



Climate Resilience

Understanding customers in
environments of
severe climate-related weather
events

QUANTITATIVE FINDINGS FROM NIGERIA

February 2024



This work was conceived and funded by CGAP as input to CGAP research on climate change and financial inclusion. It has not been peer-reviewed or edited by CGAP. Any conclusions or viewpoints expressed are those of the authors and may or may not reflect the views of CGAP.

What is the research about?

MOTIVATION



Interventions to mitigate climate impacts have not focused on developing resilience strategies at the individual and household levels of the most vulnerable communities.

The development of the current research study was motivated by CGAP's fundamental belief that financial services can play a vital role in helping these populations reduce the impact of and adapt to specific climate risks.

PURPOSE



Conduct a demand-side study in Nigeria and Bangladesh –two countries that are prone to severe weather-related climate impacts such as droughts, floods, and cyclones– to thoroughly understand how these climate disasters affect the lives and livelihoods of their most vulnerable communities and learn what financial resilience strategies they implement -if any– to cope with the effects of these events.

POTENTIAL APPLICATION



Provide insights into vulnerable populations' experiences and struggles during climate risk events and provide guidance to stakeholders to help build ad-hoc financial services that strengthen these communities' financial resilience to climate impacts.

About Decodis and MSC

Decodis and MSC partnered to complete the different components of this research



Decodis is a social research company that actively gives people the space to express themselves to elevate our understanding of their lived experiences and opinions. We use methods that are high-powered, scalable, and low-cost and have proven to be effective in helping organizations understand and better serve their target populations.



MicroSave Consulting (MSC) is a consulting firm that has pushed the world towards meaningful financial, social, and economic inclusion. We partner with participants in financial services, enterprise, agriculture, and health ecosystems to achieve sustainable performance improvements and unlock enduring value.

This comprehensive research was done in four parts



Nigeria

Qualitative study



YOU ARE HERE



Quantitative study



Bangladesh

Qualitative study



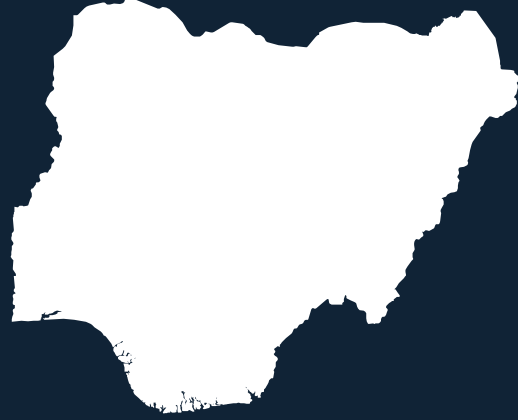
Quantitative study



MSC's additional study in Bihar, India

Smallholder farmers' climate-resilience index

Impact of climate change on smallholders and their coping strategies



Nigeria Quantitative Study

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I. Summary of Findings

Key findings 1/2

Severe weather patterns

- In Nigeria, the most recent climate-related weather event in **Kano and Enugu states were two-fold:**
 - First, **intense heat and late rains which impacted key livelihoods** – cassava and goats – by killing cassava plants and causing potentially life-threatening impacts to goats
 - Second, **intense rains that followed washed any seeds or young cassava plants** that farmers tried to replant once the rains came or caused disease for goats

Implications on livelihoods

- Cassava farmers **reported 47% lower profits in Kano and 62% lower profits** in the climate-impacted year than in the previous year when weather was “normal.”
- Goat farmers reported **losing 25% of their herd in Kano and 33% of their herd in Enugu** during the climate-impacted year.
- Women received **50% less in remittances in Kano and 20% less in Enugu** than men during the climate-impacted year.

Reactive actions

- More **respondents took action in the first phase** of the climate event rather than the second. However, their actions were **reactive** to the effects of climate-related weather as they were seeing them and **not pre-emptive**.
- The most-often used action for cassava was to try **to manage water to keep the plants from dying**. This was mostly financed by savings from savings groups. The most-often used action for goats was **to improve their shelter**. This was most often financed by selling either a goat from the herd itself or stored crops.
- More than **90% of respondents said they would keep cassava and goats as their livelihoods**. When they discussed what they would do if the following year had the same severe weather, they mentioned more of the same types of actions. This suggests that they are attempting to be **climate resilient but not adaptive**.

Key findings 2/2

Implications for financial tool preferences

- A combination of text and speech signal analysis on questions about **what respondents wished they had during the climate-impacted year** shows that:
 - Test analysis showed that respondents split between those that implied that **their financial strategies had been adequate versus those who had not felt they were adequate**. However, this text analysis reflects respondents' opinions about how well they recovered, not how well they prevented loss.
 - Speech signal analysis **provided more insights**:
 - The **most engaged speech signal** and implied success of financial tools¹ were:
 - Savings groups loans
 - Savings in the bank
 - Savings group savings
 - For women, there **was much more positivity expressed about savings**, such as savings group savings, savings in the bank and stored crops.¹
 - For men, there was **much more positivity expressed about loan products** such as savings group loans, bank loans and borrowing from a person. Men reflected negativity towards using money from other crops on the farm, money sent by relatives, livestock sales and savings group savings.
 - That said, **the top three financial tools were not without criticism** from the respondents
 - **Savings group loans are fast but not large enough**. Most savings group loans were between ₦100,000 – ₦200,000 while the costs of interventions were closer to ₦300,000 – ₦500,000.
 - **Banks are too far away to deposit** savings on a frequent basis. There needs to be more progress with branchless banking in these areas of Nigeria.

¹ As discussed in the deck, respondents commented on how much harder it has become in intense rains to keep stored crops dry and to prevent them from spoiling. So, although this strategy was highly ranked high, we felt there was indication from respondents that it might not be a good future strategy. This is an important point for women because they rank stored crops highly which reflects a lack of financial options.

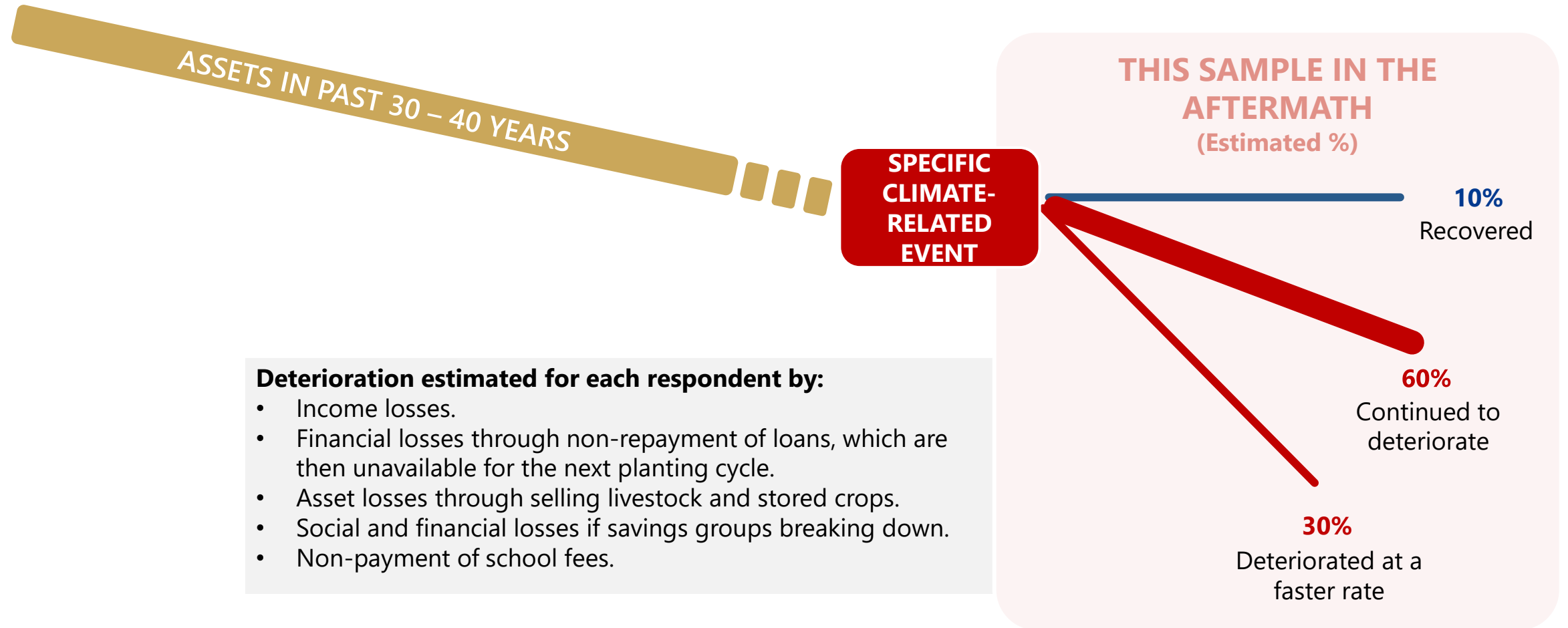
II. Setting Context

What insights did this study provide on how to think about vulnerable households' resilience to climate change and which financial services could help?

A climate-related event cannot be understood by only looking at a single period in respondents' lives



These households went into a specific climate-related event on the back of years of asset decline. This has implications for how we define “resilience”



III. Research Details

Objectives



Understand **how vulnerable communities in Nigeria are affected by climate change** –particularly weather-related disasters such as droughts and heavy rains– and how their experiences differ based on different livelihoods.



Learn **what resilience measures they undertake to prepare for and cope during these events** and whether they are effective, sustainable, or neither.



Provide insights into the **role financial strategies can play to help the vulnerable effectively adapt and grow more resilient to climate change**, which constraints impede that role, and what meaningful actions can help overcome those constraints.

How did the qualitative methods influence the quantitative methods?

The qualitative showed us – mostly through the maps themselves:

- **“Livelihood agility”**: how respondents changed livelihoods (both farming and non-farming) significantly over time as a means of coping.
- **Women’s increased involvement**: we learned that women became involved in livelihoods over time as a means of coping.
- **Non-livelihood circumstances**: what was happening to i.e. big changes in nutrition and education (in the north), less changes in health.
- **Non-financial assets**: changes over time of non-financial assets, like land and livestock herds.
- **Few supportive institutions**: MFIs, government, NGOs, financial services.

But it didn’t capture well:

- **How financial services were used** – need shorter time frames and specific events.
- **Direct response from respondents**: How respondents described what they did in their own words. Transcripts showed very short responses compared to lengthy responses in the quantitative open-ended responses.
- **Unable to quantify** finance, income, multi-use strategies
- **Level of quality of the quantitative** did not justify the expense and the danger in northern Nigeria.¹

¹MSC used their qualitative methods to collect more information about supportive institutions in Bangladesh. We will pick up long-term perspectives in the quantitative survey in Bangladesh.

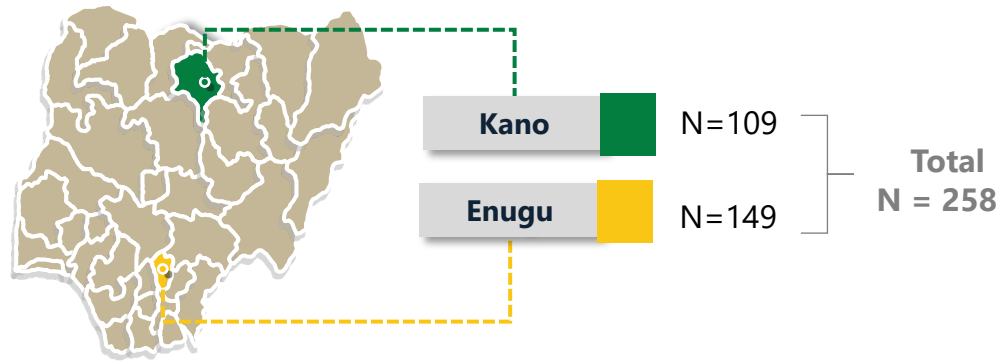
Methodology



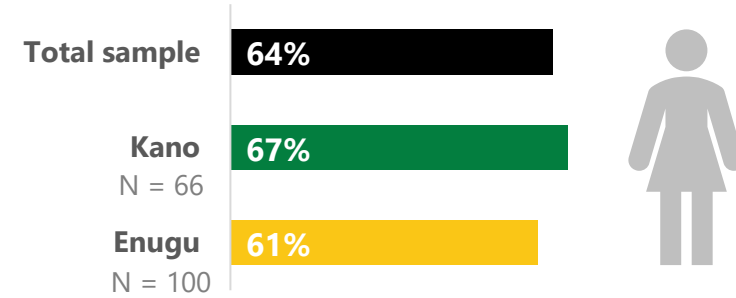
Hello, my name
is Husaina.

- We conducted a **quantitative survey** between December 3 - December 9 of 2022, **with a sample of 258 participants** from vulnerable communities in Nigeria.
- The sample was comprised of **rural farmers** –two-thirds of whom were women– who were **severely affected by droughts and heavy rains in 2021**.
- The surveys were **conducted through automated interviews**.
- We asked **open-ended questions** about the **impacts of the droughts and heavy rains on participants' lives and livelihoods and the resilience measures taken** –including the financial strategies– in the different phases of the climate events.

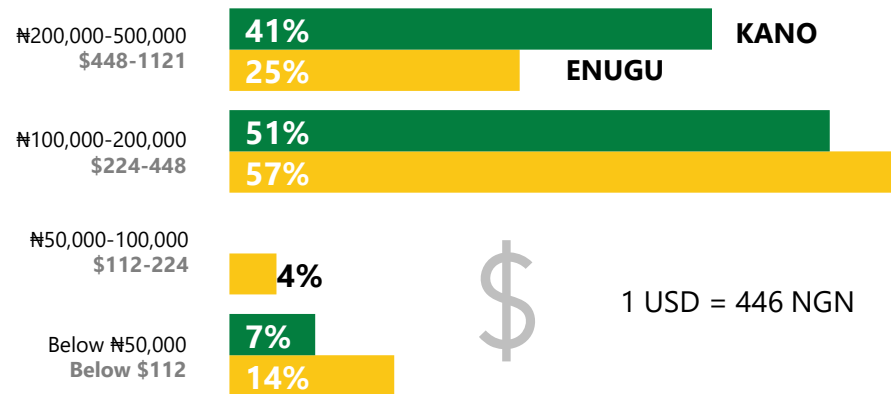
The Nigerian sample for this pilot



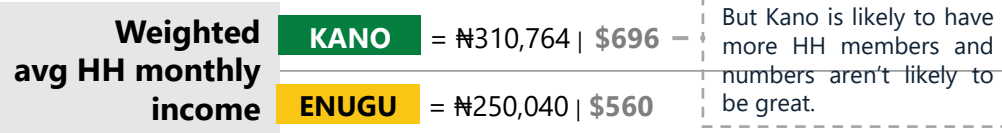
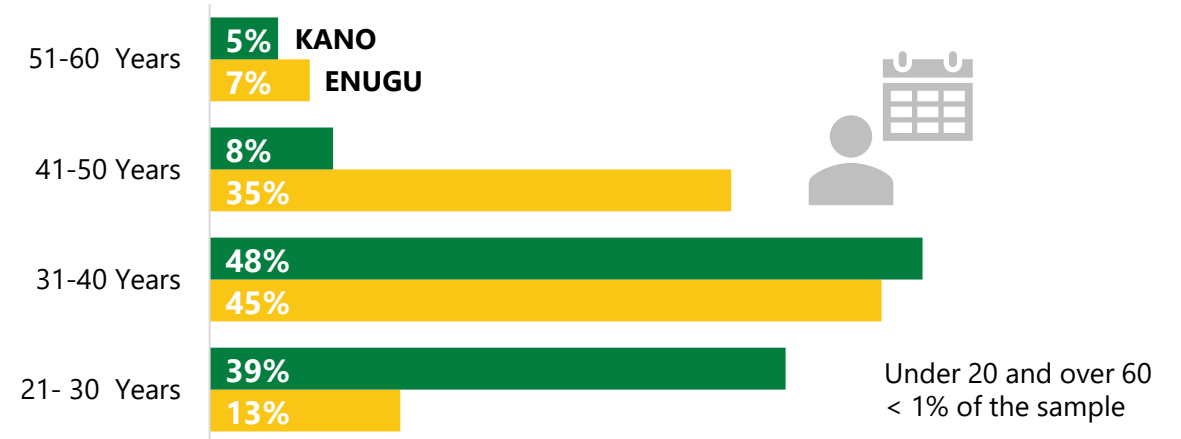
Majority of sample is female



Over half the sample earns > monthly household income of ₦100,000 / \$224

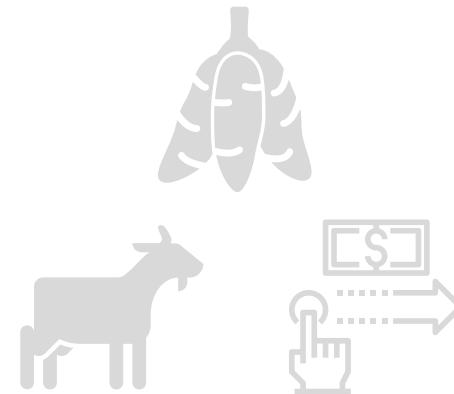
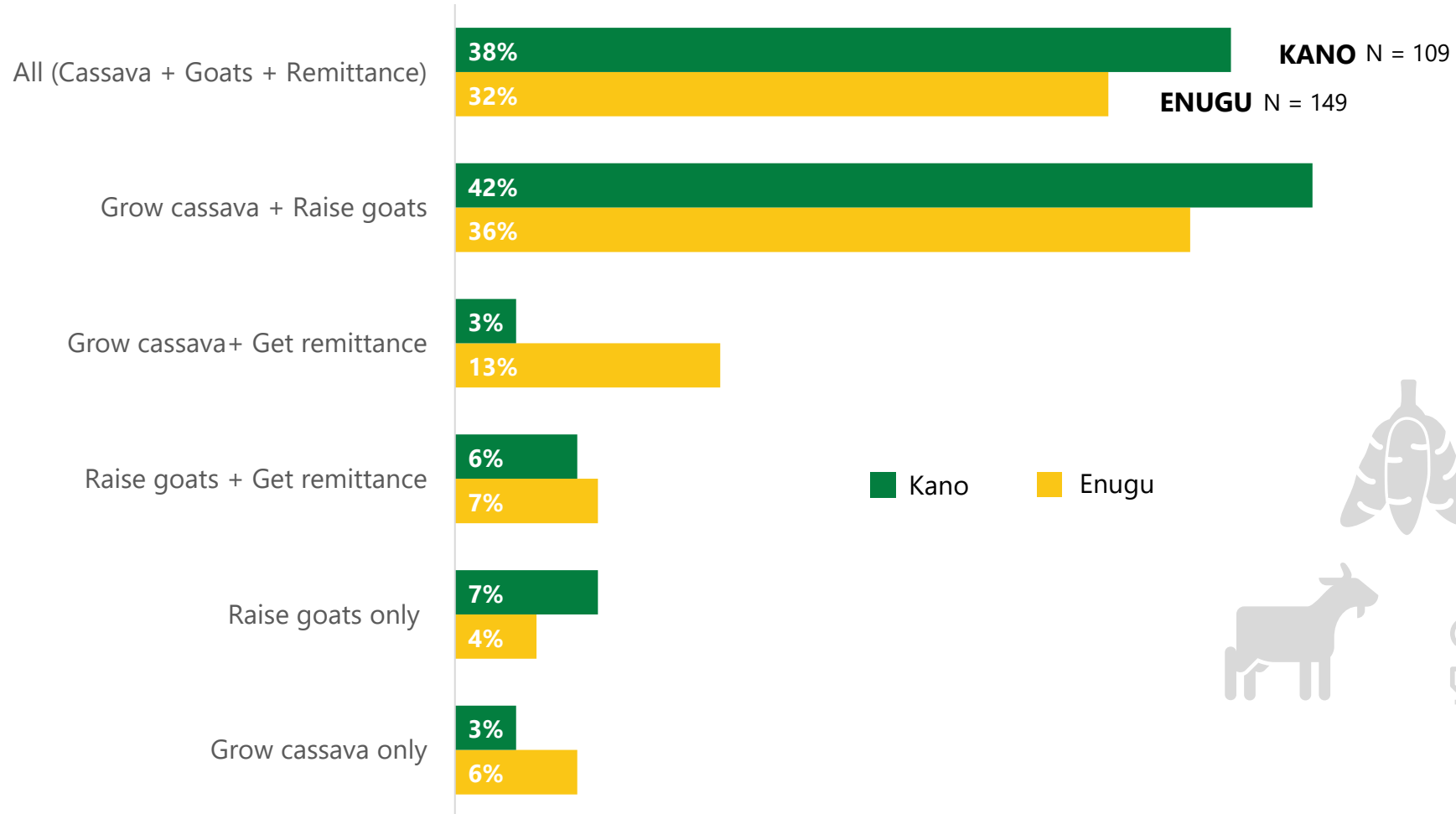


Sample is mostly between 31-50 years old



National Nigerian poverty line = ₦137,430 viz. \$382, so 68% of this sample is no more than 15% above the poverty line, i.e. quite close to the poverty line.

Sample categorized by income combinations (cassava, goats and remittances)



Livelihoods: Range of products from each



Cassava products

Gari

Flour of the fresh starchy cassava root

Fufu

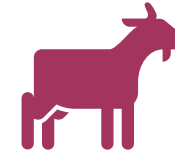
Food made from fresh or fermented cassava that have been boiled, pounded, and rounded into balls

Abacha

Salad made of dried, shredded cassava.

Bobozee

Wet cassava chips



Goats

Selling goats

Participants spoke of goats as a means of income generation through selling of goats

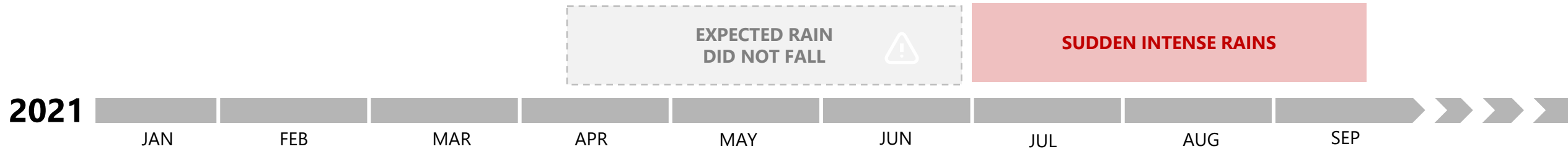
No dairy mentioned

There was no mention of goat milk being a means of income generation

IV. Detailed before/during/after analysis of climate-related event

The nature of the “severe weather” event

Both monthly weather data and pilot interviews allowed us to pinpoint two severe weather patterns in one year



Delayed rains started killing cassava crops



Goats die from heat



Cassava seeds get washed away



Goats got sick in rain, died of disease and could not be sold

Heat and Goats

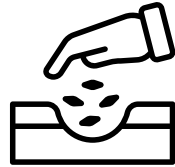
Goats suffered from heat stress beyond their comfort zone. It directly affected feed intake therefore lowers growth rate, production, reproduction, and even **death in severe cases**.

Heavy Rain and Goats

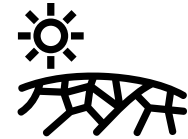
During heavy rains, goat suffered from pneumonia, picked up parasites or suffered stomach troubles from lush grass.

What happened to cassava and goats in this type of severe weather pattern?

CASSAVA



Planted seeds ahead of expected rain



Delayed rains and intense heat started killing crops



Replanted new cassava plants



Bought additional water supplies to water a portion of the crop

COPING MECHANISM

Sudden intense rains



Intense rain washed away most seeds



Fewer coping options



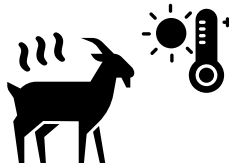
(A few) re-planted cassava

COPING MECHANISM

Very late rains + intense heat



Limited shelter for goats



Unusually intense heat made goats swollen or stomach sick



Built or improved shelter



Giving special food

COPING MECHANISM

Sudden intense rains



Goats got sick from the cold rain, or parasites, or stomach troubles from eating lush grass



Fewer coping options



Veterinary care and medicine

COPING MECHANISM

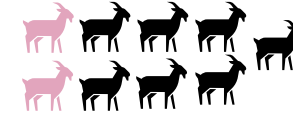
GOATS

Implications of climate-related event: Loss of Goats

Kano lost 1/3
of their herd



Enugu lost close to 1/4
of their heard.



	Mean # of goats before climate event	N	Mean # of goats died	N	% of herd that was lost	N
Kano Total	17	65	6	63	39%	40
Kano women only	14	37	7	34	44%	20
Enugu Total	31	98	9	86	27%	70
Enugu women only	25	62	11	51	31%	45

- **Gender:** Women had fewer goats than men and lost a greater percentage.

*Comparison year was COVID year, when livestock markets were closed so farmers retained their assets but did not sell much. Therefore, we did not use the "amount earned" as an indicator of loss. As this table shows, the climate-impacted year was worse based on how many goats died.

Listening to respondents, the value of a goat depends on its health, size and age. From what they reported, small goats tend to sell for between ₦7000-₦20,000 (\$16 – \$45) and large from between ₦30,000-₦80,000 (\$67 – \$179).

Income and asset implications for these two livelihoods for these households of this severe-weather event¹

Was more, or less, earned from cassava in climate-impacted year (2021) compared to the previous non-climate impacted year (2020)?

	Earnings from Cassava	% of those who cultivated cassava ³
WORSE ↑ ↓ BETTER	Loss	36%
	Less earned	50%
	Same earned	1%
	More earned	12%

N = 78

What percent of goats did you lose during the climate impacted year (2021)?²

% change in herd	% of those who raised goats ³
Lost more than 50%	23%
Lost up to 50%	37%
No loss	27%
Increased herd	13%

N = 60

KEY TAKEAWAYS

- Cassava earnings were calculated based on income given by respondents in the current year and the previous year. "Losses" were specified by needing to pay back loans on too little income.
- In both states, respondents made up for lower income by selling dried cassava from years before. In some cases, nearly 80% of what they sold was stored cassava which then **decreases the "assets" (as respondents refer to these) they might need for future bad seasons.**

¹Nigeria, like the rest of the world, was experiencing a rebound year of growth following COVID so numbers are not connected to the broader economic condition. ²Calculated from a series of questions: How many goats did you have at the start of 2021? How many goats did you purchase in 2021? How many goats were born in 2021? How many goats did you sell during 2021? How many goats did you lose during 2021? ³All answers from those who were engaged in cassava or goat rearing and had a clear response. Percentages will add to 100%.

Differences between men and women in income and asset implications

Was more, or less, earned from cassava in climate-impacted year (2021) compared to the previous non-climate impacted year (2020)?

WORSER ↑ ↓ BETTER	Earnings from Cassava	% of Women ³ growing cassava	% of Men ³ growing cassava
		Loss	42%
	Less	47%	59%
	Same	0%	3%
	More	11%	13%
		N = 51	N = 27

NOTE: Losses from **cassava** in Enugu were **much worse for women** than men.

What percent of goats did you lose during the climate impacted year (2021)?²

% change in herd	% of Women ³ raising goats	% of Men ³ raising goats
Lost more than 50%	37%	10%
Lost up to 50%	20%	53%
No loss	27%	27%
Increased herd	17%	10%
	N = 30	N = 30

KEY TAKEAWAY

- Women did worse in cassava but better in goats.

**What actions did households take and how
did financial services fit in?**

Formal Financial Service options respondents mentioned

Region	Type of formal services	Barriers
Kanu	Bank savings ¹	<p>Quality: Generally low quality “MFIs”. These MFIs charge very high interest rates and are focused on lending rather than deposits.</p> <p>Relevance: Larger commercial banks are present (Fidelity Bank, Access Bank, First Bank, GTC Bank) but most were mentioned in the context of POS agents, only 2 mentioned savings (Fidelity).</p>
	Formal loans ¹	<p>Access: A number of respondents say they attempted at banks and “MFIs”, but most were not approved or did not receive it within the time frame they needed it.</p>
	Insurance	Not available
Enugu	Bank Savings ¹	<p>Relevance: Larger commercial banks are present (Fidelity Bank, Access Bank, First Bank, GTC Bank) but respondents only mentioned savings at Fidelity Bank.</p>
	Formal loans ¹	<p>Access: A number of respondents say they attempted to get a loan, but most did not succeed.</p>
	Insurance	Limited options mentioned but none of the respondents had these. Only two insurance schemes were mentioned: Nigerian Agricultural Insurance Corporation and Fadama (part of the program was to support insurance uptake).





¹Respondents did not mention knowing other FSPs like Opay and MoniePoint.





We used respondents' vocabulary as they referred to strategies they used during the severe weather event

No.	Financial Services - Categories	Sub-Categories
1.	Assets	Farmland, livestock, stored crops, recently harvested crops
2.	Savings	Formal: Bank account savings ¹ Informal: Esusu (savings groups), savings in the house
3.	Borrowing	Formal: Banks, Microlending institutions (what are referred to as MFIs but are not group lending) Informal: Esusu, relatives
4.	Insurance	No one had formal insurance. Moreover, respondents did not talk about insurance as a product but rather highlighted aforementioned financial tools or income sources as "their insurance", which then highlighted for us the importance of that tool.

¹We did not ask about whether respondents had a bank account, but rather focused on households that said they used bank account saving to fund actions they took.

What did these actions cost?

		Cassava
 Replant cassava plants that died		₦890,000 \$1934
 Irrigation machine		₦400,000 - ₦700,000 \$869 - \$1521
 Dig well		₦125,000 \$271






		Goats
 Give special food		₦175,000 \$380
 Call a veterinary or give medication		₦65,000 \$141
 Improve shelter		₦25,000 \$54





KEY TAKEAWAY

According to these respondents, it is more expensive to remedy problems with cassava than with goats.

These values are amounts that respondents referred to as they discussed the actions they did.

Differences between men and women in actions taken

		Cassava	
		Women	Men
	Create ways to control water	80%	55%
	Put faith in God	35%	37%
	Use manure ¹ to manage water	16%	9%
	Rent/buy irrigation machine	2%	7%
	Replanting cassava plants	1%	10%
		N = 165	N = 92

		Goats	
		Women	Men
	Improve shelter	45%	17%
	Give special food	8%	21%
	Put faith in God	5%	11%
	Call veterinary/give medication	4%	3%
		N = 71	N = 49

Non-exclusive, top answers from those who responded. Percents will not add to 100%.

KEY TAKEAWAY

- Women tended to invest in the less expensive actions.

¹Manure facilitates water retention during dry periods. It also helps prevent water logging during very wet periods by opening bounded clay soils allowing water to drain. ² From a deep look at the responses, it seems that goat owners don't take much action during the intense rain phase because when they improve the shelter they do so for heat, sun and rain all at once.

Focusing on “delayed rain” phase, what financial services were used?

	Cassava	Goats
Savings from savings group	53%	54%
Sell assets (including other crops)	26%	47%
Borrowed from relatives	21%	22%
Savings from bank	26%	22%
Borrow from savings group	20%	22%
Borrow from bank	6%	29%
Remittances from relatives	4%	37%
Bought assets to sell later	4%	5%
		1%

Highest correlations between actions and financial services:

N = 167

N = 197



Control water for cassava

- Savings from savings groups (#1)
- Selling assets (stored crops/livestock)
- Borrowing from savings groups or relatives



Improving shelter for goats

- Selling assets (stored crops/livestock #1)
- Savings from savings groups
- Savings in the bank

¹ We focus from here on the delayed rain phrase because this is when most action was taken. Note: Top answers from those who responded. Percents will not add to 100%. Multiple mentions.

Why are stored crops are considered a “financial strategy”?

Tanzania Smallholder Financial Diaries

- Stored certain crops as a kind savings, intentionally kept aside if current crops fail to do well

**21 percent of Tanzania sample
report crop storage as their
most important form of savings**



Differences between men and women in what financial services were used

	Cassava	
	Women	Men
Savings from savings group	61%	40%
Sell assets (including other crops)	24%	28%
Borrowed from relatives	19%	24%
Bank savings	25%	26%
Borrow from savings group	22%	15%
Borrow from bank	6%	5%
Remittances from relatives	6%	1%
Bought assets to sell later	4%	5%
	N = 165	N = 92

	Goats	
	Women	Men
Sell assets (including selling existing goats)	50%	57%
Savings from savings groups	48%	45%
Borrow from savings groups	19%	26%
Borrow from relatives	21%	23%
Bought assets to sell later	26%	34%
Savings from bank	33%	45%
Borrow from bank	2%	10%
Remittances from relatives	2%	1%
	N = 104	N = 62

Note: Top answers from those who responded. Percents will not add to 100%. Multiple mentions.

Combinations of financial tools used to cope with the effects of the climate-related event

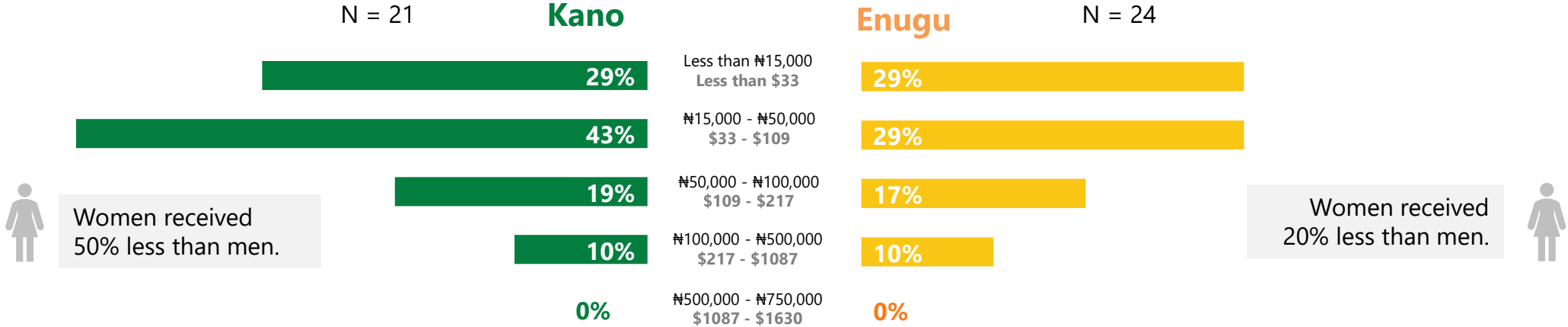
	Cassava	
	Delayed rains	Intense rains
No financial tools	13%	50%
Only one tool	53% <i>(savings group)</i>	39% <i>(selling assets)</i>
Two tools	28%	11%
Three tools	6%	0%
Four tools	0%	0%
	N = 197	N = 206

	Goats	
	Delayed rains	Intense rains
No financial tools	11%	58%
Only one tool	34%	35% <i>(Selling assets)</i>
Two tools	37% <i>(Selling assets + Savings group)</i>	6%
Three tools	17%	1%
Four tools	1%	0%

Remittances supported financial strategies but did not replace them

Q: How much did family members who migrated send each time during the year studied, when there was an adverse climate event?

Note: All answers from those who were remittance receivers, roughly **15%** of the sample. Percents will add to 100%.



Weighted Avg. = ₦89,300 / \$200 Weighted Avg. = ₦187,530 / \$420

In both places, money was sent from migrated family about 3 times in the year.

Average total in year = ₦267,900 / \$600 Average total in year = ₦562,590 / \$1260

KEY TAKEAWAYS

- Remittances were important throughout the year (roughly 2 months of income)
- But **supportive** strategy and not usually the **ONLY** one to address climate challenges.
- This result reflects the commonly observed factor that migrants don't have the financial tools to build up lump sums that might assist in an event. They typically send money when they can in smaller amounts.

What did respondents wish they could do and what financial services did they wish they had?

Asking straight out what financial tools respondents “wished they had” did not go beyond what they already knew or used.

So, we tested two approaches to try to glean some insights:

APPROACH A

Respondents articulated what actions they wished they could have taken (naming only existing one). We then map actions against what it costs and what levels of funds are generally available from most used financial tools.

Issue: not everyone answered this question in a way that indicated what action they would have wished they could take, so samples sizes are very small.

APPROACH B

We used NLP and sociolinguistics to analyze what phrases and words were used.

We used this approach so we could get more information out of the all the data.

¹ It is reasonable that people would answer this question with reference to tools within their experience or knowledge. Yet that experience/knowledge of set of financial tools is small, so they don't have a lot of choice to put one preference against another. We rather need to deduce which tools they implied more preference to in the words they used and the speech signals in their voice when answering.

APPROACH A

Actions Respondents Wished They Could Have Taken

Q: Were you wishing you could do something to mitigate the harm to your crops/goats? Tell me about that.



Fertilizer, as well as a dam, borehole or pumping machine

There is nothing I can do or what can I do? **We do not have any medicine (fertilizer) for farming here.** The kind of farming we do here is that after planting we beg God for rain, and there is no medicine, we don't have water, we don't have dam, or where to get water. We don't have borehole neither do we have pumping machine. We do not have anything.

Male, 41- 50, Kano, monthly hh income below ₦50,000 / USD 112



Estimated cost of a **pumping machine**:
₦400,000 - ₦700,000
\$869 - \$1521

Far, out of reach for his savings or borrowing.



Estimating cost of **digging a well**
₦125,000 | \$271

Closer to what he could access through savings or borrowing



Estimated cost of **shelter, medicine and food**:
₦265,000 | \$576

Out of reach for her savings or borrowing.



Creating a shelter, buy the right food and medicine

We wish to **make cage** for them, **buy food and medicine** that will prevent them sickness and even if water touch them, it will not harm them. Since there is no way to get such, we just have to leave everything to God.

Female, 31-40 years, Kano, monthly hh income below ₦50,000 / USD 112

How will they help their cassava crop in the future?

Use a combination of irrigation and drainage

First of all, what I can do is that for them (the cassava plants) to be the first to be in the sun, I will try as much as I can to make sure that there's water, get somewhere that there's water, get a tank or something where they can be getting water so that when its sunny, from there they can be getting water. But when it's raining, we know that rain is something that comes and goes - what I have in mind is somewhere that can be dug for water to pass through easily so when it starts raining heavily it won't sweep away everything. Then (to) also put sand in the bag to secure the cassava we cultivated, at least serve as a wedge so that things (cassava plants) wouldn't be of waste. Then bring out a place for water to pass freely so that when it (the rain) starts it won't uproot all the cassavas we planted.

Woman, 20s, Enugu, monthly hh income ₦50,000 – 100,000 / USD 112-224, cassava + goats (u218)

Estimated cost:
very little unless she hires labor to do this

Use manure to keep the ground wet

Nobody knows how the weather will be, but my prayer is for God to help us and if we see money to start on time to start preparing manure. That's if there's money, we start getting manure to help germination so that by the time it starts raining the manure will penetrate inside the ground and then assist in the germination. That is my thought.

Woman, 30s, Enugu, monthly hh income ₦50,000 – 100,000 / USD 112-224, cassava + goats + remittances (u168)

Estimated cost:
very little unless she hires labor to do this

How will they help their goats in the future?

Improving shelter

The plans I make towards storms and very sunny weather in the forthcoming year 2023 is that I bought blocks, cements and stones that I will use to construct where I rear goats. I'll also get zinc roofs known as asbestos that I'll use to cover it so that it will be properly ventilated. I also searched for where (to put the) shed, so that when it is sunny, they will stay in the shed, which has helped us. That is the way I have prepared for 2023 when it comes. If I had more money, there are things I planned to have done but as I don't have it, these is how I planned my 2023.

Woman, 30s, Enugu, monthly hh income ₦100,000 – 200,000 / USD 224-448, goats + remittances (u185)

Estimated cost:
₦50000 | \$108

Could finance through borrowing from savings group and savings.

Actions Respondents Wished They Could Take: Goats

Create a shelter

What I think I would have done if I had enough money is to build a zinc roof to cover the places where rains comes in from (that) disturbs my goats and cold. But I do not have much money that is why some of my goats died.

Female, 31 – 40 years, Enugu, monthly hh ₦50,000 - 1000,000 / USD 112 - 224, cassava (u199)

Estimated cost:

₦25,000 | \$54

Closer to what this person might have access to through savings or borrowing

Creating a shelter, buy the right food and medicine

We wish to make cage for them, buy food and medicine that will prevent them sickness and even if water touch them, it will not harm them. Since there is no way to get such, we just have to leave everything to God.

Female, 31-40 years, Kano, monthly hh below ₦50,000 / USD 112, cassava (u017)

Estimated cost:

₦265,000 | \$576

Out of reach for this person might have access to in terms of saving or borrowing.

APPROACH B

We identified words that respondents said, and how they said them to diagnose what existing financial options were most favored and why

We took a two-step approach for this:

STEP 1

NATURAL LANGUAGE PROCESSING

We used NLP to analyze what phrase and words they used to describe what they wish they had during the climate-impacted year.

STEP 2

SOCIOLINGUISTIC ANALYSIS

Then, we triangulated this analysis against speech signals.

- We then arrived at a [prioritized list of existing instruments](#) that reflect the most positivity from respondents.
- Subsequently, we [suggested how these need to be improved](#) according to the various problems respondents expressed about them.

APPROACH B – STEP 1

We picked up phrases that reflect whether respondents felt financial strategies were “adequate” or “inadequate”

Q: What types of savings, borrowing, insurance or assets do you wish you had in June 2021 to help you get through these late rains?

60% IMPLY STRATEGY WAS ADEQUATE

Some talked about their successes.

Mentions strategy

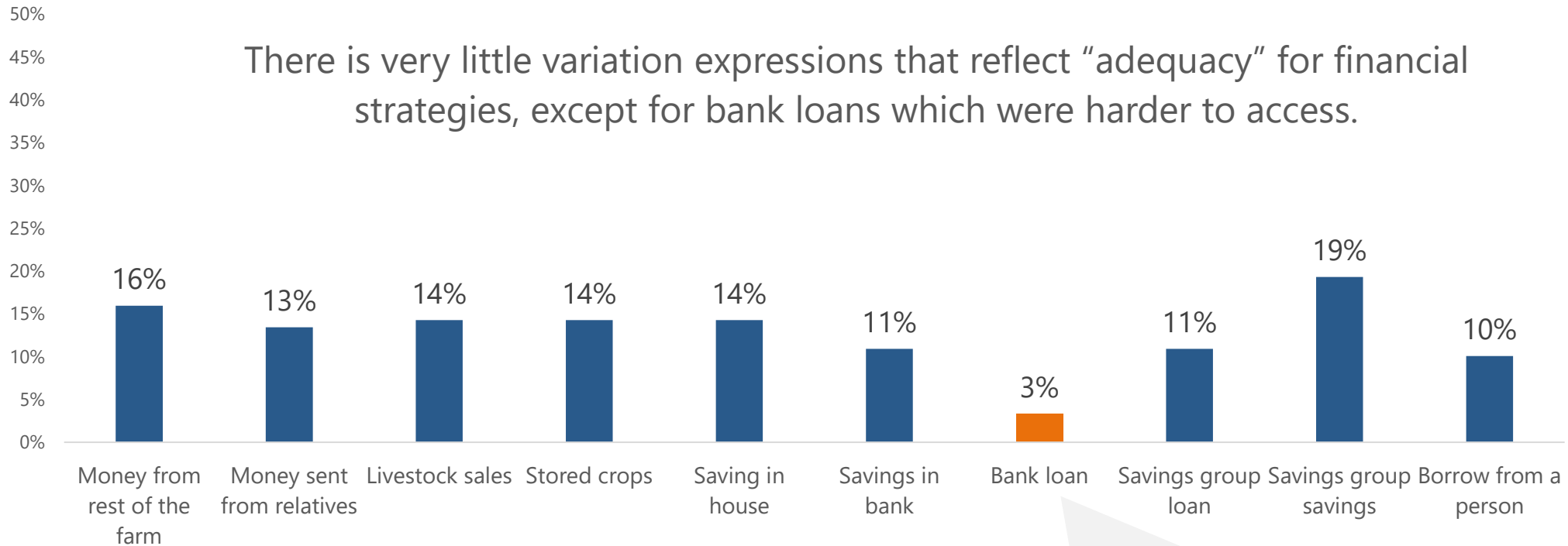
Compares favorably
to another strategy

I keep my money **in the bank** because when it **is at hand** you can easily spend it. That is why we keep it in the bank in case of any unforeseen circumstances or delay in rain fall we use the money we save when it finally rains to **get the necessary** things we need.

Phrase implying successful
acquisition of what is needed

APPROACH B – STEP 1

We mapped those who implied adequacy against each type of financial strategy mentioned



N = 119

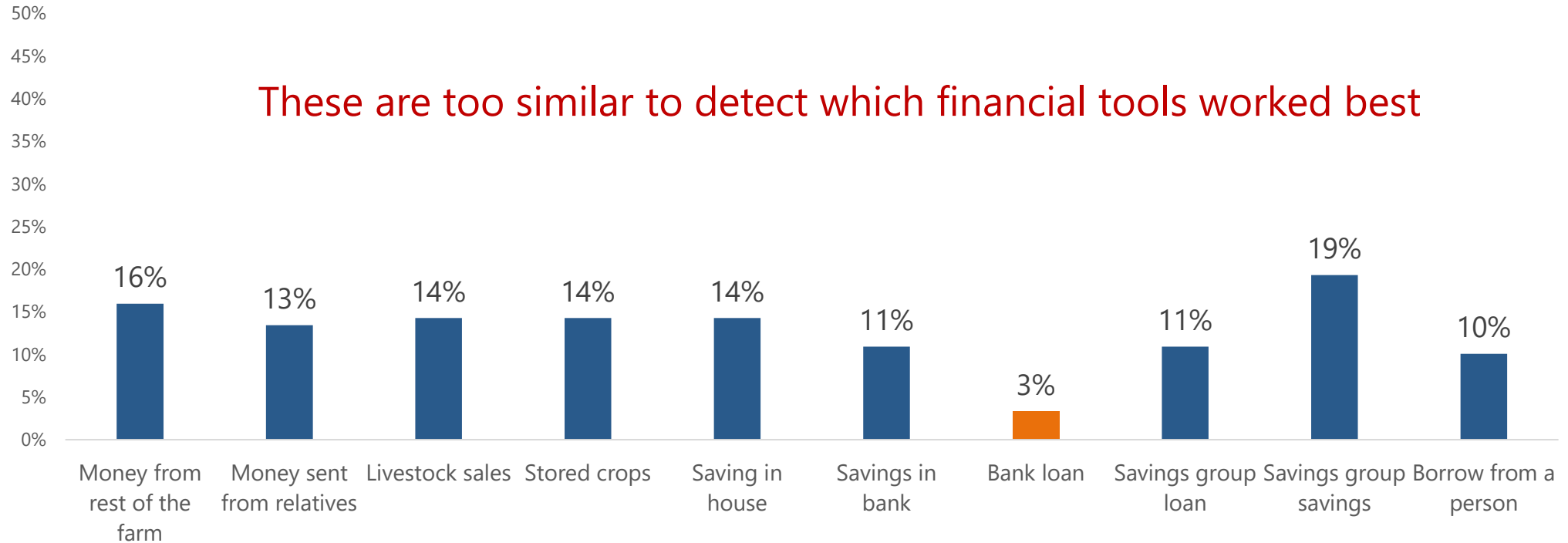
I borrowed money hoping that after the rain, that after harvesting, we will pay back. But with what happened, **I don't even know how to start paying back** everything I collected, truthfully, I don't know where to start paying.

Female, 51-60, Enugu, monthly hh income ₦100,000 – 200,000 / USD USD 224 – 448

Chart shows for each strategy mentioned, the percent of respondents who implied it was adequate

APPROACH B – STEP 1

We mapped those who implied adequacy against each type of financial strategy mentioned



We needed more information from the data.

APPROACH B – STEP 1

Some respondents provided a narrative of what they did without commenting on whether they felt their financial services were adequate.



I do not see if like that. The slice I got is what I added to the cultivation and production with cassava. Whatever I get I organize it, so that I will farm and do what I want to do to cultivate cassava very well so that what I get from cassava will be (better) because I didn't get enough cash.

Igbo-speaking male, 31-40, Enugu, monthly hh income below ₦50,000 / USD 112

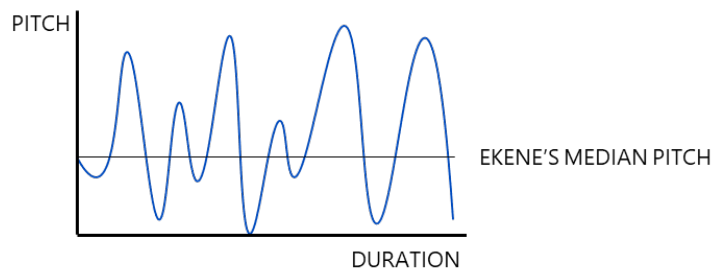
Therefore, we layered in sociolinguistics (**STEP 2**) to gain more information from the data.



EKENE

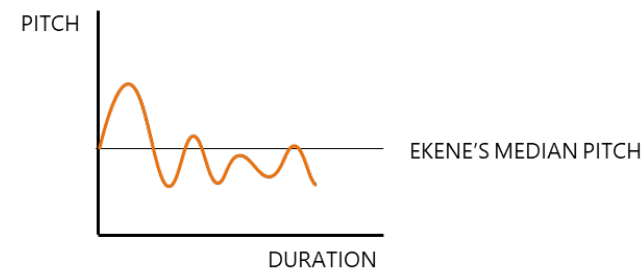
Question X

High pitch modulation + Long duration = **ENGAGED**

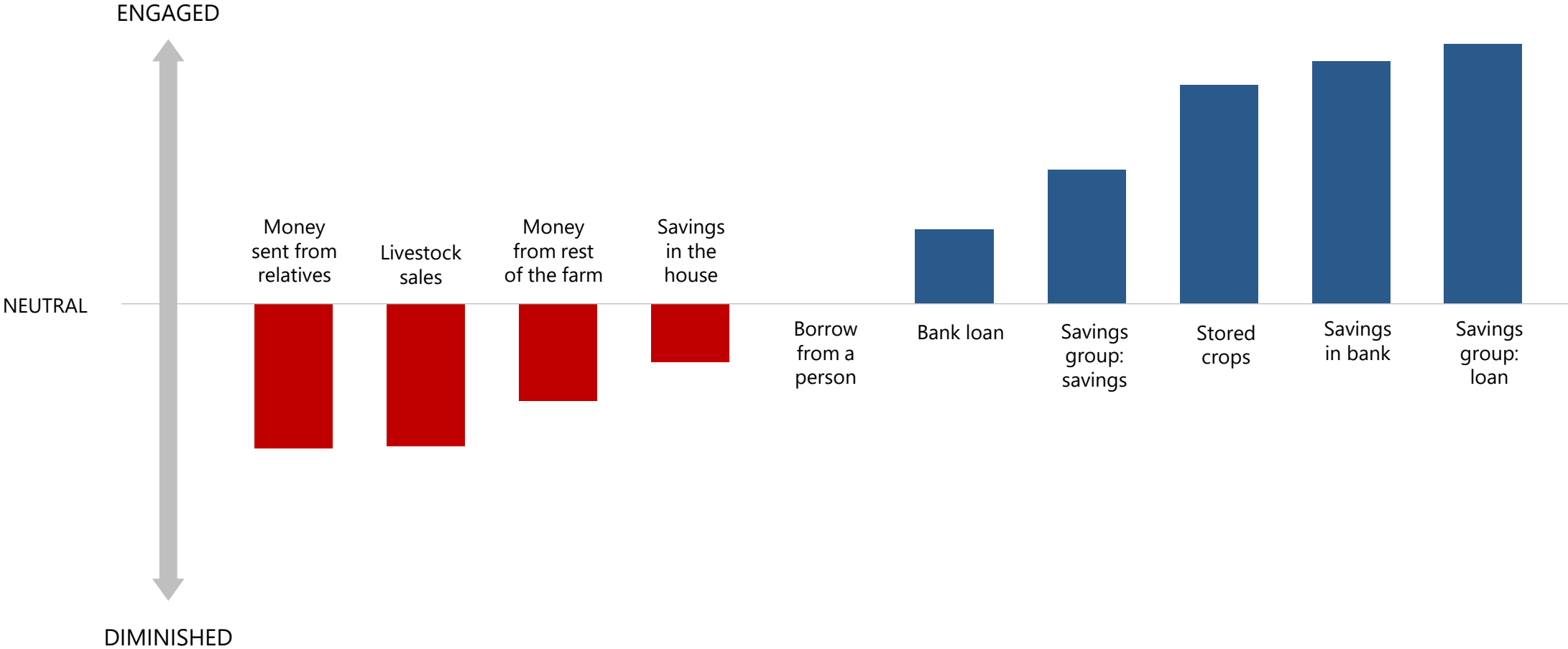


Question Y

Low pitch modulation + Short duration = **DIMINISHED**



Respondents show very high level of engagement for the financial tools in blue, but diminished for tools in red



Why do respondents talk about these so negatively?

Getting money from relatives can create hardship for them: *"At that time, I didn't get the loan (from the bank). My brother had to sell his livestock and give me the money."*

Food from rest of farm is meant for eating, not selling: *"I sold cassava flour, garri, Africa salad, yam, these are what I sold to save up money for the season. Even the ones we have that I kept and also I sold the ones we stored to eat."*

Selling livestock is usually a last resort: *"What I did during that period was to sell my goats. I don't sell my goats before . but when it happened, I had no other option but to sell the goats. . I had no other option but to sell the nanny, that was what I did during that period. I also reduced the prices. . Some were already dying, so it would be disadvantageous to allow them die off like that."*

Saving in the house gets used for something else: *"I save money but the money I kept almost fifty thousand for its sake. And what I thought when I was keep the money is for me to be able to use it to sort out issues in my farm. Sometimes need will arise and they might ask that person to go and buy; there a drug they call medicine for locust so I will go and take from that money to buy it. Sometimes it will be that I have to pay people to go water the farm."*

These are all frequent strategies – but it doesn't mean that it's not the solution they want.

Women tend to show more enthusiasm for savings and asset financial strategies and men show more enthusiasm for borrowing strategies



The top contenders for financial tools that “worked” but they can be improved

TYPE OF FINANCIAL TOOL	BENEFICIAL ATTRIBUTES	WAYS TO IMPROVE
SAVINGS GROUP SAVINGS	<ul style="list-style-type: none"> • Small and frequent contributions • Social “pressure” to maintain contributions 	<p>Worry: One respondents mentioned that people did have enough money to contribute – consider aspects to increase geographical diversity/remote contributions</p> <p>Way to improve: Use groups as a channel for adaptation or weather information</p>
BANK SAVINGS	<ul style="list-style-type: none"> • Safe • Out of reach to spend 	<p>Way to improve: Needs easier access through agent networks</p>
SAVINGS GROUP: LOANS	<ul style="list-style-type: none"> • Remain low-friction 	<p>Way to improve: Being able to obtain in larger sizes (closer to ₦200,000+ \$448+). Existing sizes are closer to ₦50,000- ₦100,000 \$112-\$224.</p>
STORED CROPS	<ul style="list-style-type: none"> • Easy to put aside • Can also be used tactically when market price is higher 	<p>Way to improve: Because climate change is also creating conditions where stored crops do not stay dry, find a way to monetize.</p>
BANK LOANS	<ul style="list-style-type: none"> • Larger loan size 	<p>Way to improve: Decrease friction so loans can be disbursed in a time sensitive way. Lower loan sizes to that above to decrease risk of indebtedness.</p>

**Key quotes describing
pros and cons of existing
financial strategies**

Storing cassava: It works only if you're able to keep it dry – and that's only getting more difficult in intense rains

Being able to wait for a higher price

We usually keep the cassava in bags, we dry and keep until the demand is high in the market and the price is high, then we sell.

Female, 31- 40, Kano, monthly hh ₦50,000 – 100,000 / USD 112 - 224, cassava + goats (u006)

Being able to process it

Yes, we ... cut it and keep it at the top of our house and dry it then when it's dry (we) will call people that grind to elubo (cassava flour) and if you pound it will give you another thing..

Male, 31- 40, Kano, monthly hh ₦100,000 – 200,000 / USD 224 - 448, cassava + goats (u098)

Can't afford to not sell it

What we kept was not more that we will eat and sell for some cash to take care of other things like children school ... we don't keep cassava at home just like that. We don't have that capacity to keep cassava at home when we need funds.

Female, 31- 40, Kano, monthly hh below ₦50,000 / USD 112, cassava + goats (u018)

Can't keep it from getting wet

The way we usually keep cassava before now 2018 and 2019, this 2021 we couldn't keep it that way. If you even keep it, you will see it developing pests and other diseases due to the extreme hot weather.

Male, 51 - 60, Kano, monthly hh ₦50,000 – 100,000 / USD 112 - 224, cassava + goats (u021)

We found that bank loans are the least used, and respondents acknowledge that bank loans can backfire

Truly, **I desired to get loan** from bank and also those organizations that give loan but, elders advised me taking loan **will not be a remedy** and I think it was a good advice because this raining season we had problem with rain.

Female, 31-40, Kano monthly hh ₦50,000 – 100,000 / USD 112 - 224,
cassava + goats (u009)

I borrowed money hoping that after the rain, that after harvesting, we will pay back. But with what happened, **I don't even know how to start paying back** everything I collected, truthfully, I don't know where to start paying.

Female, 51-60, Enugu, monthly hh ₦100,000 – 200,000 / USD USD 224 – 448, cassava + goats(u183)

Honestly, **we do not collect loan** because when you do, some **unforeseen circumstances might occur**. For instance, when take loan from the bank and your harvest was poor you would not get the money back. And also, let's say you applied for a loan and did not get it at the time you need and there was heavy rainfall, you will have an issue because you were not given the money when you needed it most and when you finally got it there was heavy rainfall.

Male, 41-50, Kano, monthly hh ₦100,000 – 200,000/ USD 224 - 448,
cassava + goats (u016)

I borrowed money from micro finance bank. I travelled to Jos to buy goats and sell it in the east, but when the sun became much, **a lot of the goat died**. It is now very **difficult for me to pay back**.

Female, 41-50, Enugu, monthly hh ₦50,000 - 100,000 / USD 112 - 224,
cassava + goats(u223)

Those respondents who can use them talk positively about bank loans and storing crops – but there are reasons why they can't always use them.

Storing crops: Can't keep it from getting wet

The way we usually keep cassava before now 2018 and 2019, this 2021 we couldn't keep it that way. If you even keep it, you will see it developing pests and other diseases due to the extreme hot weather.

Male, 51 - 60, Kano, monthly hh ₦50,000 – 100,000 / USD 112 - 224, cassava + goats (u021)

Bank loans: Positive for those who can get them but can't always get them on time

I borrowed money, but I borrowed from the one they call thrift society. I collected money from them because **when I applied for loan in the bank, the thing I wanted to purchase was ready, so it was too late**, that is why I collected money from Esusu people to do it...

Woman, 40s, Enugu, monthly hh income ₦100,000 – 200,000 / USD 224-448, cassava + goats (u116)

Banks need to be more accessible – one person mentioning that savings group contributions might have dried up?

There are no banks near where we live, so that is where we keep money when we come to meeting. Then we have another contribution we do just like Esusu, but individual saving.

Woman, 30s, Enugu, monthly hh income below ₦50,000 / USD 112, cassava + goats (u129)

It's Mama Chidera that goes about collecting money from people. Like when you give her money, she helps you keep it then at the end of the month she gives you what you were able to save. That is how we have been saving ours. **Because we cannot just enter a vehicle to the bank to save just little amount.**

Woman, 30s, Enugu, monthly hh income below ₦50,000 / USD 112, cassava + goats + remittances (u209)

Savings group loans need to be larger but still not have the friction of a bank

I borrowed money, but I borrowed from the one they call thrift society. I collected money from them because **when I applied for loan in the bank, the thing I wanted to purchase was ready, so it was too late**, that is why I collected money from Esusu people to do it...

Woman, 40s, Enugu, monthly hh income ₦100,000 – 200,000 / USD 224-448, cassava + goats (u116)

I will use the crops I harvest to pay back the bank because **the loan from Esusu people is usually not big, but it comes faster than the banks.**

Woman, 40s, Enugu, monthly hh income ₦100,000 – 200,000 / USD 224-448, cassava + goats (u116)

What actions worked well for cassava?

Planting other crops (beans)

Like I told you before, the things we have been doing that is now helping us. We planted beans in the cassava farm and that was what helped me to get ease from this problem. The things I planted help me a lot to reduce my losses.

Male, 51-60 years, Kano, ₦50,000 – 100,000 / USD 112 - 224, cassava + goats (u 021)

Using of fertilizers

The things I did that helped me from the month of August to October was that I bought fertilizer and added to the cassava so that it will grow fast because we don't know when it (would) rain. So that is what I did while we waited for it to rain so it can grow to an extent before it starts raining. That is what I did to help it.

Female, 31-40 years, Enugu, below ₦50,000 / USD 112, cassava (u110)

Making pathway for water to avoid damage through excess rainfall

Things that are useful is for you to repair your farmland very well and make path for water so that even if there is excess rainfall, it will not destroy the cassava. That has been the way to go about solving the problem of excess water. That worked well.

Male, 41 – 50 years, Kano, below ₦50,000 / USD 112, goats (u065)

Constructing crossbar in high lands

(strips of bark or wood obstructing water from entering the field)

We prepare ourselves very well for the raining season in case it changes things in the farm. You might have to construct what we call a crossbar if you're in a high land to prevent water from entering which works well but if you're in a levelled land you will face some difficulties so you might need to have a backup. That is how we do it.

Female, 41- 50 years, Enugu, ₦50,000 – 100,000 / USD 112 - 224, cassava + goats (u181)

What actions worked well for goats?

Storing and drying goat feed before the rain

What helped me a lot was the money I collected (from savings group **savings**) and use to buy goat feed. I dried the (feed) under the sun very well, because when the rain came people that go out to bring the feed would tell you they can't go because the rain is too much. So, the feed I bought helped me a lot.

Female, 31 – 40 years, Kano, ₦200,000 – 500,000 / USD
448 - 1120, cassava + goats (u113)

Using water to tackle effect of intense heat on goats

What I sold during that period was the products of my harvest, so that I can buy the things that I will use to help my goats. I sold those things and bought medicines and a water fetcher used in fetching water from the well for my goats so that they will see the water to drink. I also called people that will make the well to produce more water, since the scorching sun caused the well to dry up. I used the money I got from the sale (of harvest) to employ people that will make the well produce more water, so that I will see the water to give to my goats for them not to die.

Male, 41- 50 years, Enugu, below ₦50,000 / USD 112, cassava + goats
(u203)

Creating a shelter to protect from heat and rain

I made a house where my goats stay to protect them from the sun and rain. I heard that too much sun and rain affects them badly, that's why I made a house for them to stay whenever it's raining or there's too much sun. That's why I collected the money put in contribution (savings group) and made a house for the goats where they would stay and I would be looking after them very well, keep the place clean and bring them food. My goats do not go about in the village, so the heavy rain did not affect the goats.

Male, 41- 50 years, Enugu, ₦100,000 – 200,000 /
USD 224 - 448, cassava + goats (u158)

But they know wishes about the government are not realistic

The government should provide a solution

What I have to say about that is that I would tell the government to assist us so that loss won't be much and things would not spoil. And if there is another means of safeguarding the crops in the farmland, they should bring it out so we can be using it since it's like that because the spoilage is much.

Woman, 30s, Enugu, monthly hh income ₦50,000 – 100,000 / USD 112-224, cassava + remittances (u176)

...but they didn't believe they would get it

You know poor person of the north, he just has to be thankful to God, but **the government is not helping him** for his farming

Male, 31-40, Kano monthly hh ₦100,000 – 200,000 / USD 224 - 448, cassava + goats (u098)

There was nothing much that helped us. Just like I told you earlier, **the government has never helped us**

Male, 31- 40 years, Enugu, monthly hh ₦50,000 – 100,000 / USD 112 - 224, cassava + goats (u245)

Note that no respondents mentioned receiving any assistance from the government or even knowledge of any government program, with one exception. There was only one reference from a man in Enugu to try to sign up for the Fadama program but failing. Fadama is a World Bank program targeting women farmers of four crops including cassava.

A quasi-experimental study suggests Fadama could have beneficial effects. See Sulaiman et al (2021) "Evaluating Fadama III Development Project in Kano State: Using Difference-in-Difference Estimation with Propensity Score Match Approach" International Journal of Economics, Management and Accounting 29(2) pp. 449-517.

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