27
long-term health problem	-0.24	0.04	-0.47	-0.01	-0.22	0.23	-0.58	0.14
death of a family member	0.29	0.04	0.01	0.57	0.09	0.69	-0.36	0.55
inflation/price hikes	-0.39	0.00	-0.61	-0.17	-0.24	0.15	-0.57	0.09
job loss	-0.06	0.86	-0.69	0.58	-1.21	0.04	-2.36	-0.06
land dispute	-0.11	0.38	-0.34	0.13	0.24	0.22	-0.15	0.63
<i>Livelihood (reference: own cultivation)</i>								
Own livestock	0.26	0.35	-0.29	0.81	0.02	0.97	-0.87	0.91
Own fishing	-2.44	0.05	-4.88	0.01				
Casual labor (agr)	0.35	0.25	-0.25	0.96	0.14	0.78	-0.86	1.15
Casual labor (non-agr)	0.13	0.80	-0.90	1.17	0.34	0.65	-1.12	1.80
bush products	-0.05	0.93	-1.09	1.00	-0.91	0.28	-2.56	0.74
home business	-0.39	0.17	-0.96	0.17	0.36	0.48	-0.63	1.35
shop business	0.24	0.66	-0.83	1.31	-0.05	0.94	-1.48	1.37
government	0.63	0.21	-0.36	1.63	-0.54	0.59	-2.49	1.41
private sector	-0.34	0.59	-1.56	0.88	-1.31	0.30	-3.76	1.15
paid housework	0.00				0.00			
other economic activity	0.77	0.25	-0.54	2.08	16.59	0.99	-1896.61	1929.80
remittances	-1.50	0.32	-4.48	1.47	-15.36	1.00	-5680.95	5650.23
other assistance	-0.24	0.79	-1.96	1.48	2.37	0.11	-0.50	5.24
hh livelihood diversity	-0.14	0.00	-0.20	-0.07	-0.11	0.04	-0.22	-0.01
someone in hh migrated	0.29	0.22	-0.17	0.75	-0.01	0.97	-0.78	0.76
hh experienced crime	-0.24	0.04	-0.47	-0.02	-0.32	0.07	-0.66	0.02
hh experienced a serious crime	0.00	0.82	-0.03	0.02	0.00			
urban	0.11	0.85	-1.02	1.23	0.00			
control for sub-county								
Constant	1.88	0.00	0.88	2.88				

Table 19: Random (n=2209) and fixed effects (n=850) logit model on boys attendance

	Random effects				Fixed effects			
	co-efficient	p-value	95% CI		co-efficient	p-value	95% CI	
female household head	-0.31	0.01	-0.56	-0.07	-0.57	0.10	-1.26	0.12
age of household head	0.00	0.52	-0.01	0.01	-0.02	0.09	-0.05	0.00
dependency ratio	0.07	0.79	-0.42	0.56	0.29	0.54	-0.62	1.20
Morris Score Index	0.01	0.20	0.00	0.01	0.01	0.52	-0.02	0.03
Food insecurity (rCSI)	-0.04	0.00	-0.06	-0.02	-0.02	0.28	-0.04	0.01
Minutes to a school	0.00	0.02	0.00	0.00	0.00	0.19	-0.01	0.00
social protection	-0.15	0.42	-0.53	0.22	-0.27	0.38	-0.89	0.34
livelihood assistance	0.03	0.83	-0.23	0.28	-0.11	0.58	-0.52	0.29
<i>Shocks (can report more than one)</i>								
crop or livestock disease	0.00	0.99	-0.29	0.28	-0.08	0.71	-0.53	0.37
bad weather	0.11	0.48	-0.20	0.43	-0.04	0.86	-0.53	0.44
house fire	0.15	0.33	-0.15	0.45	0.68	0.01	0.17	1.18
sudden health problem	-0.03	0.81	-0.26	0.20	-0.05	0.79	-0.44	0.33
long-term health problem	-0.33	0.01	-0.57	-0.10	-0.44	0.03	-0.82	-0.05
death of a family member	0.20	0.16	-0.08	0.49	-0.11	0.67	-0.59	0.38
inflation/price hikes	-0.27	0.02	-0.49	-0.05	-0.17	0.32	-0.52	0.17
job loss	-0.06	0.87	-0.74	0.62	-1.00	0.11	-2.23	0.24
land dispute	-0.08	0.49	-0.33	0.16	-0.06	0.77	-0.49	0.36
<i>Livelihood (reference: own cultivation)</i>								
Own livestock	0.59	0.05	0.01	1.17	0.88	0.06	-0.04	1.80
Own fishing	-2.30	0.06	-4.65	0.05				
Casual labor (agr)	0.10	0.80	-0.66	0.86	-0.44	0.43	-1.55	0.66
Casual labor (non-agr)	0.60	0.34	-0.62	1.81	0.05	0.96	-1.96	2.05
bush products	-0.26	0.67	-1.43	0.92	-0.39	0.74	-2.65	1.87
home business	0.03	0.91	-0.53	0.60	-0.24	0.64	-1.26	0.77
shop business	0.19	0.71	-0.82	1.21	-0.69	0.50	-2.67	1.30
government	0.57	0.20	-0.30	1.43	0.27	0.73	-1.26	1.80
private sector	0.05	0.95	-1.59	1.70	-0.32	0.83	-3.16	2.53
paid housework					14.11	0.99	-2208.66	2236.88
other economic activity	0.62	0.26	-0.45	1.69	1.13	0.25	-0.77	3.03
remittances					0.00			
other assistance	0.81	0.49	-1.48	3.11	15.85	0.99	-1926.88	1958.58
hh livelihood diversity	-0.17	0.00	-0.23	-0.10	-0.15	0.01	-0.26	-0.04
someone in hh migrated	0.11	0.64	-0.35	0.57	-0.01	0.99	-0.76	0.75
hh experienced crime	-0.13	0.25	-0.36	0.10	-0.48	0.01	-0.84	-0.12
hh experienced a serious crime	-0.01	0.55	-0.03	0.02	0.00			
urban	0.36	0.54	-0.80	1.52	0.00			
control for sub-county								
Constant	2.11	0.00	1.09	3.13				

Table 20: Random (n=4356) and fixed effects (n=1611) logit model on livelihood assistance

	Random effects				Fixed effects			
	co-efficient	p-value	95% CI		co-efficient	p-value	95% CI	
female household head	-0.02	0.88	-0.23	0.19	-0.32	0.22	-0.82	0.19
age of household head	0.00	0.76	-0.01	0.00	0.00	0.93	-0.02	0.02
dependency ratio	0.19	0.33	-0.19	0.56	0.40	0.20	-0.21	1.02
Morris Score Index	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.01
Food insecurity (rCSI)	-0.04	0.00	-0.06	-0.03	-0.06	0.00	-0.08	-0.03
social protection	0.76	0.00	0.47	1.04	0.40	0.05	0.00	0.80
<i>Shocks (can report more than one)</i>								
crop or livestock disease	0.48	0.00	0.22	0.74	0.57	0.00	0.22	0.92
bad weather	0.09	0.51	-0.18	0.37	0.02	0.93	-0.35	0.38
house fire	-0.21	0.12	-0.46	0.05	-0.33	0.09	-0.70	0.05
sudden health problem	0.01	0.90	-0.18	0.20	-0.11	0.41	-0.37	0.15
long-term health problem	0.15	0.13	-0.05	0.35	0.12	0.38	-0.15	0.39
death of a family member	0.16	0.17	-0.07	0.39	0.20	0.22	-0.12	0.51
inflation/price hikes	0.11	0.27	-0.08	0.29	0.25	0.05	0.00	0.50
job loss	0.21	0.41	-0.29	0.72	0.57	0.13	-0.17	1.31
land dispute	0.24	0.02	0.03	0.44	0.21	0.15	-0.07	0.50
<i>Livelihood (reference: own cultivation)</i>								
Own livestock	0.34	0.11	-0.08	0.75	0.28	0.33	-0.28	0.84
Own fishing					-12.26	0.99	-1690.55	1666.03
Casual labor (agr)	-1.40	0.00	-2.21	-0.59	-1.22	0.01	-2.12	-0.33
Casual labor (non-agr)	0.24	0.54	-0.54	1.02	-0.17	0.75	-1.20	0.86
bush products	-0.33	0.56	-1.44	0.78	-0.80	0.38	-2.58	0.98
home business	0.38	0.11	-0.09	0.85	0.42	0.21	-0.24	1.08
shop business	-0.77	0.14	-1.79	0.25	-1.26	0.19	-3.14	0.62
government	0.37	0.22	-0.22	0.96	0.94	0.10	-0.18	2.05
private sector	-0.17	0.72	-1.08	0.75	-0.53	0.41	-1.77	0.72
paid housework	-0.40	0.73	-2.69	1.89	-0.04	0.98	-2.56	2.49
other economic activity	-0.80	0.11	-1.79	0.19	-0.33	0.60	-1.53	0.88
remittances	0.00				-13.48	0.98	-1358.87	1331.92
other assistance	-0.52	0.52	-2.12	1.08	-0.07	0.94	-2.04	1.89
hh livelihood diversity	0.16	0.00	0.11	0.22	0.14	0.00	0.06	0.22
someone in hh migrated	-0.08	0.68	-0.46	0.30	0.26	0.34	-0.28	0.80
hh experienced crime	0.45	0.00	0.25	0.64	0.55	0.00	0.28	0.82
hh experienced a serious crime	0.04	0.00	0.02	0.06				
urban	-0.42	0.48	-1.59	0.75	-0.03	0.98	-1.86	1.81
control for sub-county								
Constant	-3.18	0.00	-4.09	-2.27				

Table 21: Fixed effects on livelihood assistance with lagged terms (n=674)

	Fixed effects			
	co-efficient	p-value	95% CI	
female household head	-0.20	0.79	-1.68	1.27
age of household head	0.04	0.17	-0.02	0.11
dependency ratio	-0.68	0.41	-2.30	0.94
Morris Score Index (lagged)	0.00	0.62	-0.02	0.01
Food insecurity (rCSI) (lagged)	-0.06	0.04	-0.12	0.00
Livelihood assistance (lagged)	-32.37	0.99	-4832.25	4767.51
social protection	0.13	0.76	-0.72	0.99
<i>Shocks (can report more than one)</i>				
crop or livestock disease	1.24	0.02	0.23	2.26
bad weather	-0.15	0.78	-1.22	0.91
house fire	-0.23	0.57	-0.99	0.54
sudden health problem	-0.27	0.42	-0.93	0.39
long-term health problem	0.77	0.03	0.08	1.45
death of a family member	-0.02	0.97	-0.93	0.90
inflation/price hikes	0.21	0.52	-0.42	0.83
job loss	-0.63	0.70	-3.83	2.57
land dispute	0.55	0.14	-0.18	1.29
<i>Livelihood (reference: own cultivation)</i>				
Own livestock	-0.09	0.92	-1.77	1.60
Own fishing	0.00			
Casual labor (agr)	-1.45	0.14	-3.39	0.49
Casual labor (non-agr)	1.60	0.38	-1.96	5.16
bush products	10.38	1.00	-54774.47	54795.23
home business	0.25	0.76	-1.35	1.85
shop business	-21.33	1.00	-57238.14	57195.48
government	-13.24	1.00	-5102.02	5075.53
private sector	1.18	0.42	-1.68	4.05
paid housework	14.85	0.99	-3698.13	3727.82
other economic activity	0.20	0.90	-2.83	3.22
remittances	11.34	1.00	-358625.80	358648.50
other assistance	11.31	1.00	-42313.47	42336.09
hh livelihood diversity	0.18	0.10	-0.03	0.40
someone in hh migrated	-1.18	0.11	-2.62	0.27
hh experienced crime	0.98	0.01	0.26	1.71
hh experienced a serious crime	0.00			
urban	1.07	0.56	-2.51	4.64

Table 22: Random (n=4209) and fixed effects (n=732) logit model on social protection

	Random effects				Fixed effects			
	co-efficient	p-value	95% CI		co-efficient	p-value	95% CI	
female household head	0.06	0.68	-0.23	0.35	0.32	0.40	-0.43	1.07
age of household head	0.03	0.00	0.02	0.04	0.02	0.21	-0.01	0.04
dependency ratio	0.65	0.02	0.11	1.19	0.25	0.58	-0.62	1.11
Morris Score Index	0.00	0.37	0.00	0.01	0.00	0.30	0.00	0.01
Food insecurity (rCSI)	-0.01	0.26	-0.04	0.01	-0.01	0.47	-0.05	0.02
livelihood assistance	0.77	0.00	0.49	1.06	0.53	0.02	0.11	0.96
<i>Shocks (can report more than one)</i>								
crop or livestock disease	0.12	0.53	-0.25	0.48	0.21	0.41	-0.29	0.71
bad weather	-0.05	0.81	-0.43	0.34	0.06	0.82	-0.48	0.61
house fire	0.10	0.60	-0.27	0.47	0.10	0.73	-0.47	0.68
sudden health problem	0.33	0.02	0.05	0.61	0.37	0.08	-0.04	0.79
long-term health problem	-0.03	0.82	-0.32	0.25	0.07	0.77	-0.37	0.51
death of a family member	0.18	0.28	-0.15	0.52	0.35	0.21	-0.19	0.90
inflation/price hikes	0.17	0.24	-0.11	0.44	0.25	0.21	-0.14	0.64
job loss	0.85	0.01	0.23	1.48	0.20	0.70	-0.81	1.21
land dispute	-0.12	0.44	-0.42	0.19	-0.26	0.28	-0.73	0.21
<i>Livelihood (reference: own cultivation)</i>								
Own livestock	-0.07	0.83	-0.75	0.60	0.60	0.24	-0.39	1.60
Own fishing								
Casual labor (agr)	0.91	0.01	0.26	1.55	0.36	0.41	-0.50	1.21
Casual labor (non-agr)	-0.12	0.86	-1.40	1.17	-0.23	0.82	-2.16	1.70
bush products	-0.39	0.62	-1.91	1.14	-0.32	0.73	-2.16	1.52
home business	-0.17	0.68	-0.97	0.64	0.54	0.37	-0.64	1.72
shop business	-1.34	0.20	-3.41	0.72	-14.27	0.99	-2397.89	2369.34
government	-0.49	0.35	-1.52	0.54	-1.51	0.10	-3.27	0.26
private sector	0.40	0.50	-0.75	1.55	0.26	0.81	-1.85	2.36
paid housework	0.91	0.45	-1.43	3.25	-0.86	0.49	-3.27	1.55
other economic activity	0.53	0.30	-0.48	1.55	0.24	0.80	-1.55	2.02
remittances	1.64	0.10	-0.32	3.60	0.27	0.88	-3.27	3.81
other assistance	1.89	0.00	0.67	3.10	16.26	0.99	-2282.41	2314.94
hh livelihood diversity	0.20	0.00	0.12	0.28	0.32	0.00	0.19	0.45
someone in hh migrated	0.24	0.39	-0.30	0.78	-0.66	0.12	-1.47	0.16
hh experienced crime	0.34	0.02	0.05	0.63	0.45	0.03	0.04	0.87
hh experienced a serious crime	0.00	0.95	-0.04	0.04	0.00			
urban	0.87	0.30	-0.77	2.51	16.80	1.00	-5273.65	5307.26
control for sub-county								
Constant	-6.56	0.00	-8.06	-5.06				

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