JULY 2019

Apolou Baseline Report: Household Wealth and Market Quality

A FEINSTEIN INTERNATIONAL CENTER & MERCY CORPS PUBLICATION

Anastasia Marshak, Nate Ives, Elizabeth Stites, Kimberly Howe, Barbara Athieno

Tufts UNIVERSITY
FRIEDMAN SCHOOL OF NUTRITION SCIENCE AND POLICY
Feinstein International Center

USAID FROM THE AMERICAN PEOPLE · MERCY CORPS · Save the Children · Whave a fair future · KAPDA · NAWOA · PLAMIDIA

Cover photo: Women dancing, by Khristopher Carlson

Citation: Anastasia Marshak, Nate Ives, Elizabeth Stites, Kimberly Howe, Barbara Athieno. *Apolou Baseline Report: Household Wealth and Market Quality*. Boston: Feinstein International Center, Tufts University, 2019.

Corresponding author: Anastasia Marshak
Corresponding author email: anastasia.marshak@tufts.edu

This publication was made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the authors and do not necessarily reflect the views of USAID or the United States Government.

Feinstein International Center
75 Kneeland Street, 8th Floor
Boston, MA 02111 USA
Tel: +1 617.627.3423
Twitter: @FeinsteinIntCen
fic.tufts.edu

Acknowledgements

The Feinstein International Center would like to thank USAID's Office of Food for Peace for their generous support in making this research possible. We thank the following Apolou staff for their engagement in this study: former Chief of Party Robert Mwadime and current Chief of Party Scot Isbrandt, Deputy Chief of Party Laura Lalor, MEL Advisor Rose Hemmer Vitti, Program Quality, Partnership Manager Elizabeth Robertson, and Governance Manager Beatrice Okware. We also thank the Program Manager Roxani Krystalli for her leadership and support during the research design, training, data collection, analysis, and write-up processes. We also thank the Mercy Corps Uganda Country Director Iveta Ouvry. We are grateful for the support of Apolou offices in Moroto, Kotido, Kaabong, and Amudat Districts. We thank the Karamoja Resilience and Support Unit, particularly Mesfin Ayele, Moses Luboyera, Dr. Jarvice Sekajja, and Raphael Lokiru.

We particularly appreciate the hard work of the field supervisors, enumerators, translators, mobilizers and drivers that made data collection possible. We are grateful for the feedback provided by district and community leaders and representatives, NGO staff, and other stakeholders in dissemination workshops. We are indebted to Nate Ives and Darlington Akabwai for their excellent work on the project. We thank Feinstein's Anne Radday for her support, as well as Liz Vincent and Jessica Haswell for helping us prepare the final product. And most of all, we are deeply grateful to the people of Karamoja who gave us their perspectives and time, which made this research possible.

Contents

Acknowledgements 3

Executive summary 5

Research objectives and road map 6

Methodology 7

- Sampling and design 7
- Analysis 7

Findings 9

- Wealth 9
  - Livestock ownership 9
  - Physical asset ownership 12
  - Household expenditures 14
  - Land 16
  - Putting it all together 16
- Food security 17
- Who is wealthy in “animal-” vs. “farming-”related wealth 19

Market access and quality 22

Relationship between markets, wealth, and the intensity of Mercy Corps programming 23

Discussion and program implications 24

- Program implications 26

Annex. Additional tables and figures 27

Executive Summary

This report reflects findings from the baseline of a four-year study in a sample of Mercy Corps programming communities in Apolou, with midline data collection planned for October 2019 and an endline in 2020. In the meantime, this report provides some insights into the characteristics of these communities, particularly in relation to wealth, food insecurity, and market access.

While the data clearly underscore the importance of livestock, with most households reporting owning some type of animal, the distribution of that ownership is very skewed, more so than when it comes to non-livestock or physical asset ownership or expenditure. The data show that half of the households only hold 10% of the livestock reported in the data. This means that while most respondents do own livestock, the majority of livestock wealth is concentrated in only a handful of households. Even if the livestock data reporting is heavily biased, the relative distribution of those holdings is likely accurate. The Mercy Corps programming communities also appear to be generally more livestock poor than Karamoja more broadly. While almost half of the population of Karamoja meets the threshold of 3.3 Tropical Livestock Units (TLU)/ capita,[1] only 5% of the Mercy Corps sample meets that criteria.

There is also a clear pattern of geographical clustering of certain livestock and combinations of livestock that likely reflects preferences based on ecological zones as well as strategies for market diversification. For example, households that own cattle are more likely to own goats and sheep. Households are more likely to own this combination of livestock in certain regions, with 90% of households in Kalapata reporting owning both cattle and sheep compared to Lokori, where not a single household reported owning both.

Besides describing the sample, the goal of the baseline study was also to better understand, as well as construct an index of, wealth. Using principal component analysis (PCA), we looked at how all the different proxies of wealth—livestock, physical assets, expenditures, and land ownership—correlate with each other. The result was as nuanced as the region, with two clear but very different measures of wealth. The first measure was based on livestock ownership and expenditure on livestock products, or animal-related wealth; the second measure was based on physical asset ownership and expenditure on farm inputs, or farm-related wealth. Households that were rich in animal-related wealth were not the same households as those that were rich in farm-related wealth, nor did they share the same geographical area or household-level characteristics, and they had a different relationship with food insecurity. This heterogeneity based on livelihood specialization potentially extends to different and gendered livelihood roles within the household. The data showed that food preparers, who are generally female, were less food insecure than the predominately male respondents at the time of the harvest.

We explored how our two different wealth indices correlated with Mercy Corps program layering and found that households that had lower farm-related wealth were more likely to live in communities with *more* Mercy Corps programming, but there was no correlation with animal-related wealth, meaning Mercy Corps had some form of programming in *every* community, but not necessarily more programming in communities with less or more animal-related wealth. Finally, we found that overall market quality was good, but households on average travelled up to two hours to reach a market.

These findings, while preliminary, do have some initial programming implications that we discuss at the end of the report. Mercy Corps programming and layering needs to reflect the heterogeneity found between and within geographic regions, communities, and households, without exacerbating the existing inequality across livestock, physical assets, and expenditure.

1 A. Catley and M. Ayele, 2018, Livestock and poverty in Karamoja: An analysis of livestock ownership, thresholds, and policy implications. Karamoja Resilience Support Unit, USAID/Uganda, UK aid, and Irish Aid, Kampala.

Research objectives and road map

The baseline report reflects one of three quantitative data collections that will occur over the next three years (2018–2020). The main objective of the research is to answer the following questions:

1. How is Mercy Corps program layering correlated with *changes* in household wealth?
2. How is the expansion of the market correlated with *changes* in household wealth?

While both research questions have a temporal component that will only be evident after we have longitudinal data, in this report we begin to describe and unpack these relationships as well as define our key input and outcome variables. To define and understand wealth, our main outcome variable, in a way that reflects the heterogeneity of the Apolou region, we specifically focus on livestock ownership, physical asset ownership, household expenditures, and land. We then explore the different components of markets to create a variable that will serve as one of our two key input variables: market access and quality. Our other key input variable—Mercy Corps program layering—is imbedded in the design of the study, in which we stratified our sample by selecting half of the communities from low-intensity program areas and half the community from high-intensity program areas.

In this report, we first describe the methodology used for the quantitative survey. We then discuss the findings, starting with a description of the different aspects of wealth and how we use those different aspects to create two different indices of wealth, one based on animal-related wealth and one based on farm-related wealth. Next, we describe household food insecurity, differentiating between reported food insecurity of the generally male respondent versus the generally female food preparer. Then, we look at how our two different wealth indices correlate with geographical and household characteristics, including food insecurity. The next section looks at market access and quality. Finally, we explore the relationship between market quality, Mercy Corps program layering, and wealth. We end the report with a discussion and program implications.

Methodology

Sampling and design

We used a randomized cluster sample across 52 villages (10 households per village) within four districts in three time periods (October/November 2018, October/November 2019, and October/November 2021), resulting in a sample size of 520, plus a margin for attrition. This sample size was selected to be able to detect a difference in a mean increase of ½ a livelihood activity (0.3 standardized effect size) between two time periods, accounting for the cluster effect with alpha 0.05 and beta 0.8. The sample size calculation was based on data from the Secure Livelihoods Research Consortium (SLRC) survey carried out in Northern Uganda. In the SLRC survey, the mean was approximately 4 livelihood activities (per household) with a standard deviation of 1.58 activities.[2] In each village, households were selected using a spin-the-pen approach. The final sample size was 513 households.

To better understand how the relationship between market and key outcome indicators might vary across Mercy Corps villages with different numbers of programs (or different "layering" of programs), we randomly selected our communities from the Mercy Corps program village list: 26 communities that only received one program from Mercy Corps and 26 communities that receive more than one program from Mercy Corps. We will refer to these two groups as minimal layering and intensive layering respectively.

Table 1. Sample size for baseline

District	Frequency	Percent
Amudat	169	33%
Kaabong	120	24%
Kotido	137	26%
Moroto	87	17%
Total	513	100%

Analysis

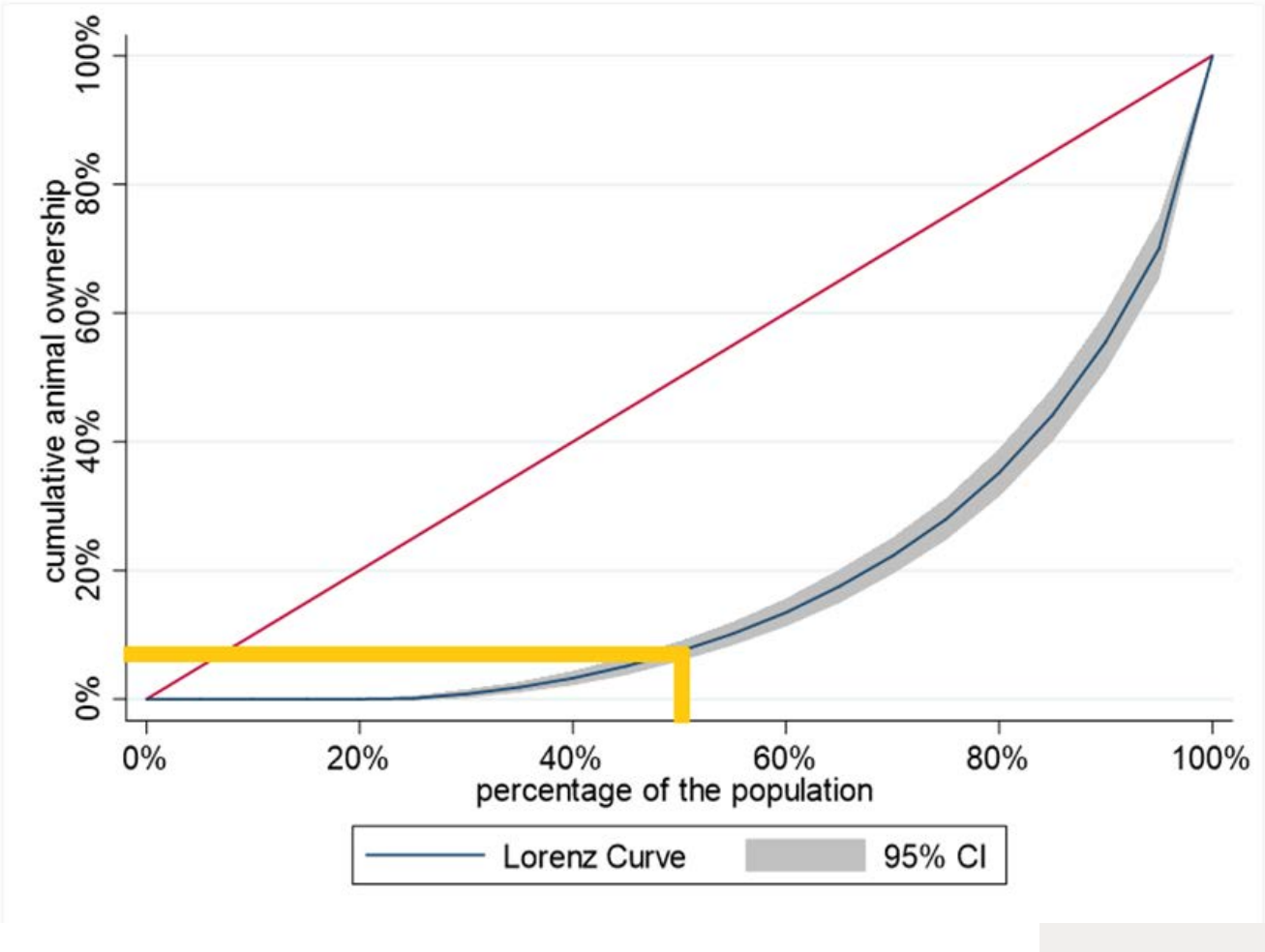
Many of the variables analyzed (livestock, physical assets, expenditures, etc.) in this report are not normally distributed (unlike a variable like height; see Figure 14 in Annex for an example of a normal distribution), but rather are skewed to the right. Put another way, most households own very few of any item (for example, cattle), and only a few households own very many of an item. This means that if we only discuss average ownership (for example, mean number of cattle owned), we would miss an opportunity to better understand the distribution of that asset variable, be it livestock, physical assets, or expenditure. Thus, in this report, we try to focus on what proportion of the population owns a certain amount of an asset or the equality of the distribution of that asset across the population. To examine what proportion of the population owns an asset, we use percentiles or the median (the middle value if the data are arranged from the smallest to the largest). To go back to the cattle example, a large portion of households reported owning cattle (77%) but when we look at how much cattle they own, we see that the median is only 2 cattle. This tells us that half of the population owns 2 or fewer cattle and that cattle wealth is highly concentrated within very few households (only 11 households reporting owning 10 or more cattle). If we spoke only about means or averages, we would not see this skewed distribution of cattle.

Another way to tell this story of an unequal distribution is through the visual aid of a Lorenz Curve. In the Lorenz Curve in Figure 1 below, the red 45-degree line shows complete equality—i.e., 10% of the population owns 10% of the total livestock, 20% of the population owns 20% of the livestock, 30% of the population owns 30% of the livestock, and so on. A simple example would be that if you

2 A. Marshak, D. Mazurana, J. H. Opio, R. Gordon, and T. 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.

have 10 people splitting 10 apples, perfect equality (represented by the red line) would mean 10% of the population would get 10% of the apples (1 person would get 1 apple) and 80% of the population would get 80% of the apples (or 8 people own 8 apples), and so on. The curved blue line in the figure, on the other hand, shows the reality as depicted in our sample data, with the gray shading representing the 95% confidence interval (CI). In Figure 1 we see that 50% of the population (the median) owns less than 10% of the livestock (where the two yellow lines connect). Using the apple example, this would be the equivalent 5 people splitting 1 apple between them, while the other 5 people get 9 apples—a rather unequal distribution. When viewing Lorenz Curves, the farther the curve is from the 45-degree line, the more unequal the distribution of the variable being examined is.

Figure 1. Example Lorenz Curve to explain concept.



Findings

In this section, we present findings from the baseline Apolou data collection. We first review the different components of household wealth, focusing on livestock, physical assets, expenditure, and land. We then combine the four different aspects of wealth to create two different measures of wealth—one to measure animal-related wealth and another to measure farm-related wealth. Next, we briefly describe the food security of our sample. In the next section, we review market access and quality of our sampled population. Finally, we review how our two wealth variables are correlated to market access and quality as well as our original stratification by Mercy Corps program intensity. For context, it is important for the reader to remember that the survey was conducted right during the harvest period and when animals might be migrating. Thus, these findings are specific to the timing of the survey and cannot necessarily be extrapolated to other time periods.

Wealth

Livestock ownership

Livestock are a critical component of livelihoods systems for households in the Apolou sample. Fewer than a quarter of all households (22%) report not owning any livestock. Goats were the most common livestock owned (85% of households), followed by beef cattle (78%), dairy cattle (77%), sheep (66%), and oxen (54%).[3] Few households owned camels (2%), and less than 1% reported having a pig (Table 2).

While livestock ownership was extremely common, the number of any individual livestock that any household reported owning was highly skewed to the right, meaning most households owned one or two animals, with only couple of households reporting much larger herd sizes. For example, even though 77% reported owning cattle[4] (second column),

Table 2. Livestock ownership (owns at least one, min, max, 25th, 50th, and 75th percentile)

	Own at least 1	Minimum # reported	Maximum # reported	25th percentile	50th percentile *(median)*	75th percentile
Dairy cattle	77%	0	30	1	2	3
Beef cattle	78%	0	80	1	3	6
Oxen	54%	0	10	0	1	2
Donkeys	13%	0	22	0	0	0
Camels	2%	0	20	0	0	0
Pigs	< 1%	0	22	0	0	0
Sheep	66%	0	180	0	3	10
Goats	85%	0	80	2	5	11

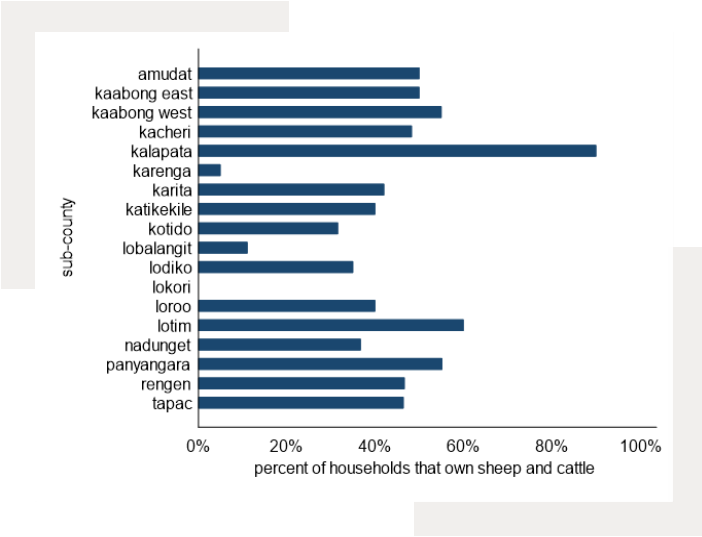
3 The distinction between beef cattle and dairy cattle was made by some of the respondents of the survey during the pilot and might be an indication of some households raising cattle for sale in towns, but more exploration is required.

4 We looked a bit closer into beef cattle and did not find evidence of significant clustering (inter-cluster correlation, which is a measure of how strongly units in the same group, in our case villages, resemble each other, was quite low at 0.03). However, there were a couple of villages that had the largest number of reported beef cattle ownership: Nadome village in Rikitae Parish; Modokonyang village in Loletio Parish; and Loletekia village in Ndaanget Parish.

50% of the sample owned two or fewer cattle (sixth column), and only 25% of households owned three or more cattle (75th percentile or seventh column). Only 11 people reported owning 10 or more cattle. Of all the different livestock types, households were the most likely to own several goats, while the largest reported herd sizes were of sheep. For example, 25% (or the 75th percentile) owned 11 or more goats, and the largest reported herd was 180 sheep. However, for most livestock—oxen, donkeys, camels, pigs, and sheep—25% of the households did not own these livestock, and for donkeys, camels, and pigs, 50% of the households did not own these livestock. The type of livestock most likely to be owned by the sampled population were dairy cattle, beef cattle, and goats.

We also observed a correlation between the ownership of different livestock. Households that owned dairy cattle were also significantly more likely to report owning beef cattle, goats, sheep, and oxen. Some of the strongest correlations were between dairy cattle and goats and beef cattle and sheep (Table 10 in Annex). Specifically, 69% of all households that reported owning beef cattle also owned at least one sheep. One hypothesis is that this might indicate that households are diversifying their livestock ownership for the market. To explore this hypothesis, we looked at what was correlated with the ownership of both sheep and beef cattle. The combined ownership of these two livestock was clustered in certain locations (Figure 2), with almost 90% of all households in Kalapata reporting owning both types of animals compared to Lokori, where not a single household owned both types of livestock. Ownership of both types of animals was distributed equally across the different ethnic groups in the sample, except for Jie and mixed ethnicity households (only 5% of these households owned both types of livestock, but they also represented only 38 out of 521 observations). Male-headed households were much more likely to own both types of livestock. Education of the household head was negatively (and significantly) correlated with combined ownership, or put another way: the more educated the household head, the less likely the household was to report owning both sheep and beef cattle. Marriage status also mattered, with 53% of households that were in polygamous relationships reporting owning both types of animals compared to 34% of households in monogamous relationships. But there was NO relationship with number of goods sold in the market or distance to a market.

Figure 2. Proportion of households that own both beef cattle and sheep by sub-county.



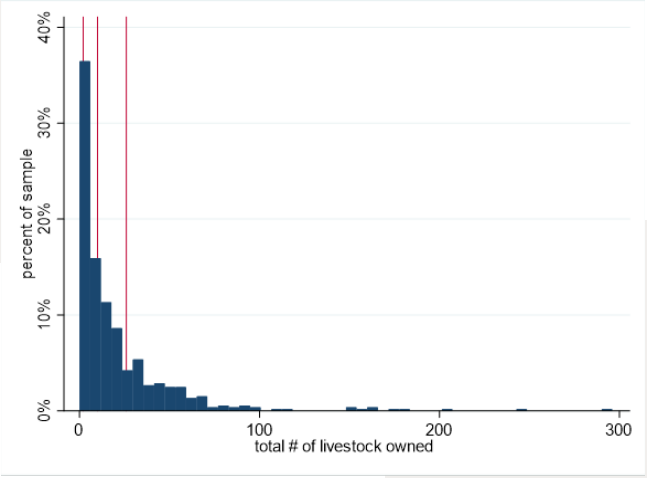
To further understand livestock ownership as a measure of wealth, we looked at both total herd size (simply a summation of all livestock owned) and a slightly more sophisticated measure—Tropical Livestock Units (TLUs), which allows us to use different weights to differentiate between more expensive animals (say cattle or camels) and poultry. The TLU index allows us to distinguish between a household with 10 cattle and 10 poultry, while our total herd size variable would rate these households as equal. Furthermore, we can compare with other studies that utilize the TLU measurement.[5]

To convert individual livestock ownership into TLUs, we used the following conversion factors (based on relative value of the livestock): cattle = 0.7, sheep = 0.1, goats = 0.1, pigs = 0.2, chicken = 0.01.[6] Both aggregate variables told a very similar story, as observed in the household totals of animals.

5 A. Catley and M. Ayele, 2018, Livestock and poverty in Karamoja: An analysis of livestock ownership, thresholds, and policy implications. Karamoja Resilience Support Unit, USAID/Uganda, UK aid, and Irish Aid, Kampala.
6 HarvestChoice, 2015, Tropical Livestock Units (TLU, 2005). International Food Policy Research Institute, Washington, DC and University of Minnesota, St. Paul, MN.

Distribution was extremely skewed, with most households owning very few animals and only a handful of households owning several livestock. See Figure 3. A normal distribution would look like an upside-down bell, with most of the data in the middle (see Figure 14 in Annex for an example of a normal distribution). Our distribution is bunched on the left-hand side of the graph, meaning most people own very few animals. For example, looking at total livestock ownership, we see that 25% of the population own two or fewer animals (first red line) and 75% of the sample own fewer than 26 animals (second red line) (Figure 3). Use of the TLU as a measure of total livestock wealth shows the same overall distribution (Figure 4). It is worth noting that it is unlikely that households reported the exact number of animals they own and most likely this information is biased downwards, but that does not prevent us from gaining a relative understanding of the distribution within our sample, and, relatively speaking, the distribution of animals is very unequal.

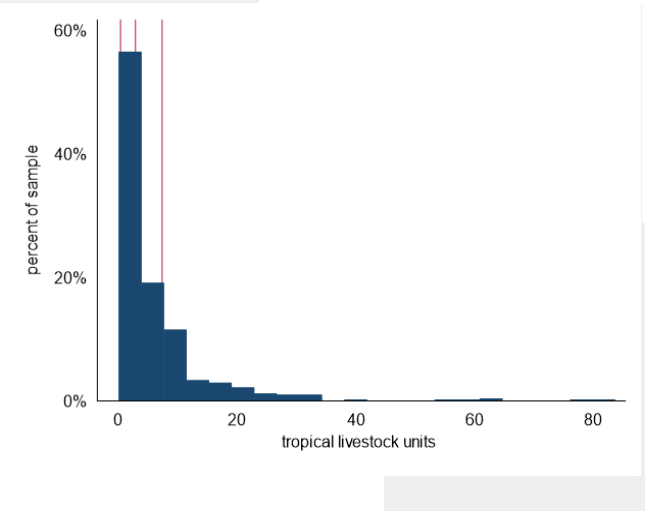
Figure 3. Total livestock ownership distribution with percentiles.



Note: The red lines represent percentiles: 25th percentile = 2; 50th percentile/median = 10; 75th percentile = 26.

We further amend our index by looking at TLU/capita to account for different household sizes. Using this approach, only 5% of our sample owned more than 3.3 TLU/capita, which is the amount identified in a recent report from Karamoja required for a livestock-based

Figure 4. TLU distribution with percentiles.



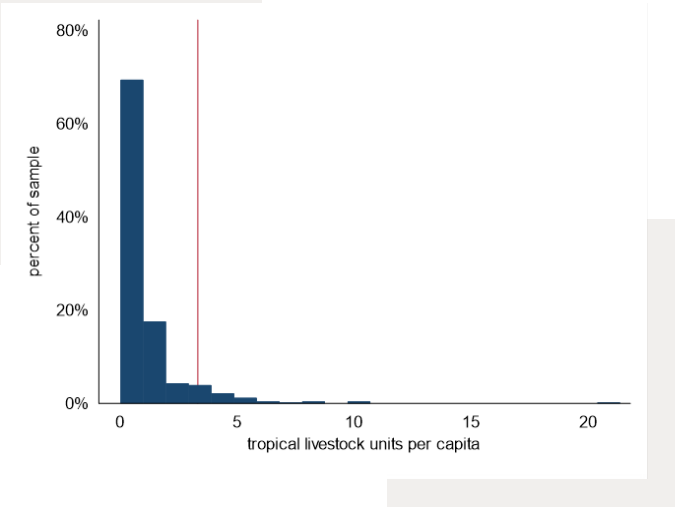
Note: The red lines represent percentiles: 25th percentile =0.2; 50th percentile/median = 2.8; 75th percentile = 7.3.

livelihood.[7] Our sample appears more "livestock poor" than identified by the recent Karamoja Resilience report (KRSU), which found that 56.5% of all households fell below the 3.3 TLU/capita threshold. In our sample, half of all households owned 0.44 TLU/capita, and, as with the other livestock measurements, the TLU/capita was highly skewed (Figure 5). An initial hypothesis was that the difference between the two surveys might be due to differences in household size. In the KRSU analysis, household size was uniformly estimated at 6 household members, while in our calculations we used the actual household size for each household. However, our average household size was quite similar (6.6), and applying a household size of 6 did not drastically change our median (from 0.44 TLU/capita to 0.47 TLU/6 household members). A more likely explanation is that our sample is not representative of the same population as used in the KRSU report. The latter used raw data from a livestock demographic survey commissioned by Mercy Corps and conducted in 2017, specifically focusing on six districts identified as "main livestock-rearing districts:" Napak, Nakapiripirit, Moroto, Kaabong, Kotido, and Amudat. Our sample, on the other hand, not only is NOT representative of the districts in which we sampled but is rather representative of the Mercy Corps beneficiary

7 Catley and Ayele, Livestock and poverty in Karamoja.

population, but also covers only Amudat, Kaabong, Kotido, and Moroto. One likely explanation is that the villages selected for Mercy Corps programming on the whole are poorer in livestock wealth than the average household in the region, and hence our mean TLU/capita is much smaller than what was found in the KRSU study.

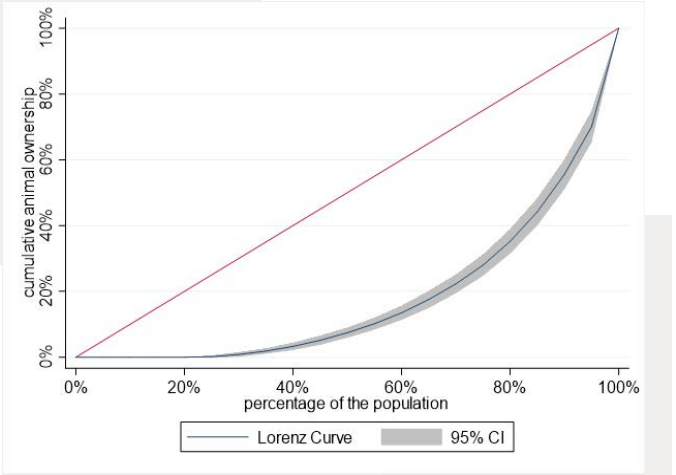
Figure 5. TLU per capita and 3.3 TLU threshold for "livestock poor."



Note: The red lines represent 3.3 TLU/capita, identified as the threshold to be considered NOT "livestock poor."

To further underscore the observed inequality in livestock ownership, we created a Lorenz Curve, which allows us to see what percentage of the population owns what percentage of the cumulative number of animals, with the red line depicting a perfectly equal society (Figure 6). The blue line represents the actual distribution of animals in our sample—the farther the blue line is from the red line, the more unequal the distribution. The Lorenz Curve underscores the extreme inequality of livestock ownership, with 50% of the sample owning fewer than 10% of the reported livestock.

Figure 6. Livestock ownership inequality.



Physical asset ownership

The physical asset that was the most commonly owned by households was a bladed tool or machete (*panga*) (95%), followed by a mobile phone (45% of households), an ox plow (30%), and a mattress (27%). Fewer than 1% of households reported owning a grinding mill, and only 3% had a wheelbarrow (Table 3). There was some correlation between different types of physical asset ownership, but not as strong as what was observed with livestock, with the strongest correlation between the luxury goods: mobile phone and mattress (Table 11 in Annex).

The distribution of total physical asset ownership, while still skewed, is far less skewed than when it comes to livestock ownership. A quarter of the sample owned at least three different physical assets and 25% owned six or more physical assets (Figure 7). The distribution of physical asset ownership underscores the greater equality across households when using assets as a proxy of wealth, at least with respect to livestock. In other words, physical assets are more equally distributed in the study population than livestock are. This is reflected in the Lorenz Curve, which shows that 50% of the sample own approximately 30% of the physical assets (Figure 8). While this finding on its own does not have implications for programming, what it does help us to do is to see how skewed the distribution of livestock is in comparison (comparing the two Lorenz Curves [Figure 6 vs. Figure 8], we see in the asset Lorenz Curve the blue line is closer to the red line than in the livestock Lorenz Curve). Physical assets are frequently used as a measure of wealth, but, if we were to use only physical assets, we would incorrectly assume that most households are somewhere in the middle regarding physical asset wealth, with a few slightly poorer and a few slightly

richer. But, when taking livestock into account in our understanding of wealth, a different picture emerges. Instead we find that MOST households are relatively poor, and only a few households report sufficient herd sizes as identified by the KRSU report.

Table 3. Physical asset ownership (min, max, 25th, 50th, and 75th percentile)

	Own at least 1	Minimum # reported	Maximum # reported	25th percentile	50th percentile *(median)*	75th percentile
Radio	15%	0	2	0	0	0
Mobile	45%	0	5	0	0	1
Mattress	27%	0	7	0	0	1
Solar panel	17%	0	2	0	0	0
Wheelbarrow	8%	0	3	0	0	0
Bicycle	12%	0	6	0	0	0
Motorbike	3%	0	1	0	0	0
Ox plow	30%	0	3	0	0	1
Panga	95%	0	10	2	2	3
Grinding mill	< 1%	0	1	0	0	0
Cart	6%	0	4	0	0	0

Figure 7. Distribution of total physical assets with percentiles.

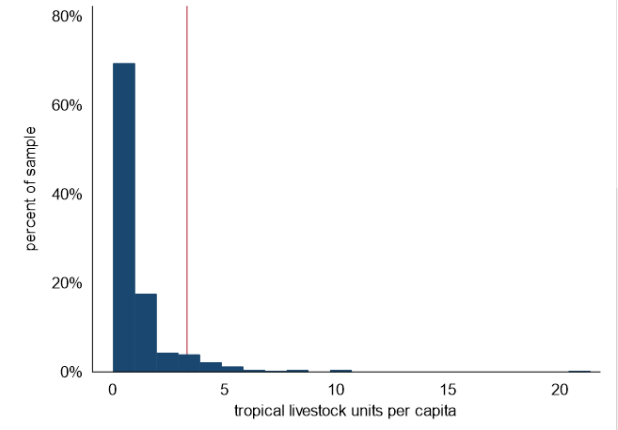
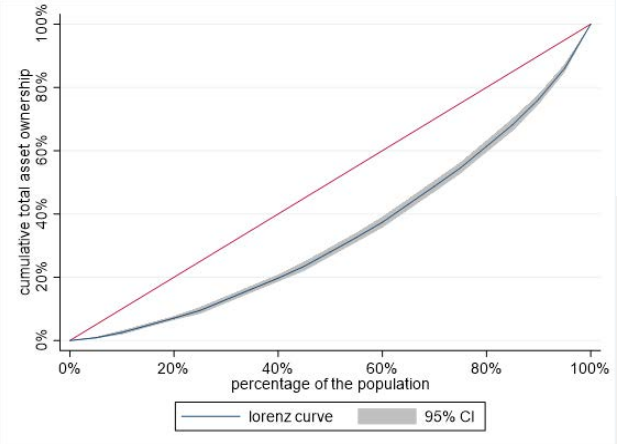


Figure 8. Lorenz Curve on physical asset ownership.



Note: The red lines represent percentiles: 25th percentile = 3; 50th percentile/median = 4; 75th percentile = 6.

Household expenditures

To better understand household wealth, we also looked at weekly, monthly, and yearly expenditures based on recall (Table 4). We categorized items by the expected frequency of purchase. Regarding weekly expenditure, the most common expenditure was on food and soap, with the least common expenditure being on water, charcoal, and public transit. The

Table 4. Weekly, monthly, and yearly expenditure (mean, min, max, 25th, 50th, and 75th percentile)

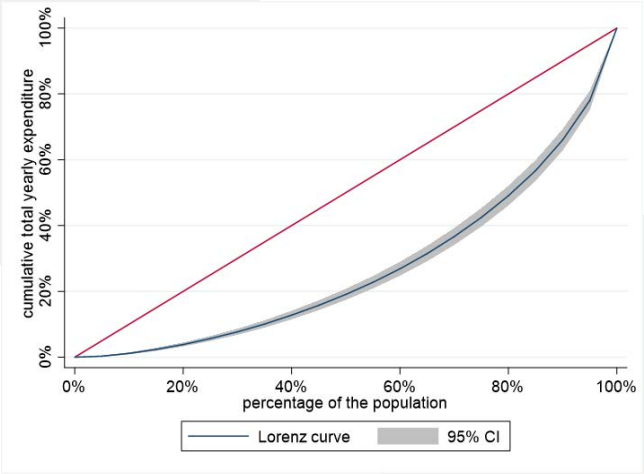
	Mean	Minimum # reported	Maximum # reported	25th percentile	50th percentile *(median)*	75th percentile
Food in the home	24,160	0	250,000	10,000	20,000	30,000
Food outside the home	3,848	0	260,000	0	1,000	5,000
Water	439	0	40,000	0	0	0
Alcohol or *Waragi*	6,324	0	205,000	0	2,000	6,000
Mobile credit	2,601	0	80,000	0	0	3,000
Charcoal	429	0	20,000	0	0	0
Soap	3,029	0	70,000	1,000	2,000	3,000
Public transit	1,892	0	60,000	0	0	0
Animal medicine	34,417	0	600,000	0	20,000	45,000
Fuel	1,690	0	250,000	0	0	0
Batteries	435	0	20,000	0	0	0
Loan	10,661	0	1,000,000	0	0	0
Rent	586	0	60,000	0	0	0
Agricultural inputs	8,400	0	1,200,000	0	0	0
Minor health	35,598	0	1,550,000	0	18,000	40,000
Education	136,749	0	3,700,000	0	1,250	80,000
Large appliances	65,119	0	10,000,000	0	0	10,000
Small appliances	24,838	0	360,000	0	0	40,000
HH* furnishings	9,485	0	1,000,000	0	0	0
Clothing	89,024	0	2,000,000	28,000	52,000	100,000
Health	114,456	0	3,500,000	0	45,000	150,000
Funeral	20,209	0	2,000,000	0	0	0
Marriage	298,145	0	15,000,000	0	0	10,000

* HH = household

largest weekly expenditure was on food, with 50% of all households spending at least 20,000 UGX a week on food. The largest monthly expenditures were on health, both animal and human. Interestingly, households, on average, spent about the same amount on both animal and human health monthly: about 35,000 UGX. Animal health-related costs are strongly correlated to TLU/capita ($p < 0.01$), while expenditure on human health is not. The largest yearly expenditure was on marriage, followed by education. However, these expenses were only reported by a small minority of the sample: 50% of households spend less than 1,250 UGX on education and/or zero on marriage.

To better understand overall expenditure, we combined weekly, monthly, and yearly expenditure into one variable (weekly*52+monthly*12+yearly). As with livestock and physical assets, the distribution was uneven, with approximately 50% of households representing less than 20% of total expenditure (Figure 9).

Figure 9. Lorenz Curve on total expenditure.

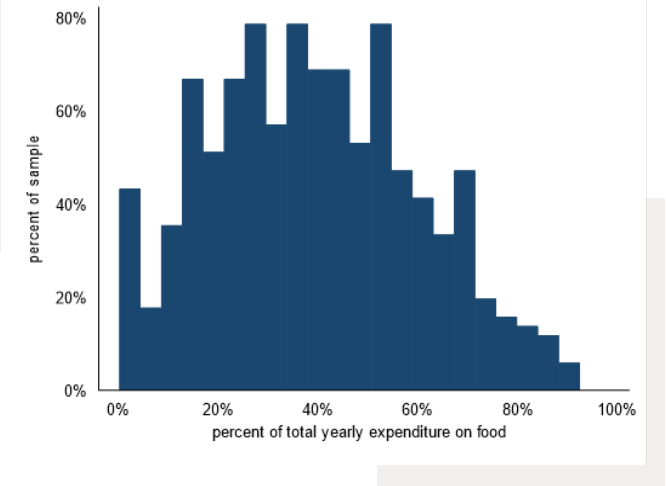


As with TLU, we also explored our "overall expenditure" variable by household size. This recalculation did not affect the overall distribution or inequality as measured by the Lorenz Curve. In general, total household expenditure was strongly correlated with household size (p-value < 0.01). A common indicator of wealth is the proportion of total expenditure spent on food—the higher the proportion, the poorer the household. Despite the skewness and inequality observed in our proxy wealth indicators—livestock, physical assets, expenditures—the distribution of what proportion of total expenditure was spent on food was almost normal (Figure 10), likely indicating that as wealth increases, households purchase more expensive products (and vice versa). We find that 50% of households (median was equal to the average in this sample) spend about 38% of their total expenditure on food and 75% spend 50% of total expenditure on food. This percentage (38%) varies drastically from the 65% of total expenditure spent on average on food identified in the baseline USAID data (data shared internally). The most likely reason for the discrepancy is the timing of the data collection. The data in this report were collected in October and November, shortly after the harvest, when households still have food stocks and prices at the markets are their lowest. The USAID data collection, on the other hand, took place in June and July and thus in the middle of the hunger gap, when household stocks are more likely to be depleted and market prices are higher. However, this pattern might look different for primarily pastoralist households, who have a greater hunger gap in January/February when animals are not producing milk. By June and July, pastoral households are normally able to rely on dairy products again, and they can eat more wild foods. Like many of the variables we are exploring, percentage of expenditure on food is likely to have extremely high seasonal variation.

Another important caveat in interpreting this variable, separate from seasonality, is that this measure does not allow us to capture households that might not spend any money on food because they are subsistence farmers or livestock owners, meaning they produce what they eat. These households might be extremely poor or extremely rich, which would not be captured by this variable. For example, the data show a significant (p-value < 0.01) but negative relationship with animal wealth, meaning the more livestock a household has, the lower the household's expenditure on food versus other expenditures. Specifically, the more beef cattle (p-value = 0.04), oxen (p-value = 0.06), and/or sheep (p-value = 0.04) a household owned, the significantly smaller the proportion of their total

income that went to food. However, it is worth noting that when regressing on overall expenditure on food (rather than a proportion of the total), the relationship with individual livestock ownership was either insignificant or actually positive in the case of oxen (p-value = 0.05). Thus, interpretation of this measure should be done with caution.

Figure 10. Proportion of total yearly expenditure on food.

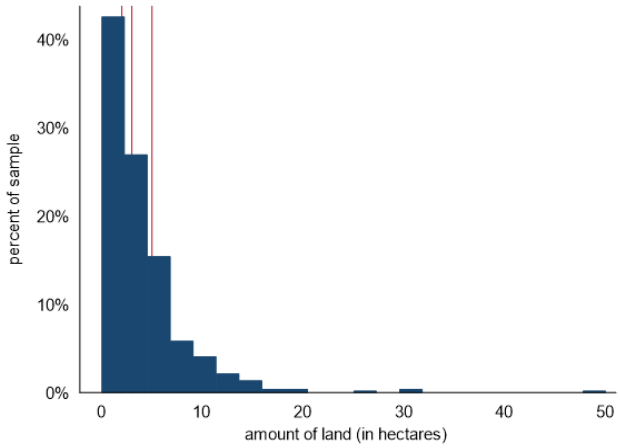


Land

As a final component of wealth, we looked at whether households said they had access to land for either cultivation or grazing and number of hectares of land "owned." This is a complex variable in this population, as land ownership is predominately customary in Karamoja. This complexity was partially reflected in the somewhat counterintuitive relationship between these three variables, with households that reported not having access to land for cultivation or grazing still reporting "owning" several hectares of land. We looked at the relationship between the amount of land households reported "owning" and whether they said they had access to grazing land or land for cultivation. Those households that reported they had access to land for cultivation on average had 4.3 hectares of land versus 1.2 hectares for those who reported not having access to cultivatable land ($p < 0.01$). The "amount of land" question is less of a reflection of grazable land, with households that said they had access to grazable land reporting "owning" 4.3 ha and households that reported not having access to grazable land "owning" 3.3 ha of land; this difference is still significant ($p = 0.02$) but clearly not as direct a relationship as with land for cultivation. The interpretation of these quantitative responses will have to be reviewed and unpacked with the qualitative data given the complexity of the concept of "land ownership" in this context.

Ninety-two percent of households reported having access to land, and, of those, 97% reported owning that land, likely through customary ownership. However, the amount of land owned was relatively small: 25% of households owned less than 2 hectares, 50% owned less than 3 hectares, and only 25% owned more than 5 hectares (Figure 11).

Figure 11. Distribution of land, with percentiles.



Note: The red lines represent percentiles: 25th percentile = 2; 50th percentile/median = 3; 75th percentile = 5.

Putting it all together

Finally, we wanted to better understand how the different components of wealth described above interact with each other and how we can potentially combine these variables to understand how different types of households might be wealthy in different ways. To do this, we used an approach called principal component analysis (PCA). This allows us to see how different aspects of wealth might cluster together. PCA identified two main clusters of wealth variables. The first

cluster represents households that are "wealthy" in livestock: they own cattle, sheep, goats, and oxen but at the same time are far less likely to own physical assets. In addition, they report higher expenditure on livestock-related products and medicine. We will call this "livestock-related wealth." The second component or cluster of variables identified using PCA shows a higher level of physical asset wealth. These households are more likely to own things like radios, wheelbarrows, and mattresses, and are less likely to own livestock, particularly large ruminants. They are also more likely to report a higher expenditure on agricultural inputs. We will call this "farm-related wealth" (Figure 12). The households that are wealthy in livestock are NOT the households that are wealthy in physical assets, and vice versa. While we included land in the PCA analysis, the result is more difficult to interpret. According to the PCA, land figured much more prominently into the "animal-related wealth" variable. This may be because pastoral households require more land for grazing, or perhaps because households in more arid areas have access to larger amounts of land that is of limited suitability for farming.

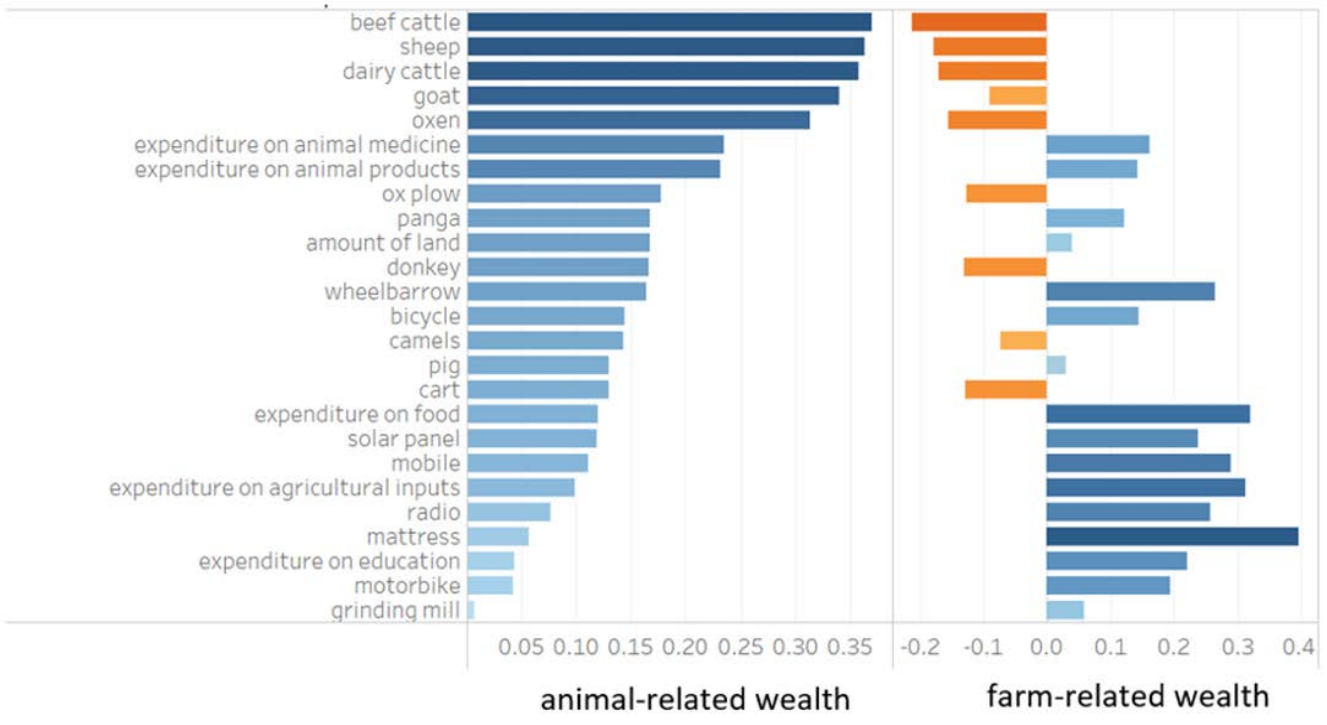
To better understand the role of market access on wealth, we will use these two components of wealth—livestock-related wealth and farm-related wealth—to understand what aspect of household wealth market expansion affects in the midline and endline.

Food security

In this section, we briefly explore our food security indicators: months of adequate household food provisioning (MAHFP) as reported by the respondent; MAHFP as reported by the food preparer; household dietary diversity index (HDDI); and number of different food-related coping strategies adopted.

MAHFP captures the number of months that a household considers itself food insecure. We collected this information from both the respondents (normally male) and the food preparers (normally female). On average, respondents reported 4.8 months (out of 12) of food insecurity compared to the 3.5 months reported by the food preparers. While the two MAHFP indices are strongly and

Figure 12. Using PCA to understand wealth.



significantly correlated (p-value < 0.01), they are also significantly different (p-value < 0.01), with food preparers reporting fewer food-insecure months. Not surprisingly, the most food-insecure months are June and July, immediately prior to the harvest, and the most food-secure months are November and December, after the harvest (Table 5). Interestingly, the time of year when there is the greatest discrepancy between the respondents and the food preparers is at the time of the harvest, with the food preparer significantly less likely to say her household was food insecure in September through December. This is likely a reflection of the roles in the household, with women more actively participating in farming activities and men in livestock-related activities, which have slightly different seasonal calendars.

Table 5. Percent of households that are food insecure, by month and respondent

Month	Respondent	Food preparer
January	39%	38%
February	43%	44%
March	48%	51%
April	52%	54%
May	56%**	59%
June	64%	64%
July	62%	65%
August	38%	38%
September	33%*	30%
October	32%**	28%
November	24%***	19%
December	25%***	15%

* significant at p-value < 0.10; ** significant at p-value < 0.05; *** significant at p-value < 0.01

We collected information on dietary diversity using the HDDI (recall period referred to the previous day). This information was only asked of the food preparer. On average, households consumed 3.2 food groups. Grains were the most common food group, consumed by 94% of households, followed by vegetables (77%) and dairy (55%) (Table 6).

Table 6. Percent of households consuming certain food groups

Month	Respondent
Grains	94%
Roots	12%
Vegetables	77%
Fruits	13%
Meats	21%
Eggs	12%
Fish	4%
Pulses	34%
Dairy	55%
Fat	38%
Sugar	37%
Other	29%

Finally, we looked at coping strategies related to food consumption. While the strategies were adopted from the Coping Strategies Index (CSI),[8] the current calculations do not include weights based on severity of the coping strategies. Furthermore, we included these questions as "yes" or "no" questions for the past 12 months rather than "number of days in the past seven days" that the coping strategies were used. The reason for that is that, as part of future quantitative analysis, we will be exploring changes in both short- and long-term coping strategies, which

8 D. Maxwell and R. Caldwell, 2008, The Coping Strategies Index: A tool for rapid measurement of household food security and the impact of food aid programs in humanitarian emergencies. Field methods manual, 2nd edition, January.

do not lend themselves to the same construction as the CSI because they can be one-off strategies.[9] These questions were only asked of the food preparer. The least-common strategy was reducing consumption of household members for working adults to eat, and the most common was skipping a meal (Table 7).

Table 7. Food-related coping strategies in past 12 months

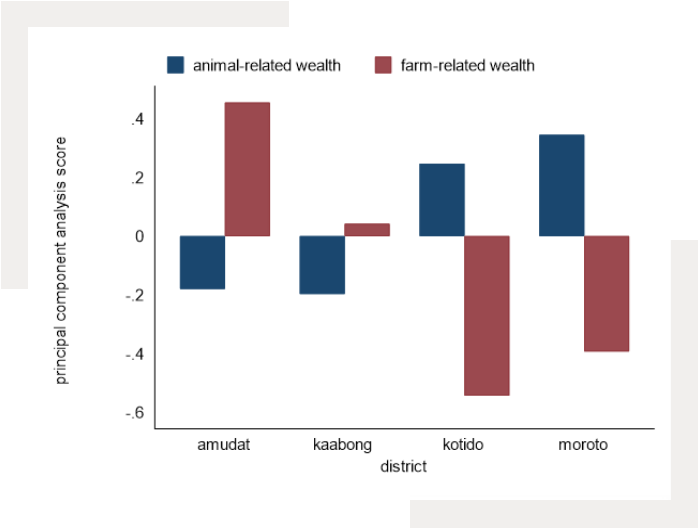
Coping strategy in past 12 months	% of hh
Reduce consumption in order for children to eat	48%
Reduce consumption in order for working adults to eat	4%
Skip a meal	64%
Consume wild food	56%
Harvest crops	35%
Consume seeds	46%

Who is wealthy in "animal-" vs. "farming-"related wealth

In this section, we briefly look at how our "animal-" and "farming-"related wealth composite indicators correlate with a range of household characteristics. We look at geographical, demographic, livelihood, food security, and shock differences across the two wealth indices. The data support our wealth construction variables.

There is a clear geographical distribution between households that rank high in animal- vs. farm-related wealth (Figure 13). When looking at sub-counties, there was a large distinction as well, with Karenga and Amudat sub-counties (in Kaabong and Amudat Districts respectively) exhibiting the greatest farm-related wealth, while Kaabong East and Karita (both in Kaabong), and Panyangara (in Kotido District) had the greatest animal-related wealth. We also collected information on whether the household lived in a compound (*manyatta*) or stand-alone structure[10] (i.e., living outside of a *manyatta*). We found no relationship with animal-related wealth, but a weak relationship with farm-related wealth, with households living in stand-alone structures having slightly more farm-related wealth ($p = 0.07$).

Figure 13. Animal- and farm-related wealth PCA score by district.



Next, we looked at how our different wealth indices were correlated with access to natural resources, specifically water for consumption, water for cultivation, water access in the dry season, land for cultivation, land for grazing, and access to firewood. There was a general association between greater access to natural resources and greater wealth, but it was not consistent across the two wealth variables. Households rich in animal wealth also were more likely to report greater access to land for cultivation ($p < 0.01$) and water in the dry season ($p = 0.08$). Households rich in farm-related wealth were more likely to report having access to land for grazing during the dry season ($p < 0.01$), water for cultivation ($p < 0.01$), and water during the dry season ($p = 0.02$). Both households rich in animal- and farm-related wealth were significantly less likely to report access to firewood ($p = 0.05$).

9 Some of our coping strategies are more long term and non-reversible such as "Did you sell any livestock?" Because we cannot really ask "How many days in the past seven days did you sell livestock?" we adapted all of our coping strategies to be "yes/no" questions.
10 We collected these data as we had learned anecdotally of some people opting to set up homesteads outside of the traditional *manyatta* structure. We were interested to see if these individuals differed in wealth and/or livelihood profile from the general population.

We also wanted to understand if and how household demographics might vary across our two wealth indices and thus looked at household size, the dependency ratio, number of adults, number of children (it is worth noting that these four variables are highly interdependent), age of the household head, sex of the household head, education of the household head, and marital status of the household head. Households with greater animal wealth tended to have a significantly larger household size, with a higher dependency ratio ($p = 0.05$ for both). Breaking it down further, we found that the greater the animal-related wealth, the more children a household had and the fewer adults ($p = 0.06$ for both). There was no relationship between household composition and farm-related wealth. The characteristics of the household head, on the other hand, were correlated with *both* animal- and farm-related wealth. Male-headed households were significantly ($p = 0.01$ and $p = 0.03$ respectively) correlated with higher animal- and farm-related wealth. Marriage status was also correlated with household wealth, but in the opposite direction with the two types of wealth we are exploring. Household heads who were in polygamous relationships had significantly higher animal wealth compared to households in monogamous relationship ($p < 0.01$); the opposite relationship existed with farm-related wealth, with household heads in monogamous relationships reporting significantly higher farm wealth than those in polygamous relationships ($p = 0.08$). Education of the household head was positively and significantly ($p < 0.01$) correlated with farm-related wealth only.

Despite the assumption of high rates of pastoralism in Karamoja, 72% of all households reported own cultivation as their primary source of income, followed by bush products (8%), and only 7% reported animal trade or livestock. However, when you look at tertiary income, 45% of all households reported either livestock, animal trade, or animal products. It is important to note here that a household could be rich in animals but not have income from livestock because they are not selling them or their products on the market. There were some interesting distinctions in the two types of wealth based on the primary reported income. The primary income with the highest reported farm wealth was motorcycle taxi (*boda boda*), business, mining, and wage labor. The primary livelihood with the highest animal-related wealth was *boda boda*, business, livestock ownership, and digging wells (but only one person reported this, so it can be ignored). Farm-related wealth was also strongly correlated ($p < 0.01$) to having a member of the household migrate; there was no such relationship with animal-related wealth.

We also wanted to better understand how our two indices might be correlated with food insecurity. We looked at number of coping strategies used, MAHFP according to the respondent, MAHFP according to the food preparer, and HDDI according to the food preparer. There was no relationship between either of the MAHFP variables and animal- or farm-related wealth. However, both wealth measures were correlated with coping strategies but in opposite directions. The more animal wealth a household had, the more coping strategies they reported using ($p = 0.07$); at the same time, the more farm-related wealth a household had, the fewer coping strategies they used ($p = 0.02$). However, when breaking down the analysis between wealth and individual coping strategies, we do not see a relationship with animal-related wealth. We do see a relationship between some individual coping strategies and farm-related wealth. The more farm-related wealth a household had, the less likely they were to report consuming seed stock before planting ($p = 0.04$), harvesting immature crops ($p = 0.01$), and/or reducing consumption so working adults could eat ($p = 0.09$). It is worth pointing out that the first two coping strategies specifically relate to farming, and so it makes sense that we would not necessarily see a relationship with animal-related wealth. Finally, we asked households if they had sold any livestock in the past year as a long-term coping strategy. We found no relationship with farm-related wealth, but a highly significant ($p < 0.01$) and positive association with animal-related wealth—the more animal-related wealth a household had, the more likely they were to report having sold animals. This likely indicates that we are not necessarily capturing coping but rather the ability of wealthier households with more animals to sell livestock as part of their livelihood. Farm-related wealth was also positively correlated with the HDDI. These findings are not

altogether surprising, especially given the timing of the data collection (right after harvest), when we would expect that households with greater farm-related wealth might have better food security and nutritional diversity.

Finally, we explored how the different wealth variables might be associated with the experience of shocks. We found that animal wealth was significantly correlated with total number of shocks experienced in the past year ($p < 0.01$), while farm-related wealth was not. When looking at individual shocks, animal-related wealth was correlated with higher reporting of inadequate rains ($p = 0.01$), flooding ($p = 0.03$), livestock disease ($p = 0.01$), and crop destruction due to weather ($p < 0.01$). Farm-related wealth was correlated with fewer households reporting late rain ($p = 0.03$) but more households reporting inadequate rains ($p = 0.01$). It is a bit difficult to interpret these relationships, as households with more wealth have more to lose and so could be more, rather than less, affected by shocks. We will use shocks as a mediating factor to understand the relationship between market expansion and our wealth variables in future temporal analysis.

Market access and quality

In this section, we look at the quality of and access to markets. As a proxy for market quality, we look at the total number of different products available at the market. Specifically, we ask about the availability of lentils, cereals, fruits, oil, seeds, agricultural tools, livestock inputs, sheeting, and construction material (Table 8). On average, most households reported that these goods were available. For example, 94% of households said agricultural inputs were available, 90% said cereals were available, and 89% said oil was available. Seeds were the least available of the products asked about in the survey, and yet 71% of households still reported having them in the market. On average, out of the nine goods asked about, households reported that their market had almost seven of them.

Table 8. Availability of goods at market

Products	Percentage that said product was available
Lentils	79%
Cereals	90%
Fruits	84%
Oil	89%
Seeds	71%
Agricultural tools	78%
Livestock inputs	94%
Sheeting	87%
Construction materials	66%
Average # of goods	**6.8**

Next, we asked about the distance households had to travel to reach a market to get a better understanding of access. Unlike the market quality variable, there was far more dispersion regarding travel time. On average, households reported traveling about two hours, with some reporting as little as 2 minutes of travel to a portion of households reporting up to four hours to reach a market (Table 9).

Table 9. Travel time to market

Travel time	% of sample
Less than an hour	13%
1–2 hours	32%
2–3 hours	25%
> 3	30%
Total	**100%**

An inverse and significant relationship was observed between quality and distance: the farther the reported market, the fewer the goods it carried. We created a composite index of both access and quality by taking the inverse of the number of products available (so that it has the same directionality as the access variable) and multiplying it by distance. The composite market access and quality variable will serve as our primary input variable and how we will define whether there has been an expansion in markets over the course of the five-year study. Thus, the farther and lower the quality of the market, the higher the index, and vice versa.

Relationship between markets, wealth, and the intensity of Mercy Corps programming

In this section, we briefly look at the relationship between our main input and output variables. Given that the data are highly skewed to the right, we use a negative binomial regression. No significant relationship was observed between our two wealth indicators (PCA farm wealth and PCA animal wealth) and both the market index variable and its components. This is not surprising when visually exploring the relationship between wealth and market quality/access. There is a fanning effect, meaning at higher ends of the distribution, the relationship is quite tight (poor access/lower-quality markets has a distribution of wealth that is quite homogenous and tight), but as you approach higher-quality and closer markets, the distribution of wealth expands, and you get a much greater distribution of wealth (Figure 15 in Annex).

We also looked at the relationship between our Mercy Corps programing variable (high intensity vs. low intensity programming) with respect to both market quality/access and our two wealth variables using a logit regression. There was no observed relationship with market quality/access, no relationship with animal wealth, and a relatively weak negative relationship with farm wealth (p-value = 0.07). The latter implies that Mercy Corps has slightly more programming in areas with low farm-related wealth, but there is no such relationship with animal wealth.

Discussion and program implications

In this section, we briefly summarize the findings from the baseline study, focusing on the characteristics of wealth, food insecurity, and market access of the Mercy Corps Apolou communities. We then discuss program implications. However, it is important to note that the goal of the study is to understand how *changes* in market access and intensity of Mercy Corps programming affect *changes* in wealth in the selected communities, and therefore the baseline findings are only an interim report until the midline (2019) and endline (2020) data are collected to allow us to look at change over time. Another important consideration is that, given the high level of seasonality in this region, these findings are primarily representative of the harvest period when the data were collected. While we can extrapolate some findings, others around, for example, food insecurity are likely specific to this season.

Most households reported owning some type of livestock. The most common reported livestock were dairy cattle, beef cattle, and goats. However, while most households do own livestock, the distribution of that livestock is extremely uneven. The majority of households own only a few animals, and most of the livestock wealth is concentrated in only a handful of households. Half of the households in our sample held only 10% of all reported livestock (this distribution held when looking at TLU as well as TLU/capita). Comparing this to the distribution of physical assets or expenditure—both common proxies for household wealth—we see how skewed the livestock distribution really is. When it comes to physical assets and expenditure, half of the sample own approximately 30% of total physical assets and spend 20% of total expenditure compared to owning 10% of total livestock. Of all the wealth variables explored in this analysis—livestock, physical assets, expenditures, land—the livestock distribution was the most unequal. It is also worth noting that, while there might be bias in reporting the exact amount of livestock a household owns, we can assume that the distribution, and hence relative livestock ownership, is accurately reflected.

We also found that the sampled Mercy Corps program villages are likely more livestock poor than Karamoja more broadly is. The KRSU report found that in Karamoja a little less than half of all households are above the 3.3TLU/capita threshold identified by the report as required for a livestock-based livelihood. In our sample, only 5% of households met this threshold. While there are numerous differences between the representation and sampling of the two studies, the most likely explanation for this difference is that the villages selected for Mercy Corps programming are poorer in livestock wealth than the average household in the region, and hence our mean TLU/capita is much smaller than what was found in the KRSU study.

The data also showed that there was a correlation between the types of livestock a household owned. The largest correlation was between dairy cattle and goats and between beef cattle and sheep, meaning households that owned dairy cattle were more likely also to own goats, and households that owned beef cattle were more likely also to own sheep. For example, two-thirds of the households that reported owning at least one beef cow also owned at least one sheep. This combined ownership was clustered by location, with almost 90% of households in Kalapata reporting owning both types of animals compared to Lokori, where not a single household reported owning both. The geographical distribution and clustering of different types of animals likely indicates specific preferences based on ecological zones and diversification for the market.

The low level of relative livestock ownership is also reflected in the primary reported source of income in the survey. Almost three-quarters of households reported "own cultivation" as their primary source of income, followed by bush products (8%). Seven percent reported trade in animals or livestock.

The role of livestock came out a bit more clearly when reporting tertiary income, with almost half of households saying that livestock, animal trade, or animal products was their main source of income.

Given the variety of collected wealth measures and importance of farm-related income (whether by choice or not) as well as livestock in Apolou, we wanted to better understand how the different components of wealth (types of livestock, types of physical assets, types of expenditures, and land ownership) related to each other. To do this, we used PCA analysis. This approach identified that there were two clusters of wealth variables. The first cluster of correlated variables primarily identified greater livestock ownership, lower physical asset ownership, and a higher expenditure on livestock-related products and medicine. The second component of clustered variables identified households that were more likely to own items like radios, wheelbarrows, and mattresses but less likely to own large ruminants and had a higher expenditure on agricultural inputs and education. Thus, to put it simply, the PCA identified livestock-related wealth and farm-related wealth as two separate wealth indices. These two wealth variables were not correlated to each other, meaning the households that are wealthy in livestock are not the same households that are identified as wealthy in physical assets.

The data also show that households that are rich in these different indices look very different from each other and have different priorities. In order to better understand who is livestock wealthy vs. who is farm wealthy, we correlated these two different indices of wealth with household characteristics and found very different patterns. Households that had high farm-related wealth mostly come from Karenga and Amudat sub-counties, were more likely to live in *manyattas* (compounds), had male household heads, were in monogamous relationships, and had a household head with a higher level of education. Households rich in animal-related wealth, on the other hand, tended to live in Kaabong East, Karita, and Panyangara sub-counties, had larger households, particularly in terms of the number of children, were in polygamous marriages, and had a male household head. Importantly, for animal-related wealth, education had no correlation with higher or lower wealth, in contrast to the relationship observed with farm-related wealth. The low importance of education when it comes to animal-related wealth is also clear in the construction of the index itself, in which expenditure on education is not correlated with large livestock ownership but is correlated with greater physical asset ownership.

There was also a difference between the two indices and food insecurity. At the time of the survey (right after harvest), the richer the household in farm-related wealth, the less likely they were to report using food-related coping strategies, specifically picking immature crops, consuming next year's seed stock, and reducing consumption of certain household members so working adults could eat. Households rich in farm-related wealth were also more likely to have a diverse diet (using HDDI). The higher the animal-related wealth of a household, the more coping strategies they used, but there was no relationship with any other food security variable. The food insecurity data also highlighted intra-household variability. Using the retrospective measure of food insecurity (MAHFP), we found that the respondent (generally male) reported more months of food insecurity than the food preparer (generally female). The difference was most stark during the harvest period, with the food preparer significantly less likely to report that the household was food insecure from September through December. Both findings likely reflect that, at the time of the harvest, households and household members engaged in farming-related activities are better off than households and household members who are more reliant on livestock.

Market quality, as measured by the number of goods available, was quite high in our sample. However, again, this is likely a reflection of the timing of the survey, immediately following the harvest. Still, 94% of households said agricultural inputs were available, 90% said cereals were available, and 89% said oil was available. Seeds were the least available of the products asked about in the survey, and yet 71% of households still reported having them in the market. On average, out of the nine goods asked about, households reported that their market had almost seven of them. However, the distances households had to travel to a market were extremely far. On average, a household reported travelling for two hours to reach a market, with some reporting up to four hours of travel. The farther the market, the

fewer reported goods it carried. However, there was no relationship between either of our wealth indices and reported quality of or distance to a market. Nor was there a relationship with Mercy Corps program layering.

Finally, we wanted to see if Mercy Corps initial layering of programs had any correlation with wealth. We already know, from the comparison to the KRSU data, that the Mercy Corps communities appear significantly more livestock poor than Karamoja more broadly, but does the layering reflect intra-community differences? We did find a weak, but still significant, relationship with farm-related wealth. The less farm-related wealth a household had, the more likely they were to live in a community that received more Mercy Corps programs. However, there was no relationship between layering and animal- related wealth.

Program implications

These findings have some initial implications for Mercy Corps programming. The overarching conclusion from the baseline data is that the region is extremely heterogenous in terms of markets, livelihoods, and ecological conditions and that household practices reflect this heterogeneity. Programming needs to be equally varied. Even when it comes to livestock support, different regions are focused on different livestock and different diversification of livestock. Mercy Corps programs need to correspond to the preferences and specialization of each community or region. Mercy Corps' approach to layering programs is a particularly good fit for such a heterogenous environment, if the different programming components can be targeted appropriately.

In the baseline data, it appears that the initial communities were targeted based on lower livestock wealth (at least compared to the KRSU findings, which are meant to be representative of Karamoja). However, the layering of programs seems to be more a reflection of traditional proxies of wealth such as assets and expenditure on agricultural products rather than livestock. While this works for households that are poor in farm-related wealth, the layering should also reflect the variation in animal-related wealth. The program should explore how it can target some of the layering of interventions based on livestock ownership and animal-related expenditure.

A major, but not unexpected, finding is that different households appear wealthy in different assets, livestock, and expenditures. The clustering of these wealth proxies seems to reflect different livelihood specializations. Some households are wealthier in assets and expenditure related to farming, while others are wealthier in livestock and expenditure related to animals. These households have very different characteristics and geographic locations and thus likely have different programming needs. Mercy Corps programs need to reflect this heterogeneity, with greater support of livestock-related activities in some communities and greater support of farming-related activities in others. This variability in specialization and associated household characteristics might also affect the take-up of certain programs. For example, there was a clear relationship between expenditure on education and association with education for households that had greater farm-related wealth, but education had no correlation with animal-related wealth. Thus, it is important that household preferences and priorities be consistently reflected in the programming itself.

The data also show possible heterogeneity within the households, specifically in terms of perceptions of food insecurity. Particularly in households where gender is correlated to different livelihood specializations, programs need to support the different needs and livelihood priorities accordingly, rather than treating the household as a homogenous unit.

Finally, all the wealth-related proxies explored in this report show an incredibly high level of inequality, particularly with livestock. Considering that improved market access and support is a key pillar of Mercy Corps programming in Apolou, it will be critical to make sure that any intervention does not exacerbate the existing observed inequalities and instead serves to lift those households showing the lowest animal- or farm-related wealth. And that is precisely the research question that the midline and endline data will help us answer: How are changes in market access and quality as well as Mercy Corps program layering associated with changes in household animal- and farm-related wealth?

Annex. Additional tables and figures

Figure 14. Normal distribution example.

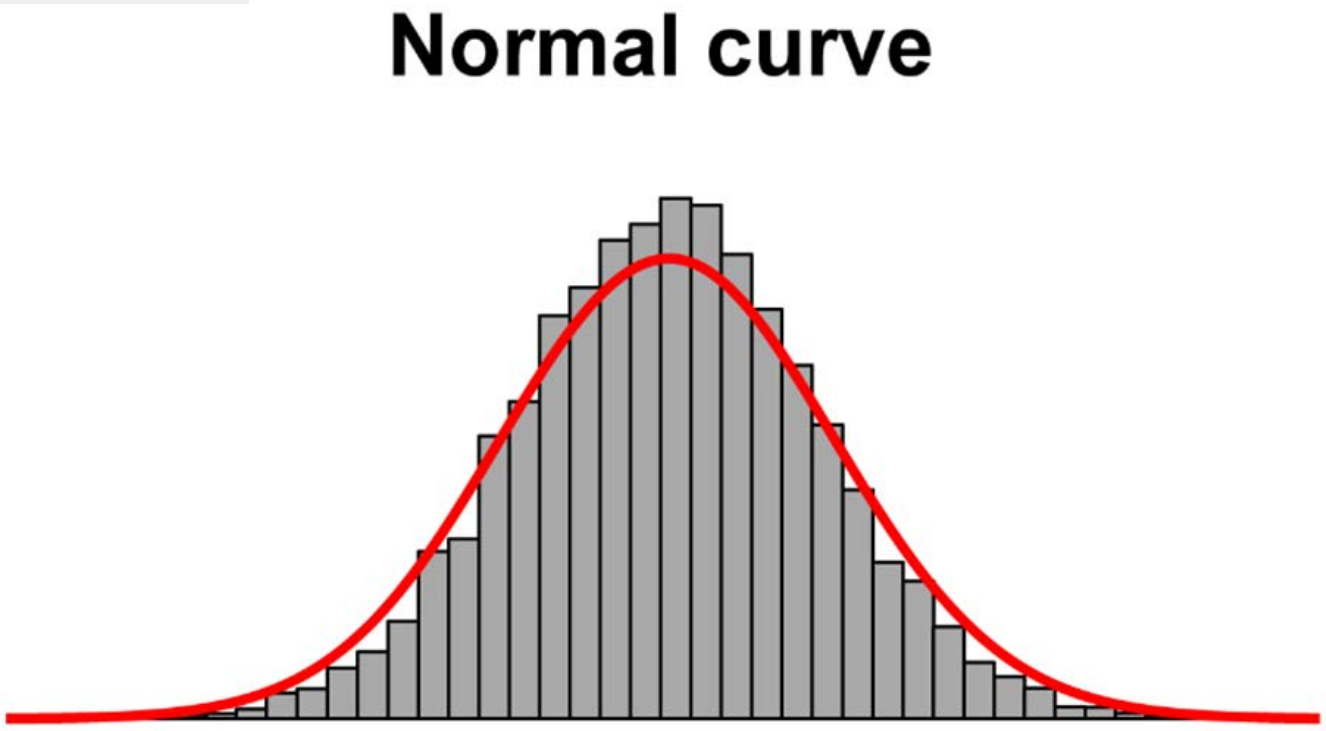


Table 10. Correlation between different types of livestock

	Dairy cattle	Beef cattle	Oxen	Donkeys	Camels	Pigs	Sheep	Goats
Dairy cattle	1							
Beef cattle	0.5502*	1						
Oxen	0.3621*	0.3888*	1					
Donkeys	0.063	0.1153*	0.3242*	1				
Camels	0.4145*	0.0823	0.0542	-0.021	1			
Pigs	0.0269	-0.0178	0.0463	0.021	-0.007	1		
Sheep	0.3410*	0.5640*	0.2662*	0.2682*	-0.0066	0.3948*	1	
Goats	0.5297*	0.4032*	0.2325*	0.0811	0.3912*	0.0398	0.3627*	1

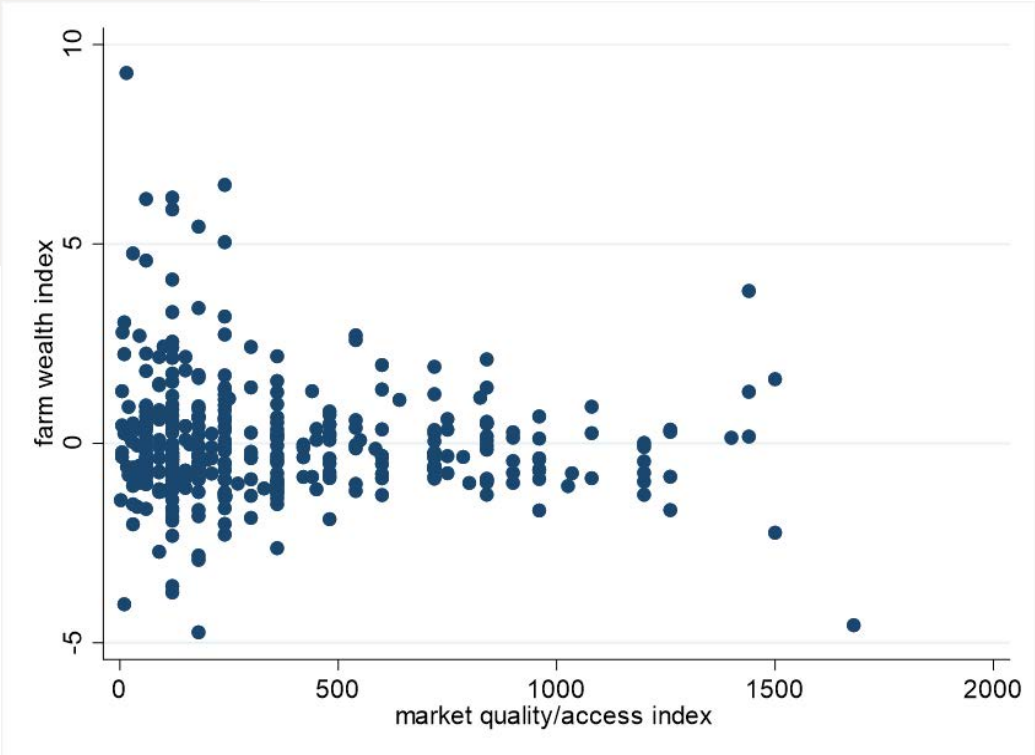
* significant at p-value < 0.10

Table 11. Correlation across physical asset ownership

	Radio	Mobile	Mattress	Solar panel	Wheel-barrow	Bicycle	Motorbike	Panga	Ox plow	Grinding mill	Cart
Radio	1										
Mobile	0.27*	1									
Mattress	0.21*	0.37*	1								
Solar panel	0.23*	0.23*	0.21*	1							
Wheelbarrow	0.21*	0.17*	0.21*	0.24*	1						
Bicycle	0.10*	0.10*	-0.01	0.13*	0.18*	1					
Motorbike	0.19*	0.11*	0.13*	0.04	0.01	0.11*	1				
Ox plow	0.02	0.01	-0.13*	0.05	0.12*	0.11*	-0.02	1			
Panga	0.01	0.02	0.10*	0.01	0.21*	0.09*	0.05	0.11*	1		
Grinding mill	0.05	-0.01	0.04	0.04	-0.01	-0.01	-0.01	-0.03	0.01	1	
Cart	0.05	0.07	-0.09*	0.06	0.10*	0.11*	-0.04	0.20*	0.01	-0.01	1

* significant at p-value < 0.10

Figure 15. Relationship between farm wealth and market quality/access.



The Feinstein International Center is a research and teaching center based at the Friedman School of Nutrition Science and Policy at Tufts University. Our mission is to promote the use of evidence and learning in operational and policy responses to protect and strengthen the lives, livelihoods, and dignity of people affected by or at risk of humanitarian crises.

Twitter: @FeinsteinIntCen

fic.tufts.edu