Mercy Corps AgriFin Agile Impact Research for Ignitia

Report completed by Busara on behalf of Mercy Corps AgriFin

January 2021

Busara MERCY CORPS | AGRIFIN mastercard foundation ignitia TROPICAL WEATHER FORECASTING

About Mercy Corps AgriFin

We work with over 9 million farmers and 130 partners across Africa

Mercy Corps' AgriFin Accelerate Program (AFA) was created with the goal of supporting the expansion of digital financial services to one million farmers in Sub-Saharan Africa (SSA).

- Objective to develop services that increase **farmer income, productivity and resilience**, with 50% outreach to women.
- Work with **private & public sector scale partners** such as banks, mobile network operators, agribusinesses, technology innovators and governments.
- We help our partners develop bundles of digitally-enabled services, including **smart farming, financial services, market access and logistics** supporting data-driven partnerships.

AFA and its partners provides increased access to digital services that help address some of farmers' pressing challenges. Over the years it has become important to assess the importance of increased access to digital services .

To this end, Busara and Mercy Corps AgriFin worked together to assess and quantify the impact of increased access to digital services through these partners on smallholder farmers outcomes

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Agile Impact Study Objectives

Impact evaluation based on in-house data provided by partner organizations

This **Agile Impact Study** aims to assess the impact of Mercy Corps partners under the AFA program on smallholder farmers' outcomes. More specifically, it seeks to uncover:

- What impact have AFA partners had on SHF income, productivity and resilience to shocks?
- What financial and value-added products and services do SHFs, including women and youth, value most and why?
- How does bundling of products and services impact uptake and usage of digital financial services?
- What capacity building tools have the highest impact on SHFs willingness and ability to use digital financial services?
- What distribution channels are most effective for delivery of services to SHFs

To achieve the learning objectives, Busara Center for Behavioral Economics used existing administrative data provided by each partner to assess and quantify the trackable impact for each partner.

- Partners onboarded with this study:
  - **Ignitia**
  - ACRE
  - eProd
  - Hello Tractor
  - TruTrade
  - SunCulture
  - aWhere
  - iProcure
  - KALRO

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Executive Summary

Executive summary

This report presents the findings of the deep data analytics conducted on data provided by Ignitia to answer key learning questions on behalf of Mercy Corps AgriFin. We sought to understand Ignitia's influence on smallholder farmers outcomes since 2017 till date in various countries (Nigeria, Ghana, Mali and Burkina Faso) using primary data collected from two groups of farmers

Direct subscribers

Users in Ghana and Mali that got information through SMS based adverts, decided to subscribe, and pay for the forecasts out of their airtime balance per forecast received

Project beneficiaries

Users in Nigeria and Burkina Faso that received the service for free as a result of some partnership between Ignitia and other development organisations

The report contains four sections:

- The first section captures the analysis of 439 direct subscribers from Ghana in 2017
- The second section includes the analysis of the primary data from 427 direct subscribers from Ghana and Mali in 2018
- The third section captures data analysis for 127 and 40 project beneficiaries in Nigeria and Mali, respectively

Executive summary

We highlight some of the core findings below:

Farmers' productivity

- In Ghana and Mali, we observe **positive association between the use of the Iska forecasts and improved farmers' productivity** in most of the value chains with consistent significant growth among farmers in the pepper and rice value chains. However, growth in female farmers productivity falls slightly short of male farmers
- In Nigeria, 6 out of the 10 value chains recorded positive productivity changes post-iska.
- Female farmers in Nigeria perform significantly better than male farmers with respect to growth in productivity.

Usage of service

- Reading the message is significantly positively correlated with increased productivity rates Nigeria. **Farmers who share similar characteristics but only differ in that they read the messages, are more likely to record a change in their productivity rates** compared to farmers with similar characteristics but failed to read the messages.
- Farmers in Ghana report that they use the services for activities beyond farming suggesting **Ignitia has positive externalities to other parts of the farmers' lives.**

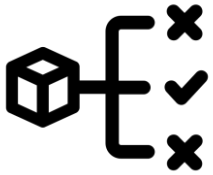
Behaviors and practices

- Farmers report that Ignitia has helped them **change the timing at which they harvest and apply chemicals like fertilizers and pesticides** suggesting improved farming practices following the receipt of the SMSs'
- Generally, farmers have made changes to their farming practices as a result of the iska forecasts. **However, female Nigerian farmers report more changes to their farming practices compared to male farmers in Nigeria.**

Introduction

The following are the key research questions used to guide this research:

What impact has ignitia's flagship product (i.e. 48-hour forecast SMSs) had on SHFs' planning behaviors, farm income, and resilience to weather-related shocks?



What value-added products or services provided by ignitia do SHFs, including women and youth, value most and why?

- What are the products used most often by farmers, particularly women and youth?
- How are usage of these products addressing their top needs, stresses or challenges in life?

What are reported or observed changes in attitude towards receiving digital services or transiting to digital agriculture, among ignitia's subscribers?

Theory of Change

- Ignitia's theory of change is to **reduce the risk and farm loss of West African farmers by sending the most accurate, location - specific weather forecast** on a daily, monthly and seasonal basis, and to build their resilience in an ever-changing climate.
- Furthermore, Ignitia provides various products in weather forecasts to farmers to address different user needs. The flagship product, a 48-hour forecast message (**iska**) delivered daily via SMS directly to the subscribers' phone, is twice as accurate as global models with an 84% accuracy and reliability rate.
- Ignitia services are available to farmers and other business owners alike, with farmers making up the majority of the customer base. Farmers are able to make short-term plans based on the daily forecasts, and plan for long runs according to predictions, likelihood, timing and intensity of the weather informed on a monthly or seasonal basis.
- Given the ToC and user profiles, Busara is prepared to assess how the weather forecast messages (particularly the 48-hour ones) has influenced farmers' planning behaviors around farming, farm income and resilience to weather-related shocks in West African countries (specifically, Ghana, Nigeria, and Burkina Faso).

Advice on theory of Change

What has worked well?

- **Productivity** has largely improved in the different countries as well as across the value chains in Mali and Ghana, and some of the value chains in Nigeria and Burkina Faso.
- **Agricultural practices:** Farmers are changing their farming practices due to the iska forecasts
- **Usage:** Some farmers in Ghana use the service for other purposes beyond farming, a signal of positive externalities resulting from the messages

Areas for improvement

- **Gender disparity in productivity:** In Ghana and Mali, male farmers are more likely to gain higher productivity rates compared to female farmers. This observation is consistent with the literature, and is largely attributed to structural barriers, e.g access to, resources(land, labour), access to agents, literacy etc. Ignitia should seek to understand the specific structural barriers its female subscribers in Ghana and Mali contend with, and where additional services can be provided to support e.g through partnerships with other service providers

Additional data points

- **Additional data points on farmers' access to resources (land, labour) and agents, farming experience, ecological zones,** etc. can be collected by Ignitia as proxy for other data points. This will help in segmentation exercises to better understand the different profiles of farmers, and help Ignitia understand the challenges its farmers faces

Data Limitations

	Use of self-reported data: The use of self-reported data implies that we assume a reasonable margin of error due to failure of the beneficiaries to recollect information accurately. However, this implies that we may be missing the measurement of these outcomes systematically i.e farmers could have either under-reported or over-reported some of the key outcomes measured, on average. So while we may be missing the mark on either side, the outcomes can be reported as fair estimates of the actual outcomes
2.	**Confounding factors:** Because the iska programme was not randomized to the beneficiaries, it is difficult to fully attribute the impact observed on key outcomes to iska. So while changes might be seen in outcomes like yield, productivity rates post-iska, these changes could have been caused by multiple factors not accounted for during the analysis. In essence, this study does not claim to attribute causality in outcomes measured, but some level of correlation between use of Iska and farmers' outcomes

Our process

Alignment call

Alignment call with Ignitia team to understand Ignitia's theory of change, proposed research questions and data availability

Shared Data request

Busara shared a data request with Ignitia.

Data mined and shared

Ignitia shared available data based on the data request.

Identification of data gaps

Busara identified data gaps and suggested proxies for Ignitia.

Creation of PAP, data analysis and findings report

Busara created a pre-analysis plan, following which the data was analyzed and findings put together

Dissemination of findings

Presentation of findings to the team

Demographics

Including gender, age distribution and country breakdown

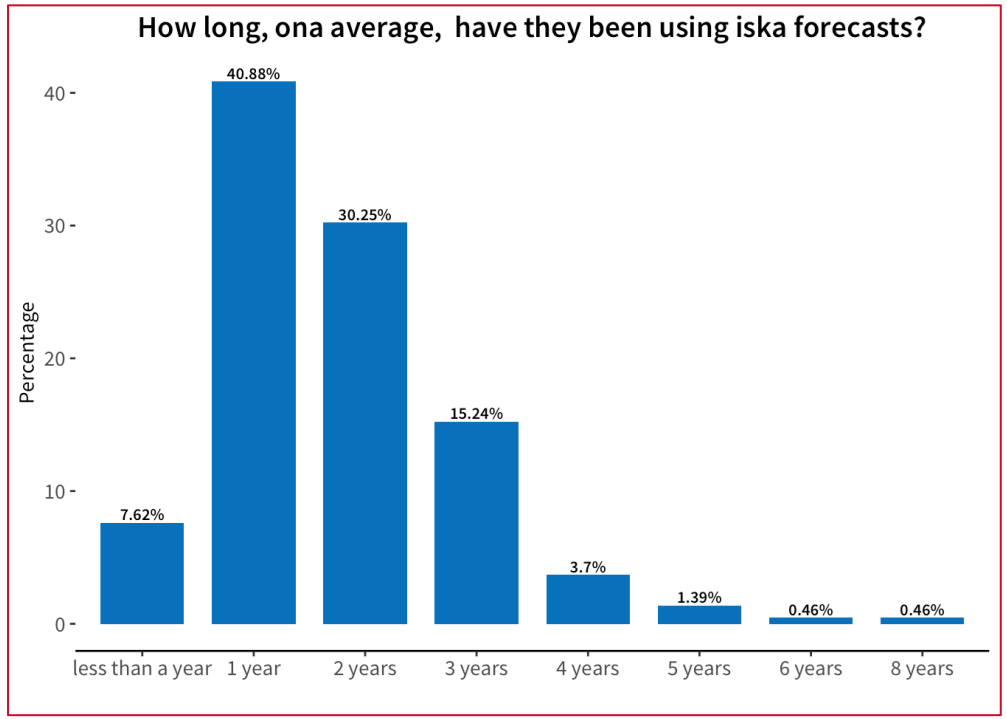
Demographic Breakdown

Ghana (2017 direct subscribers)	Ghana + Mali (2018 direct subscribers)	
439 Ghanian farmers	397 Ghanaian farmers	30 Malian farmers
13% female farmers	16% female farmers	
87% male farmers	84% male farmers	
Most popular crops farmed: Maize (27%)	Most popular crops farmed: Maize (29%)	

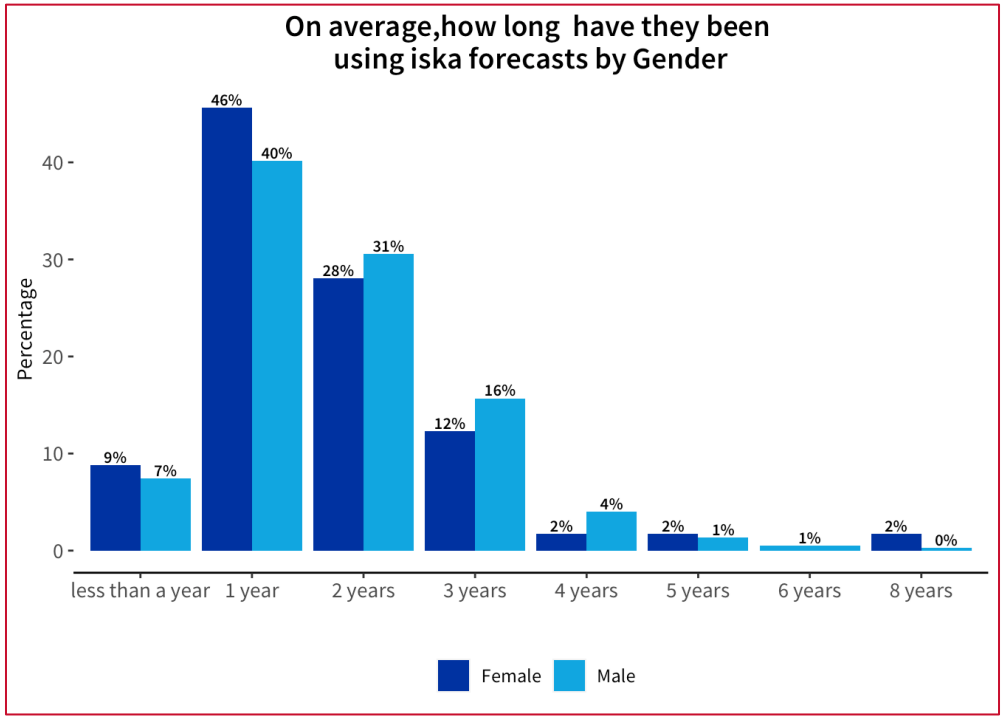
Findings: A focus on Ghanian Ignitia users in 2017

While women's representation in 2017 was still generally low, it largely increased from past years

Ghana (2017 direct subscribers)



Ghana (2017 direct subscribers)



- As at 2017, over 90% of the farmers (direct subscribers) interviewed in Ghana had been using Ignitia's Iska forecasts for at least 1 year from when they were interviewed
- Women's representation in usage also improved one year prior to data collection

Farmers’ report on the usefulness of iska

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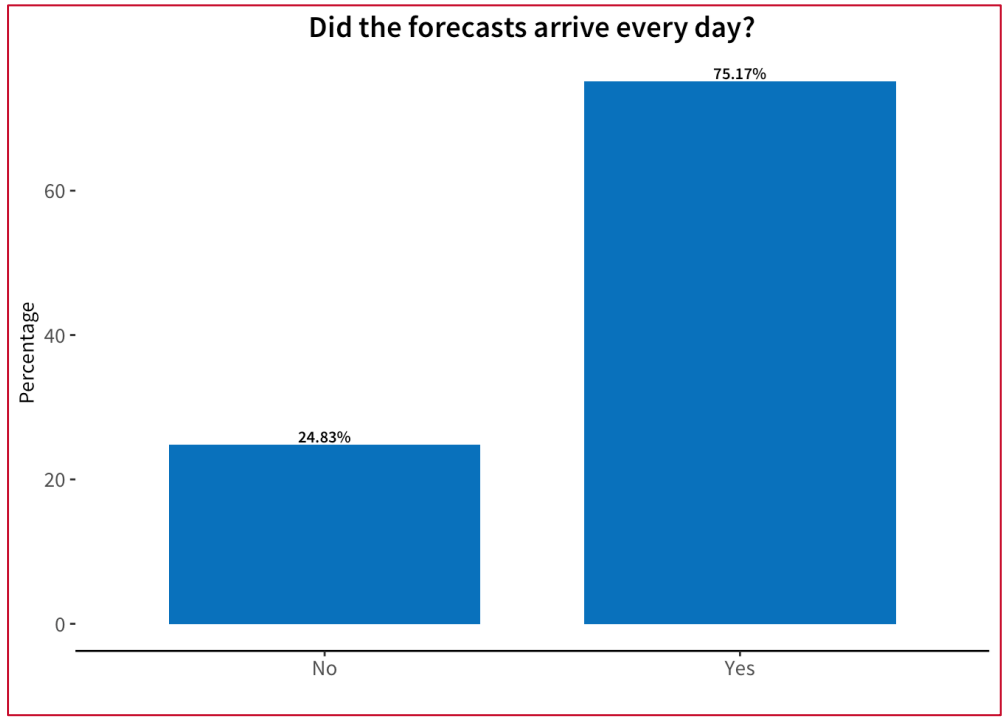
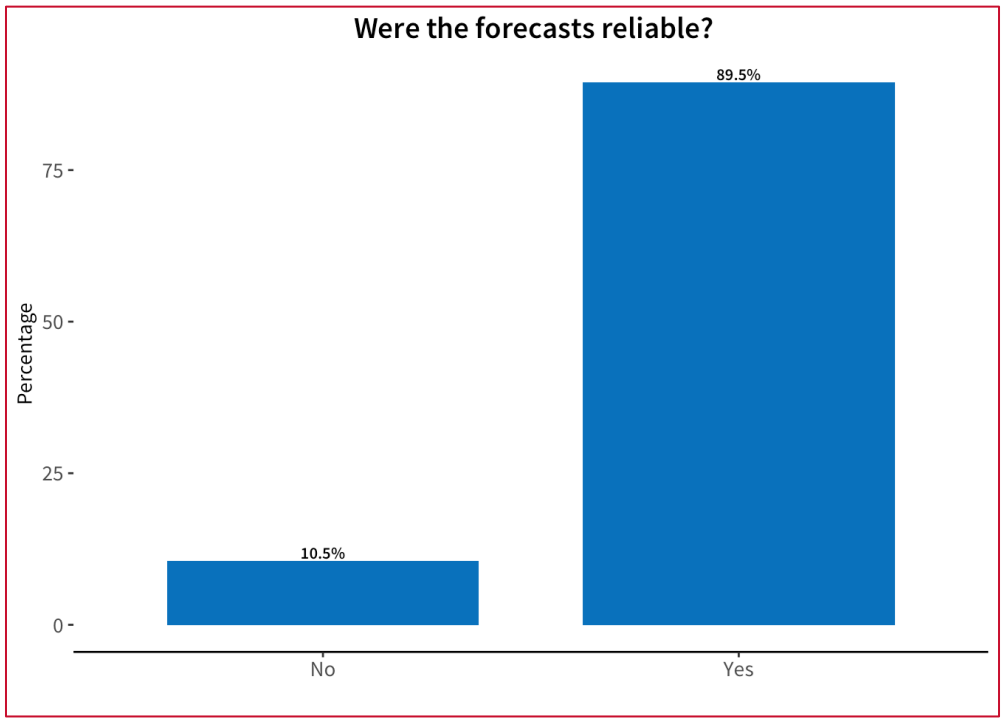
Most direct subscribers interviewed in 2017 felt the forecasts were accurate

Ghana (2017 direct subscribers)



Ghana (2017 direct subscribers)



- 75% said they received the messages every day, implying 3 in every 4 direct subscriber paid for the forecasts on a daily basis in 2017
- Approximately 90% of the Ghanaian farmers in 2017 felt iska's forecasts were reliable

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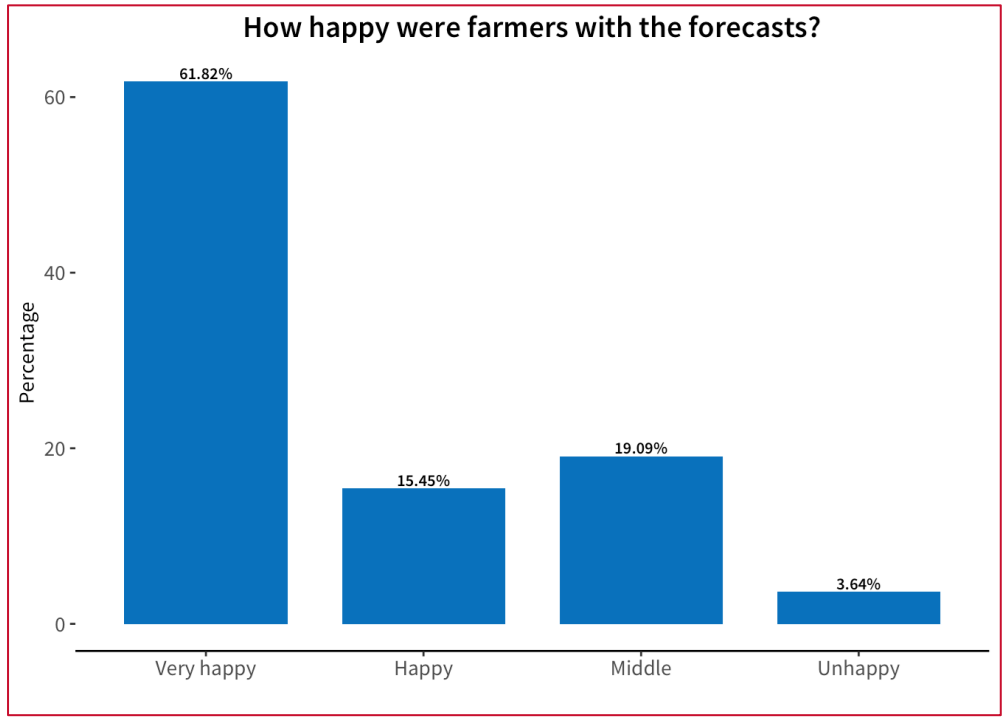
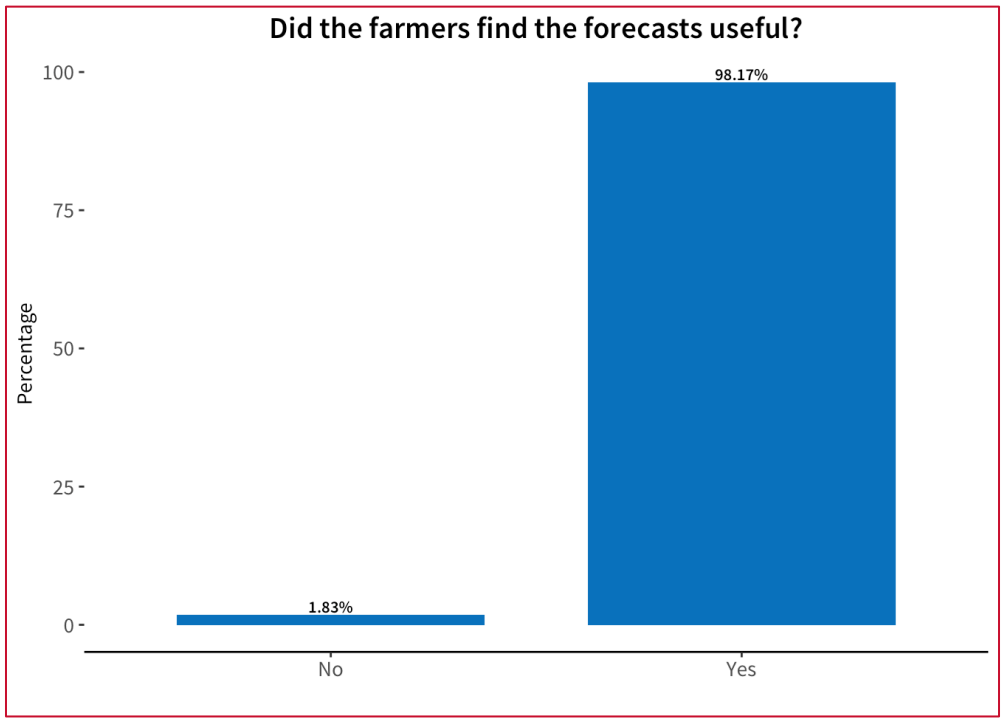
Consistent with the reported reliability of the forecasts, direct subscribers were happy with the forecast and found it useful

Ghana (2017 direct subscribers)



Ghana (2017 direct subscribers)



- At least 77% of the farmers in 2017 were happy with the forecasts they received
- 98% found the forecasts useful to them

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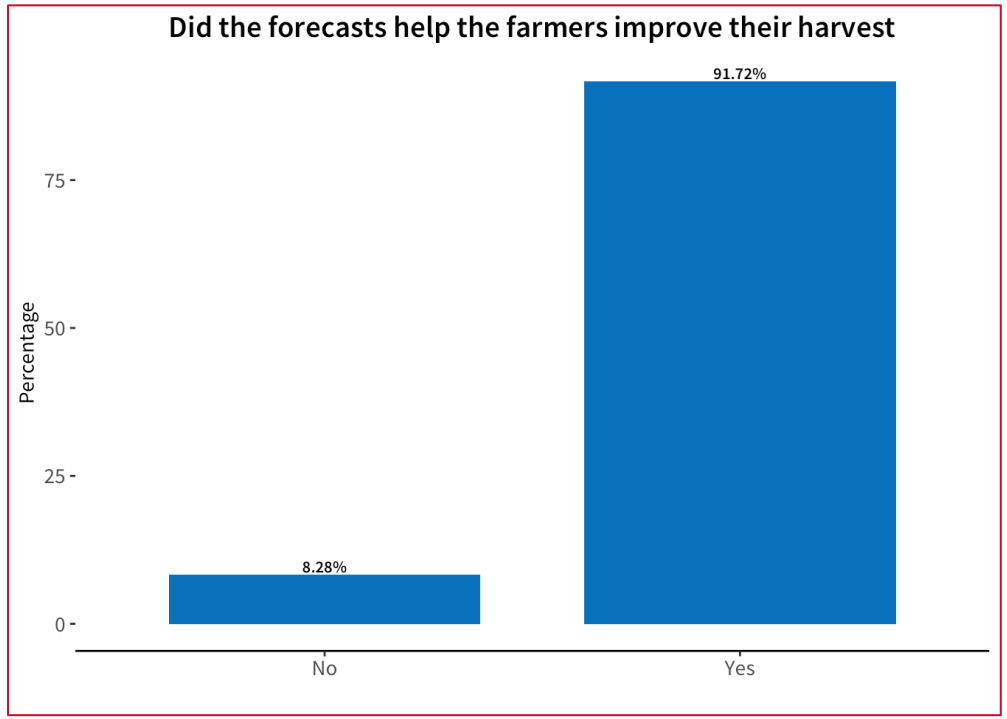
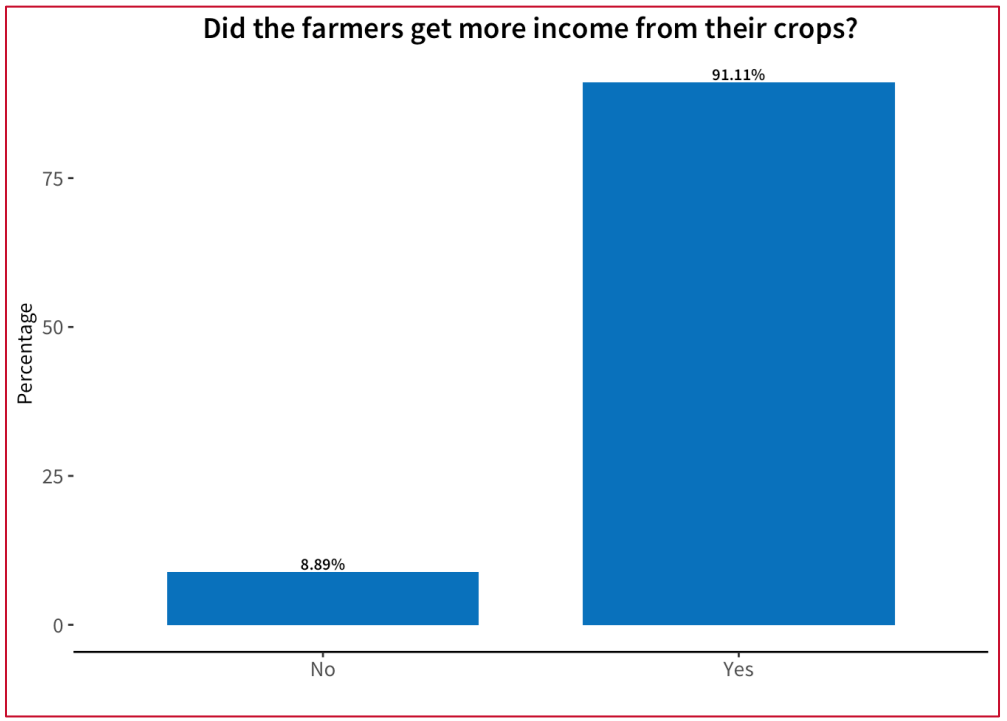
A large portion of farmers reported that the forecasts helped them improve their harvest and get more income in 2017

Ghana (2017 direct subscribers)



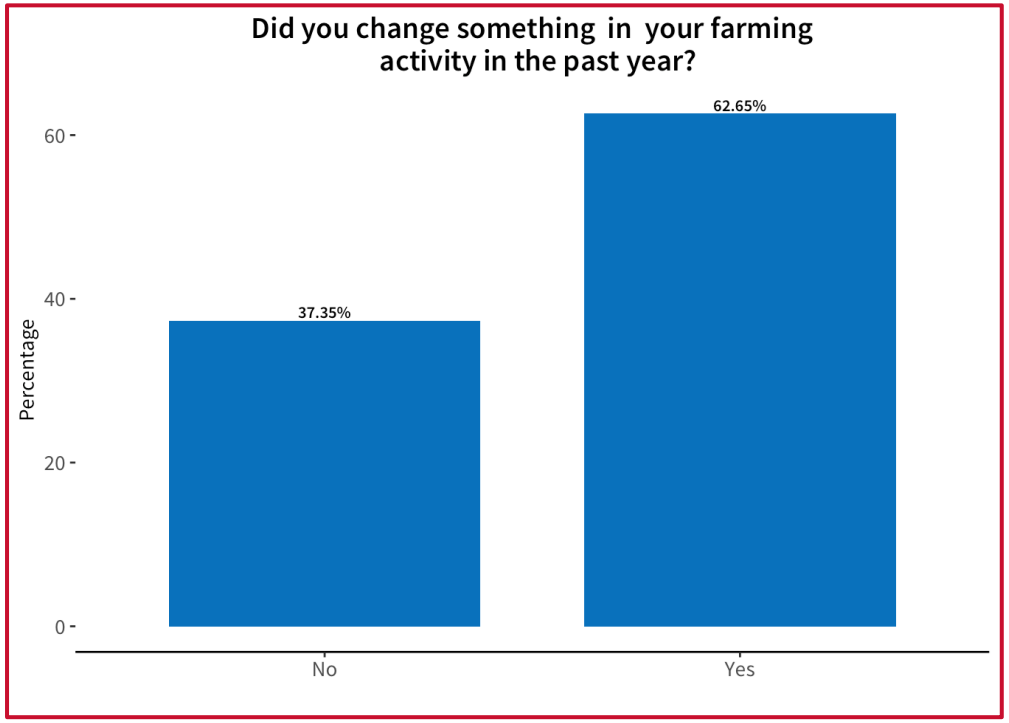
Ghana (2017 direct subscribers)



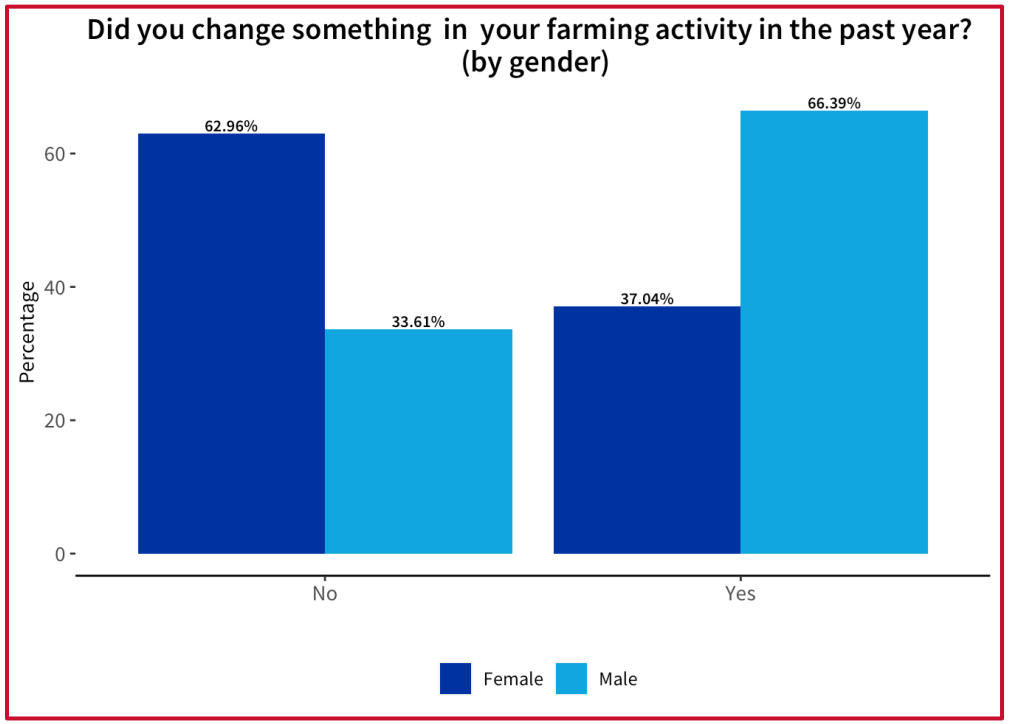
- 92% of direct subscribers reported that the forecasts helped them improve their harvests
- In the same vein, 91% of the direct subscribers reported that the forecasts helped them improve the income they received from their crops

Overall, direct women subscribers in 2017 were less likely to change their farming activities compared to male farmers

Ghana (2017 direct subscribers)



Ghana (2017 direct subscribers)



- 2 in 3 male farmers changed some part of their farming activities (cultivated more land, used new fertilizers) in 2016
- However, only 1 in 3 female farmers changed some of their farming activities in the 2016 planting season post-iska

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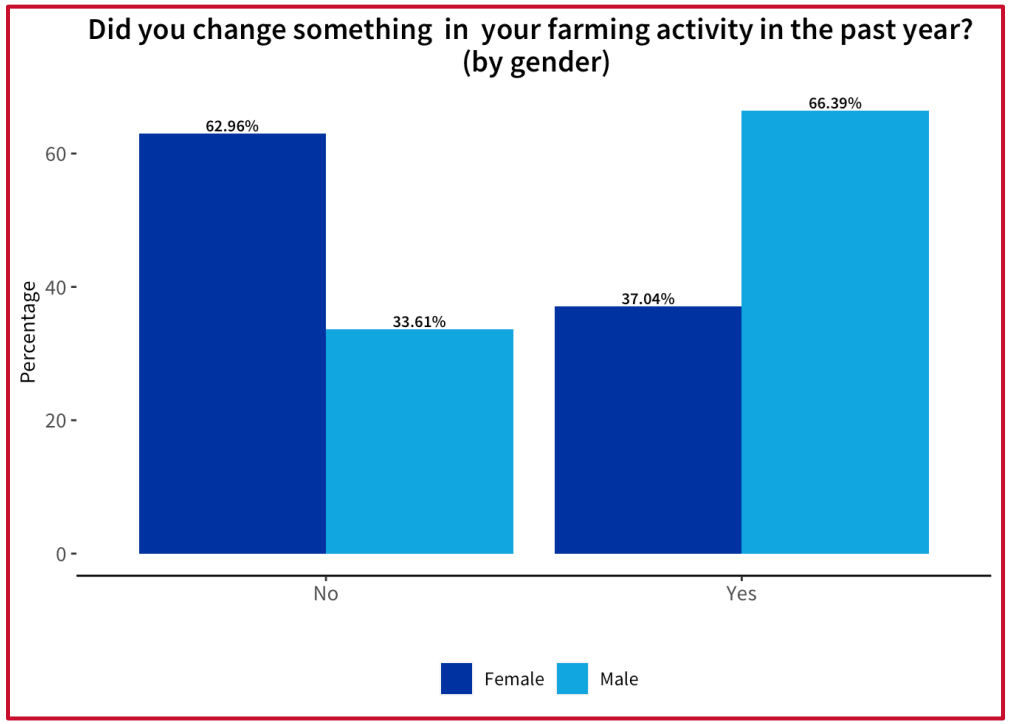
Women with similar duration of access to iska's service and similar value chains as male farmers are still less likely to change their farming practices

Ghana (2017 direct subscribers)



Ghana (2017 direct subscribers)

Outcome	Variables	correlation coefficient of changing farming practice
Change in farming practice	- Gender	0.32***
Change in farming practice	- Gender - value chain - duration of access to service	0.19***

- When we control for duration of access to service and the value chains, men were significantly associated with changing their farming practices compared to women farmers
- This might be due to structural barriers that women face e.g access to extension agents and resources that Morris and Doss (2001) find is correlated with gender among farmers in Ghana, and could affect uptake of new agric practices

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What is the influence of Iska on farmers' productivity
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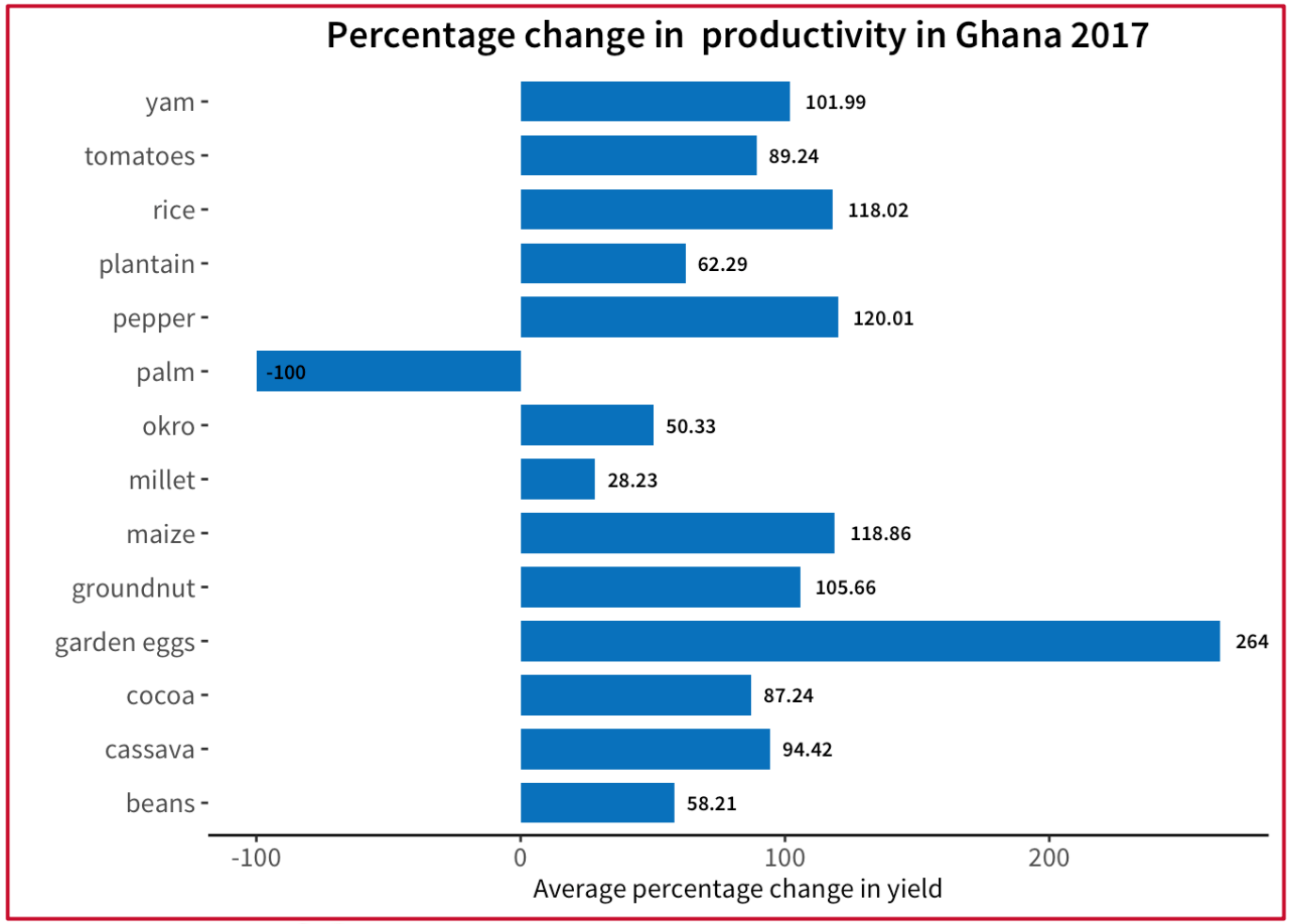
On average, farmers in 6 out of the 14 most popular value chains doubled their reported productivity growth rate in 2017

Ghana (2017 direct subscribers)



- Farmers in the yam,rice, pepper, maize, groundnut and garden egg value chains experienced **doubled** productivity rates post-iska
- However, farmers in the palm oil value chain witnessed their yield drop by double, on average
- Majority of the farmers in the palm sector say the forecasts were reliable and useful
- Farmers in the palm oil value chain were not less likely to change their farming practices compared to farmers in other value chains so the negative change was likely due to other external factors faced by farmers in the value chain

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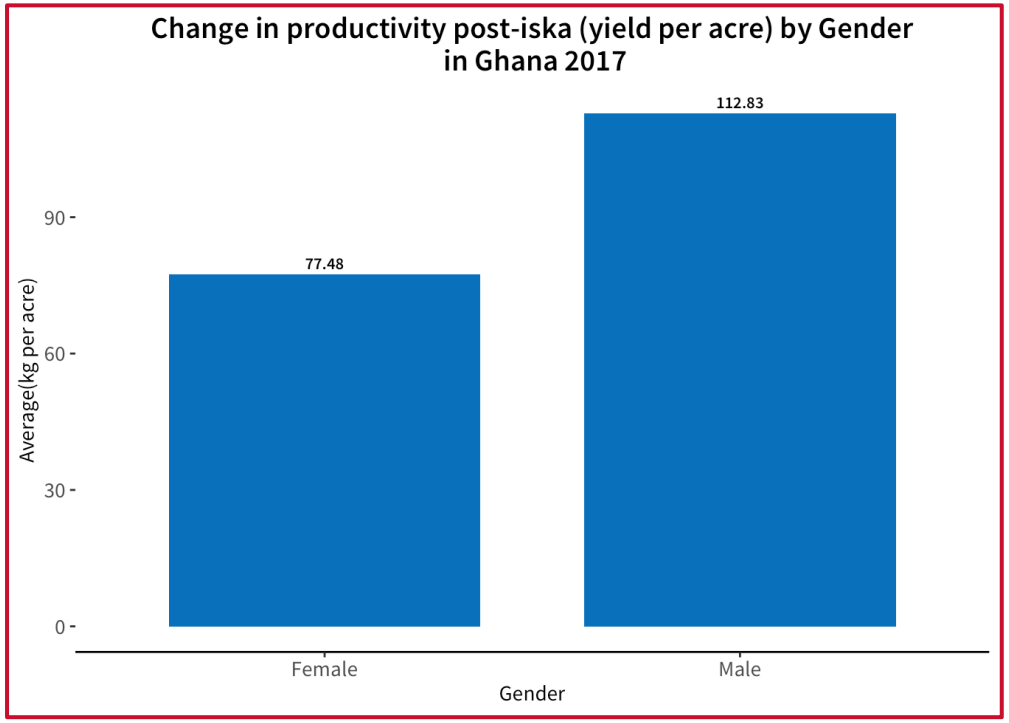
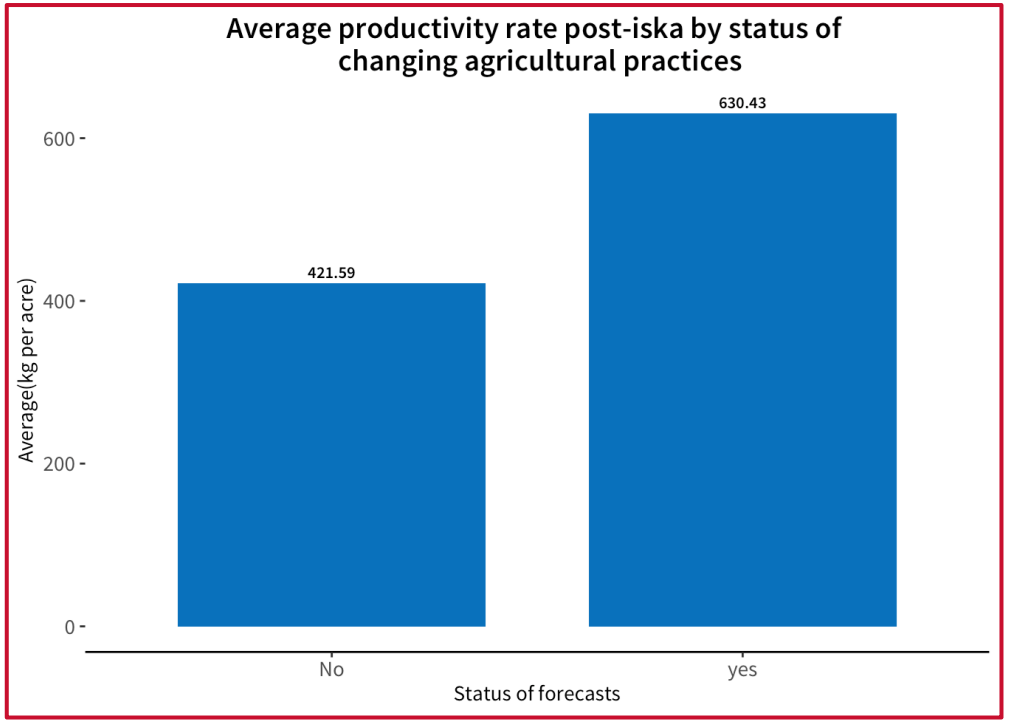
In 2017, male farmers in Ghana were more likely to have a larger increase in their productivity rate, compared to female farmers, post-Iska

Ghana (2017 direct subscribers)



Ghana (2017 direct subscribers)



- On average, male farmers experienced a higher change in their productivity rate compared to female farmers
- On average, change in productivity rate was larger for farmers that changed their agricultural practices

Findings: A focus on Ghanaian and Malian Ignitia users in 2018

Quick facts about the farmers

80%
Use machines on their farms

72%
keep farm records

66%
own a smartphone

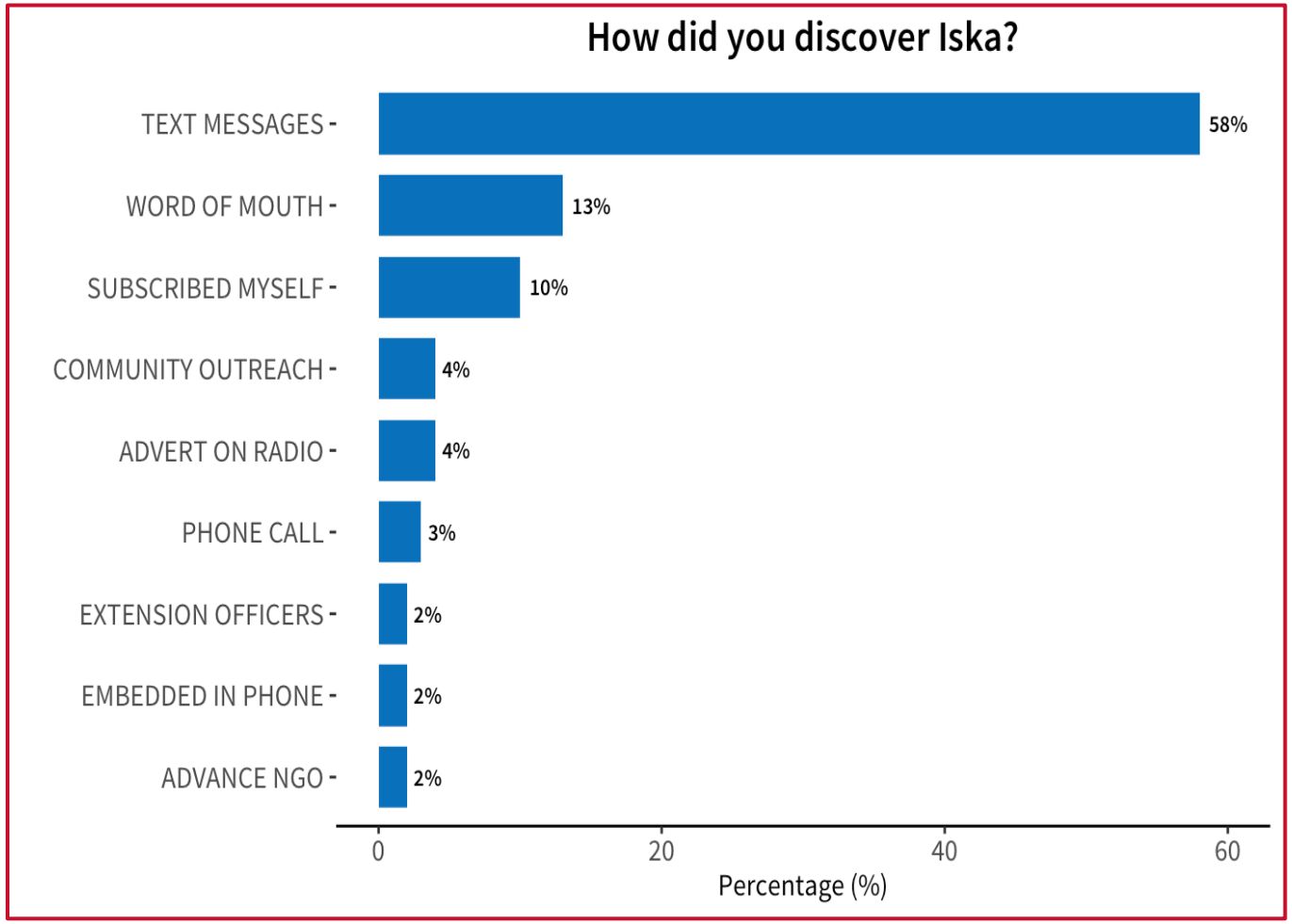
58%
Access social media

50%
Access whatsapp

67%
have heard of climate change

Over half of iska's users in 2018 discovered the service through SMS blasts

Ghana + Mali (2018 direct subscribers)



- Most farmers discover iska through SMS campaigns
- 13% hear about iska through word of mouth i.e family, friends and extension agents
- 10% reported that they subscribed themselves and 6% get referred to the service from friends

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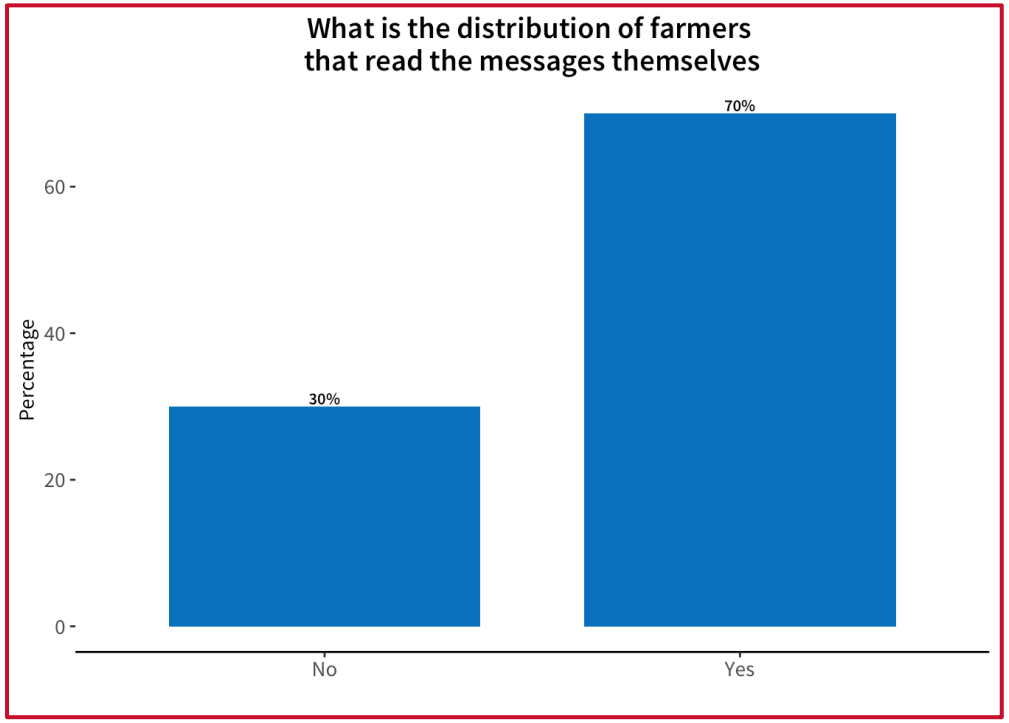
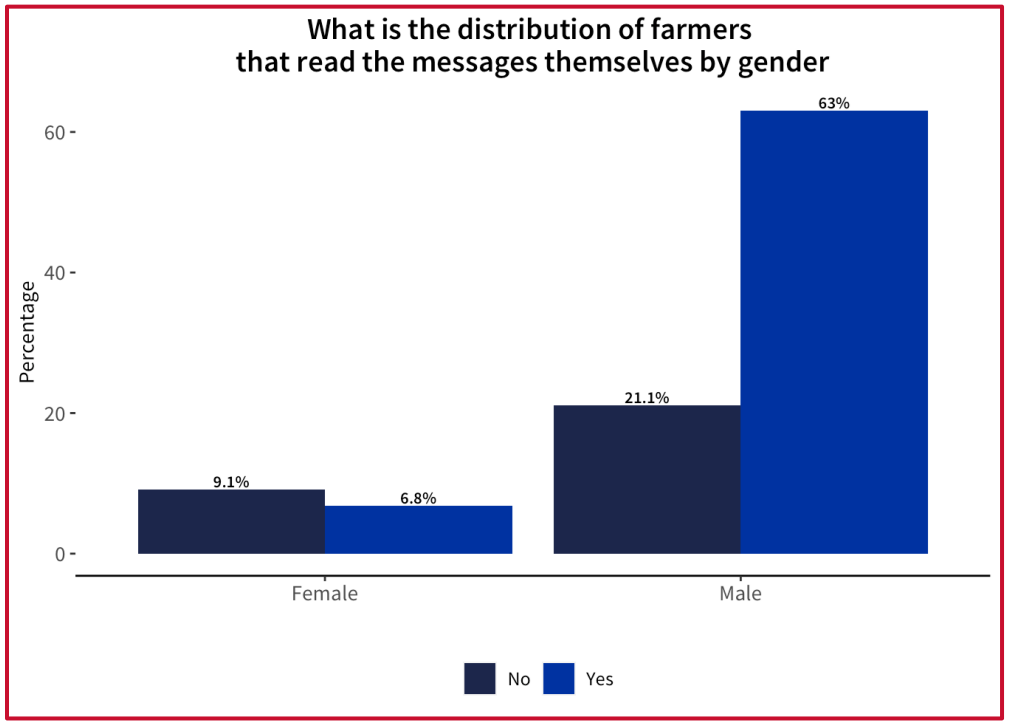
A large number of farmers read the messages themselves, but females were more likely than men to not read the messages themselves

Ghana + Mali (2018 direct subscribers)



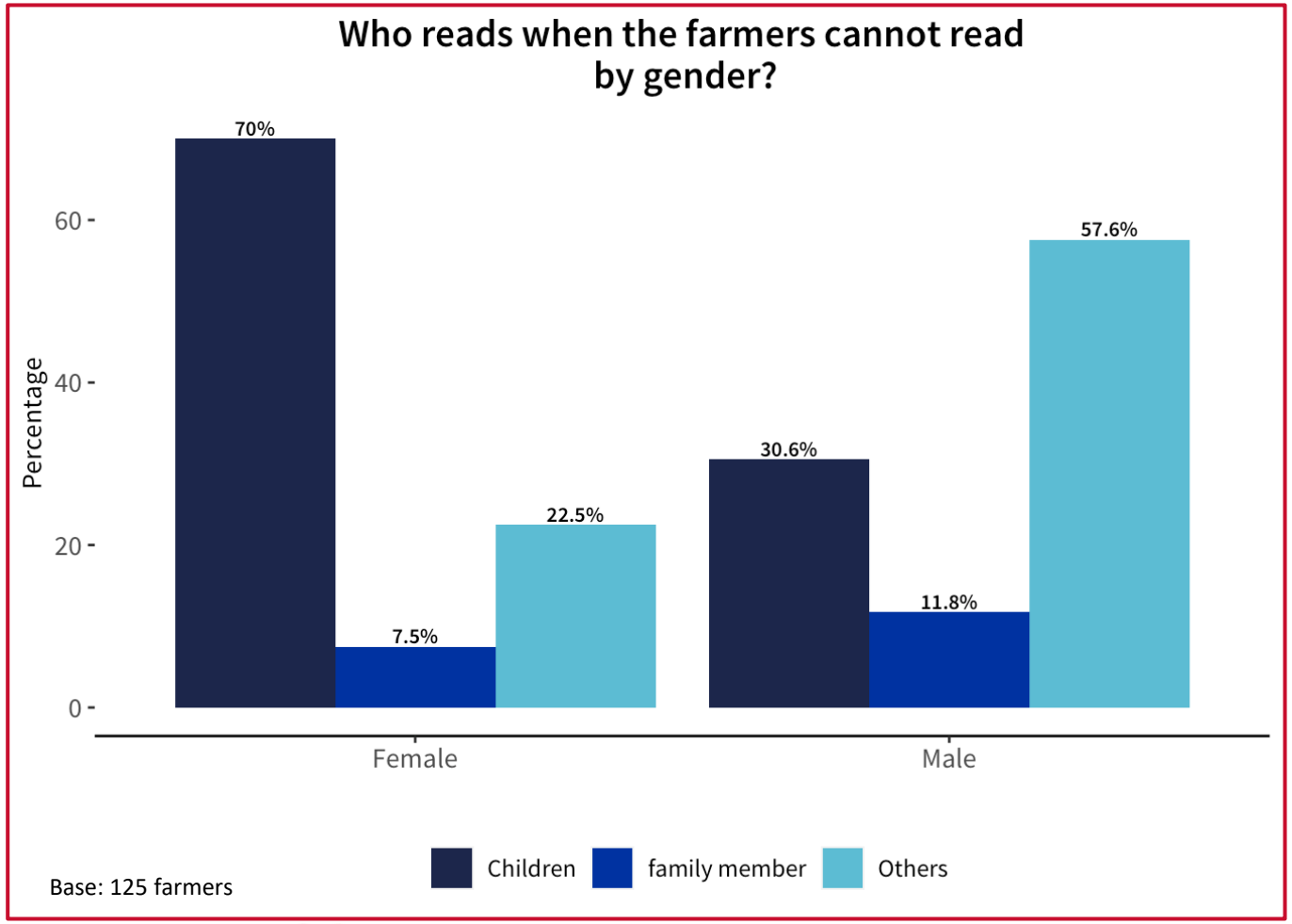
Ghana + Mali (2018 direct subscribers)



- 70% of farmers in Ghana and Mali read the messages themselves implying majority of the farmers understand the content of the messages
- Over half of the female users do not read the messages themselves.

Female farmers often result to their children to read the messages for them

Ghana + Mali (2018 direct subscribers)

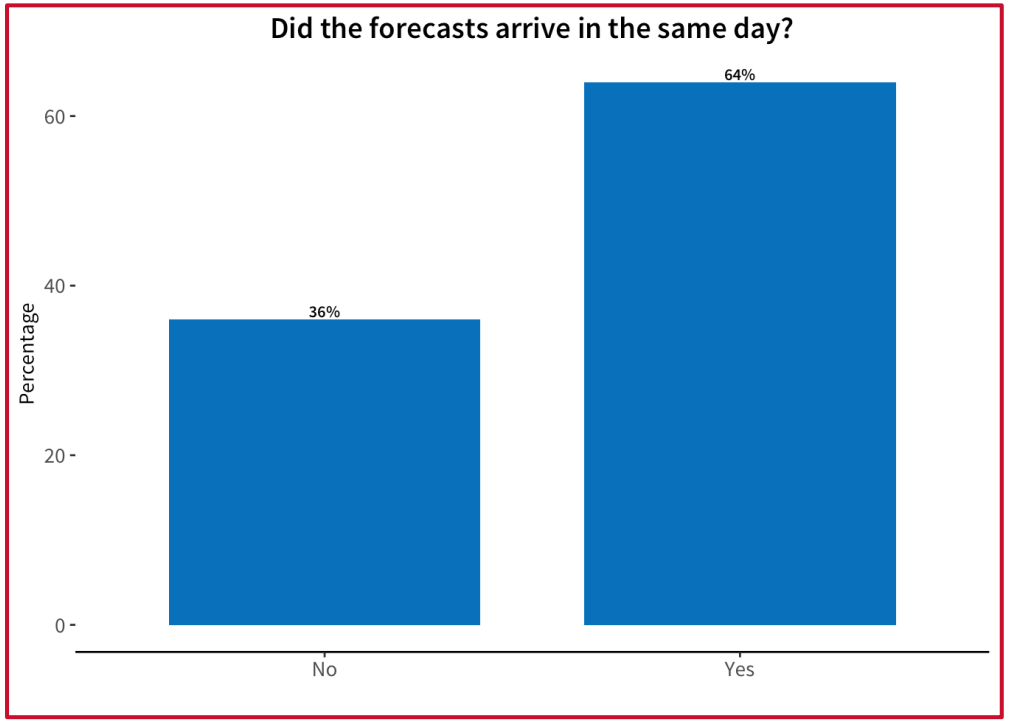


Base: 125 farmers

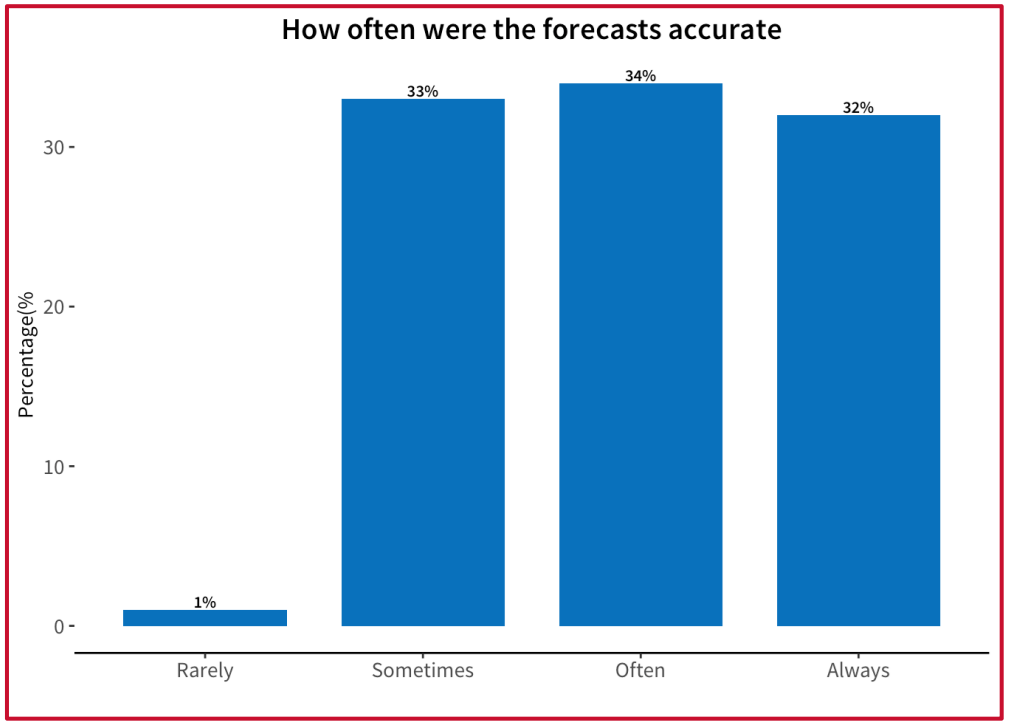
- Female farmers often give their children the messages to read when they cannot read it themselves
- Male farmers mostly give other people like their friends, agents etc. to read the messages when they can't read it themselves
- This is not surprising given that in low income settings, male farmers are more likely to be educated than female farmers
- Following this trend, we see that on average, male farmers interviewed have higher level of education compared to female farmers

Compared to 2017, a smaller portion of users reported that they received the forecasts every day in 2018

Ghana + Mali (2018 direct subscribers)



Ghana + Mali (2018 direct subscribers)



- 64% of farmers mentioned that the forecasts arrived in the same day
- 2 in 3 farmers said the forecasts were at least often accurate. When compared to 2017's reliability sentiments, 2018's forecast reliability falls short

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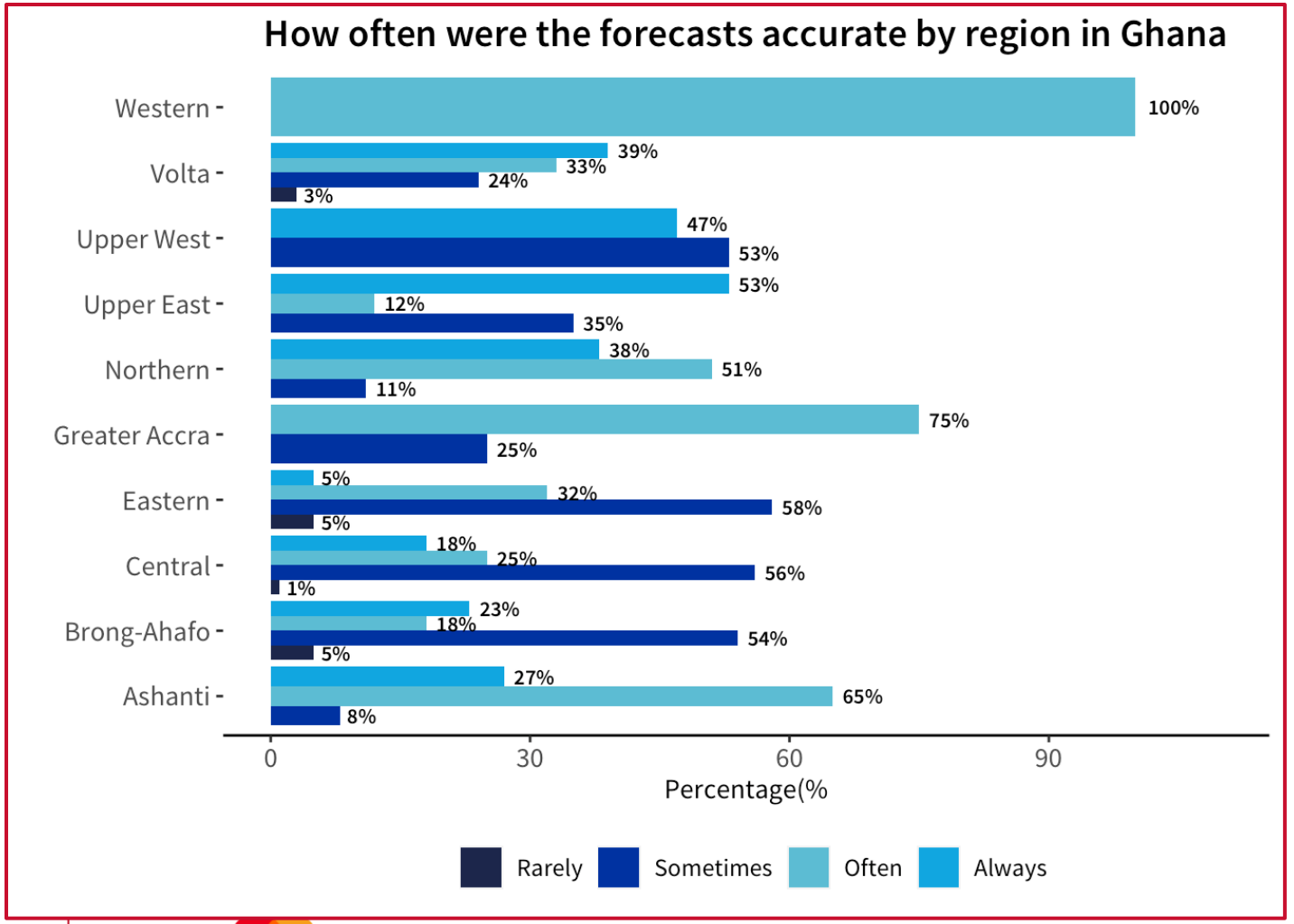
Over half of the farmers in Brong-Ahafo, the Central, Eastern and the Upper Western regions thought the forecasts were only accurate sometimes

Ghana + Mali (2018 direct subscribers)



- Farmers in Greater Accra, Volta, Ashanti, the Northern, Western, Upper Eastern regions thought the forecasts were at least often accurate
- However, farmers in Brong Ahafo, Central, Eastern and the Upper Western regions said the forecast were only accurate sometimes

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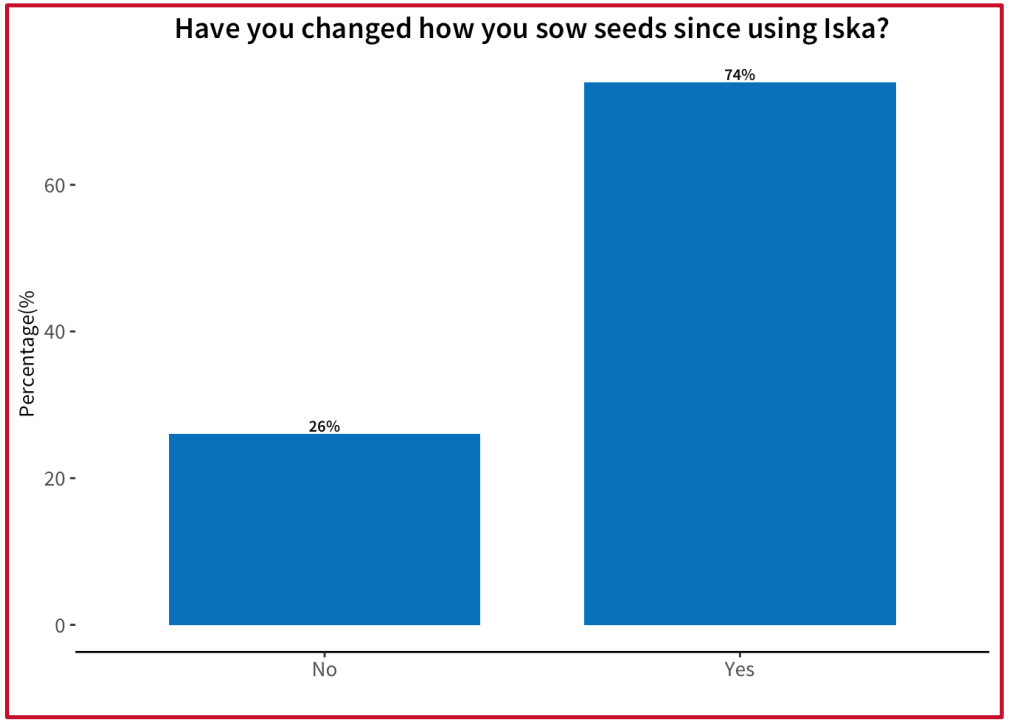
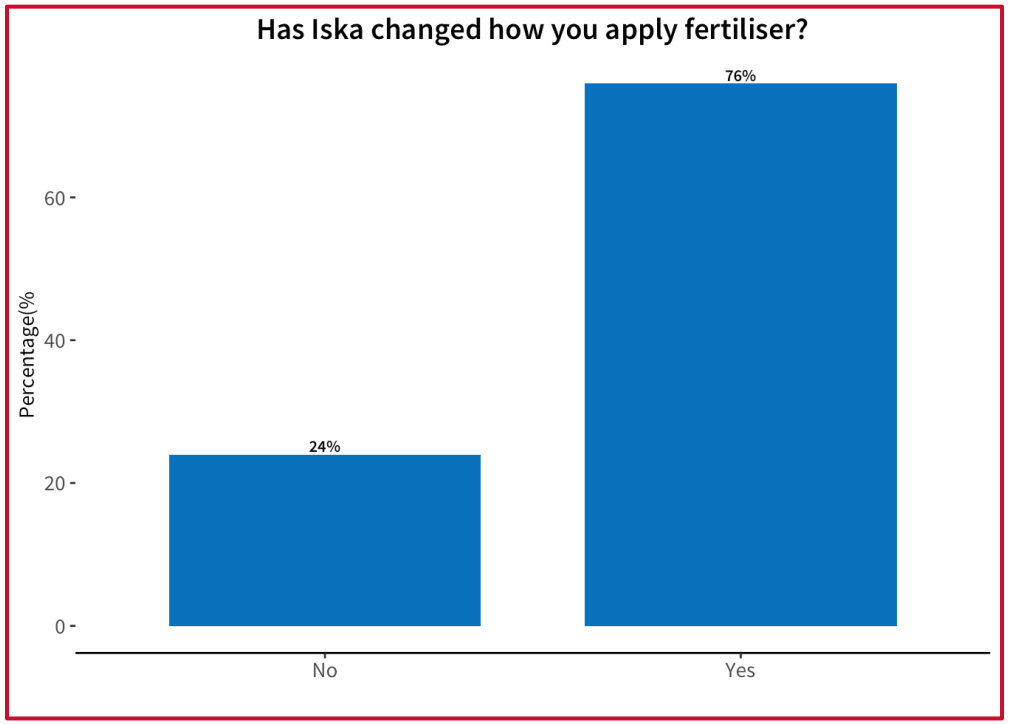
In 2018, majority of farmers shared the sentiment that iska changed some of their approach to farming

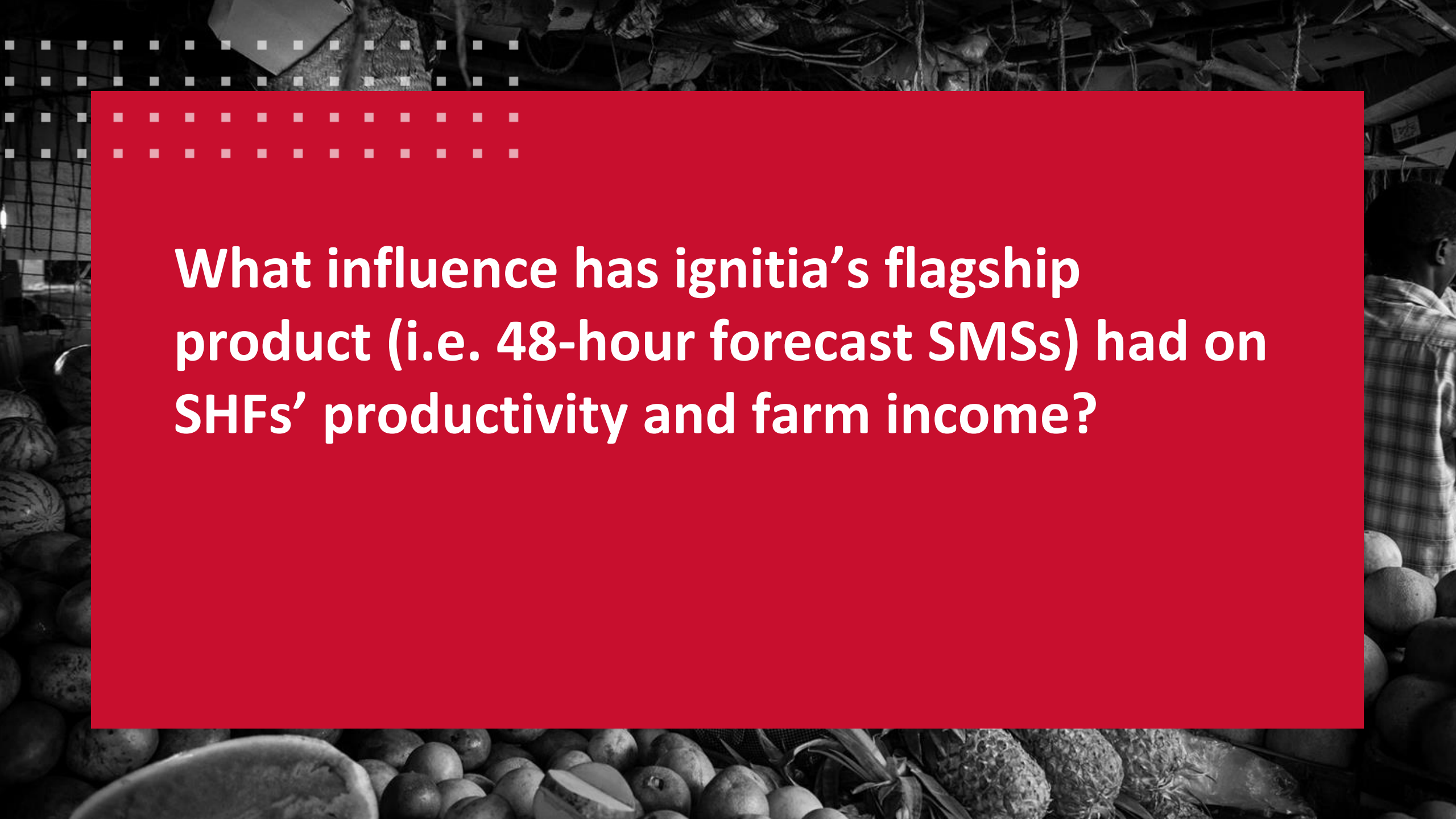
Ghana + Mali (2018 direct subscribers)



Ghana + Mali (2018 direct subscribers)



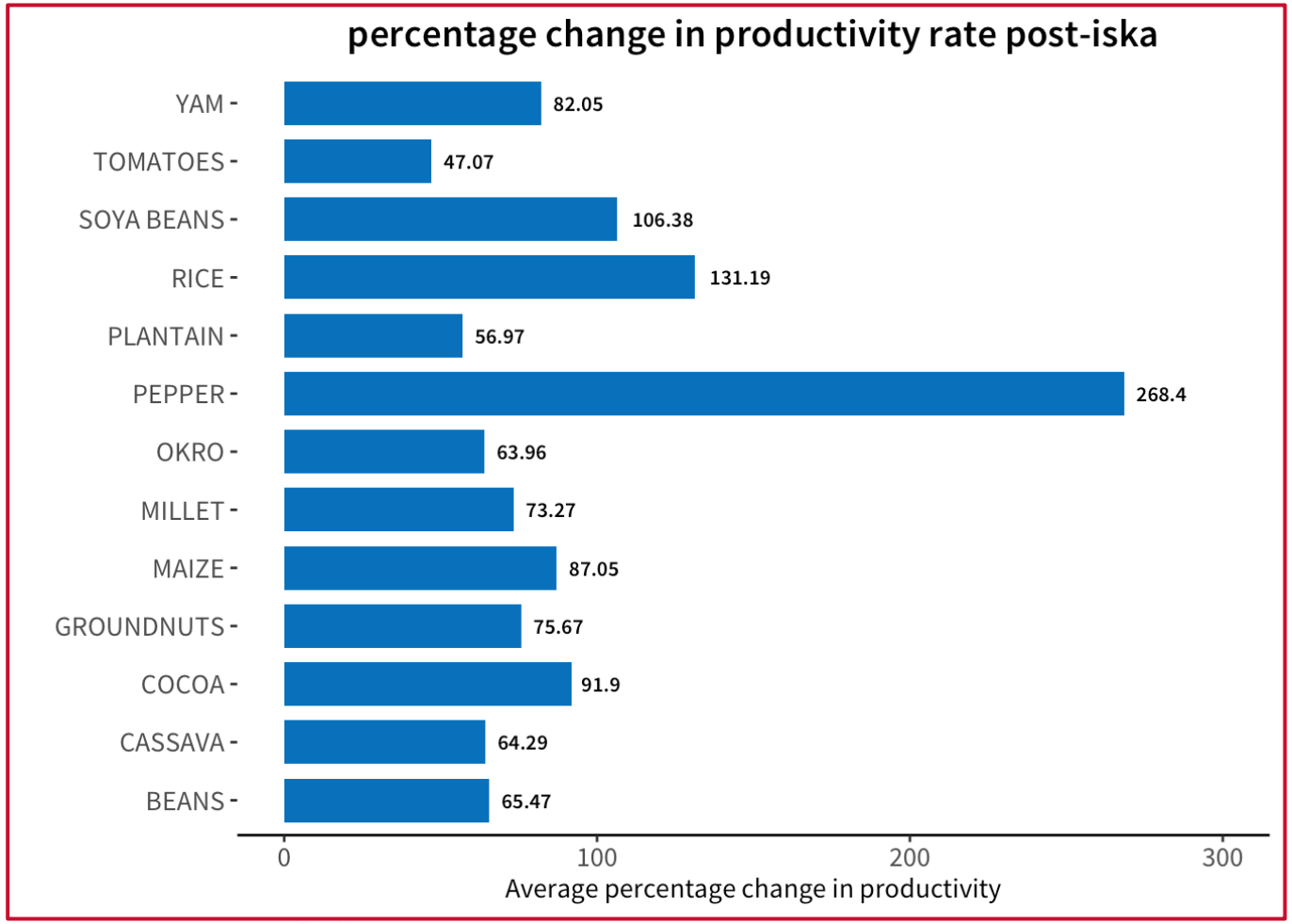
- Most farmers feel iska has changed how they sow seeds, apply fertilizers and apply pesticides



What influence has ignitia's flagship product (i.e. 48-hour forecast SMSs) had on SHFs' productivity and farm income?

Farmers in all the value chains reported growth in their productivity post-iska, with farmers in the pepper chain recording the highest change in productivity

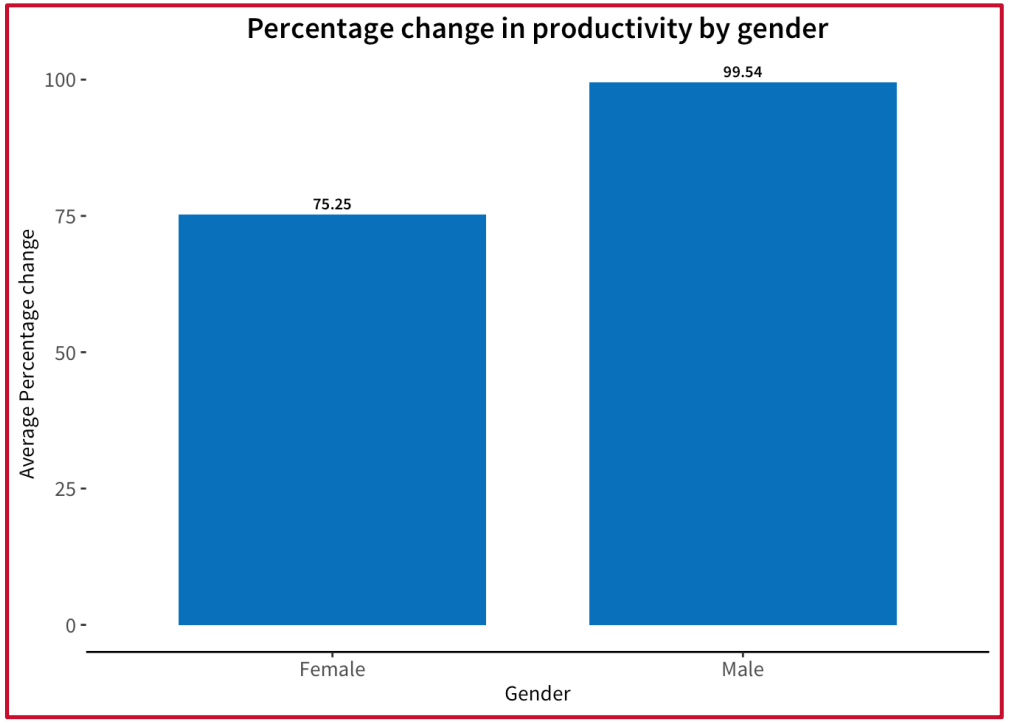
Ghana + Mali (2018 direct subscribers)



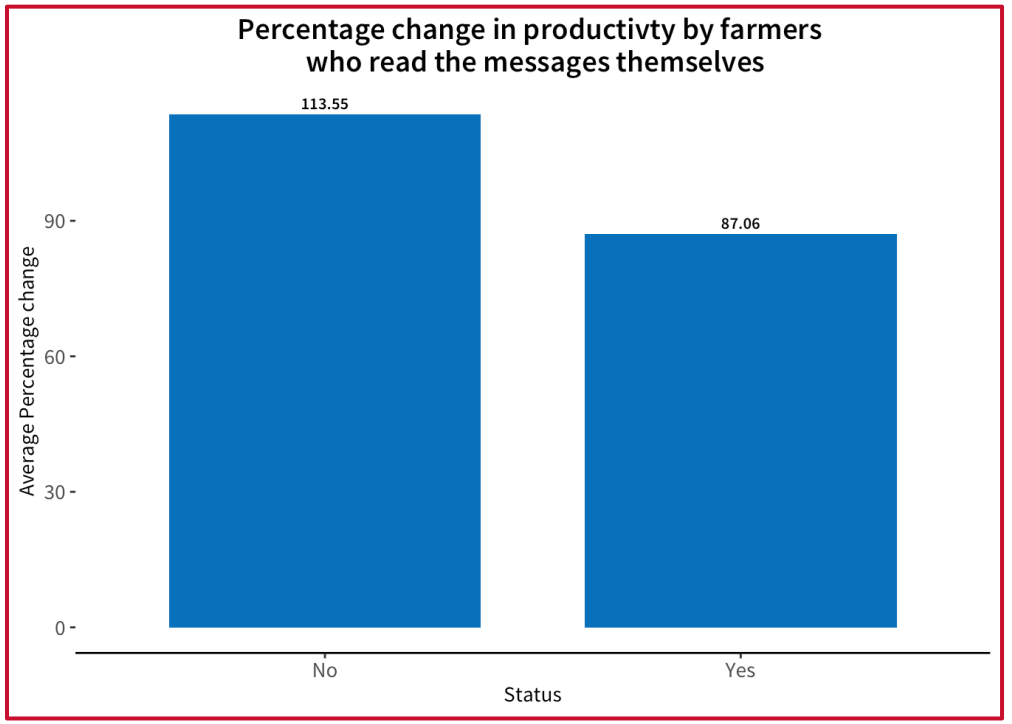
- In 2018, farmers in the pepper value chain recorded the highest change in their productivity rate post-iska, followed by farmers in the rice value chain

Similar to 2017, in 2018, male farmers recorded higher changes in their productivity rates compared to female farmers

Ghana + Mali (2018 direct subscribers)



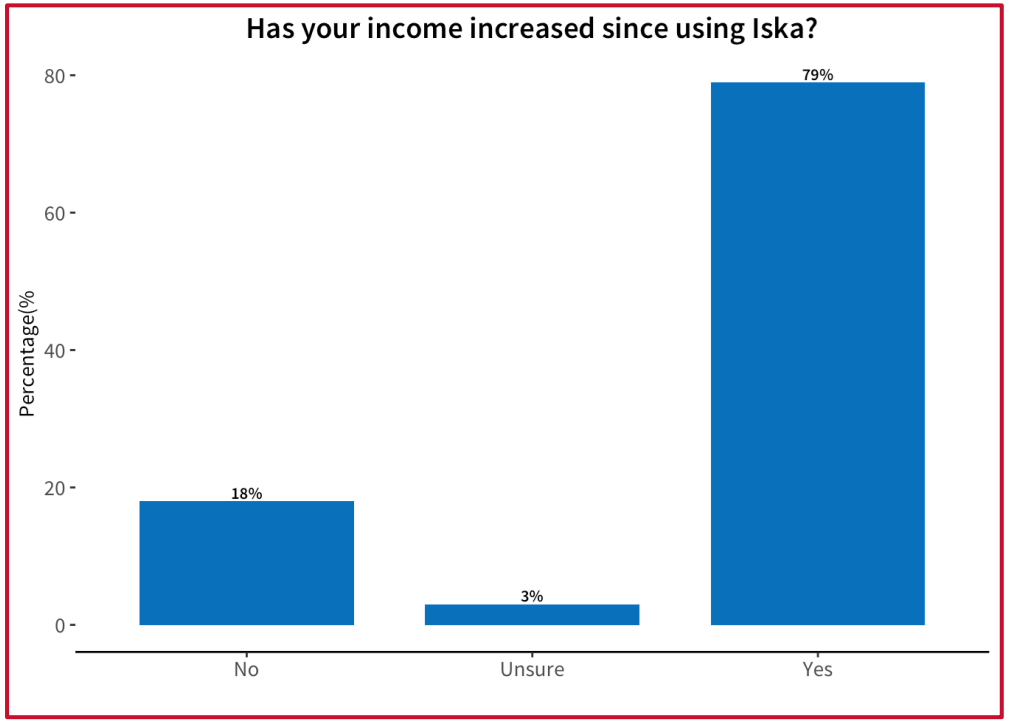
Ghana + Mali (2018 direct subscribers)



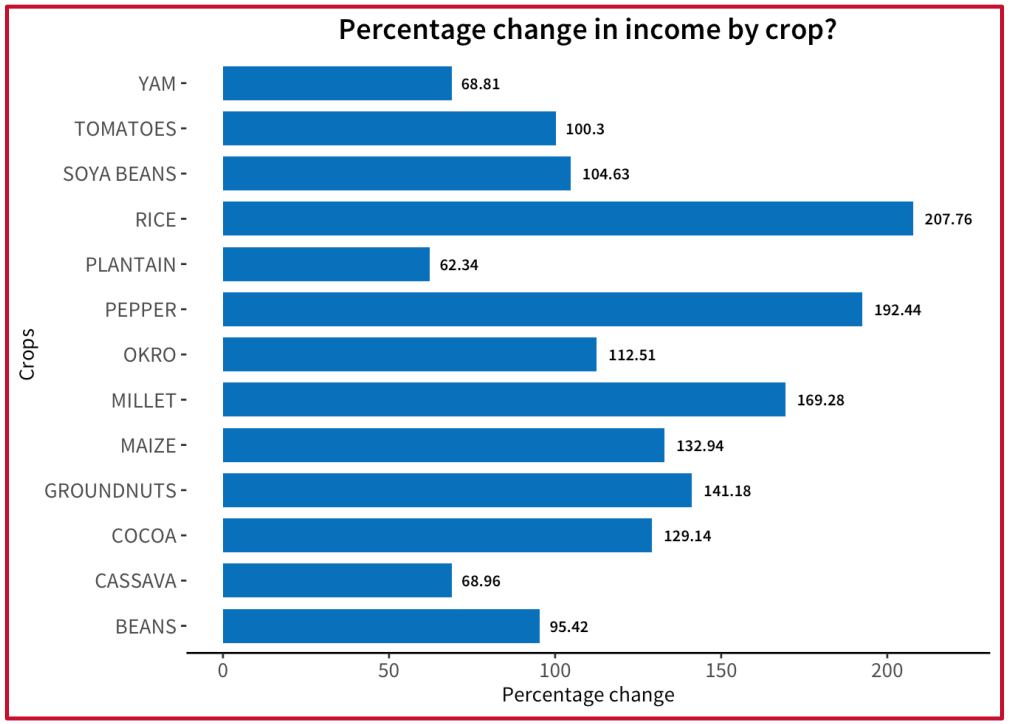
- Male farmers in 2018 recorded higher productivity rates than female farmers by approximately 25 percentage points
- Interestingly, farmers who did not read the messages themselves in 2018 recorded a higher productivity rate, on average, than farmers who did, with a difference of 26%.

In 2018, farmers in 9 of the 13 most popular value chains reported growth in their incomes post-iska

Ghana + Mali (2018 direct subscribers)



Ghana + Mali (2018 direct subscribers)

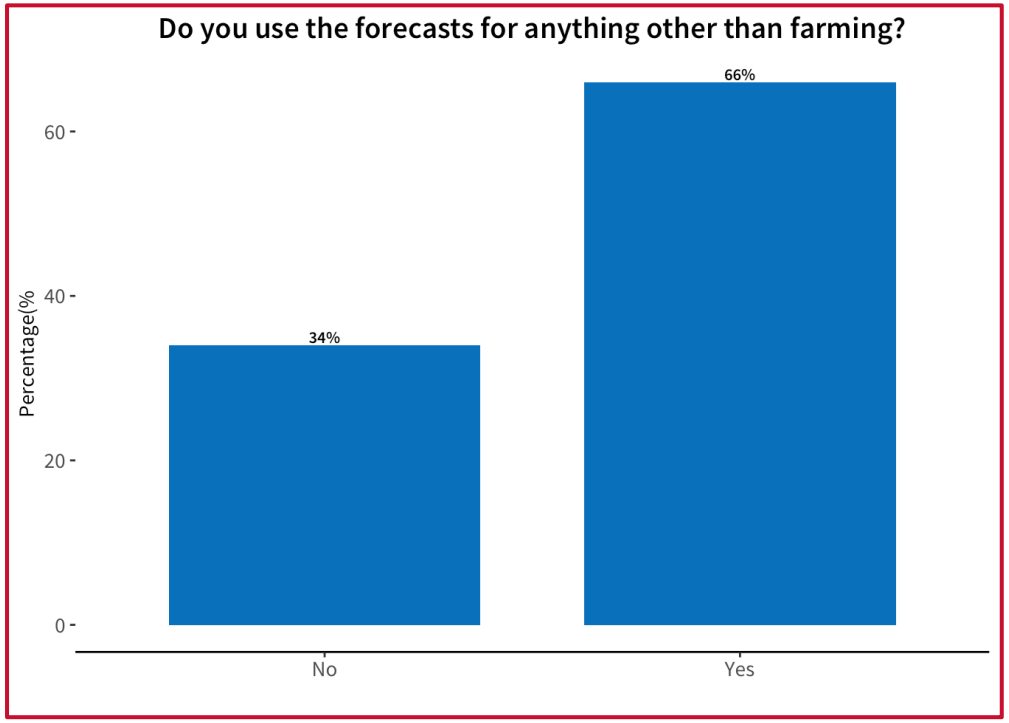


- Farmers reported, on average, higher increases in their income in 2018 with the rice and pepper value chains recording the largest growth in income with 207% and 192% respectively

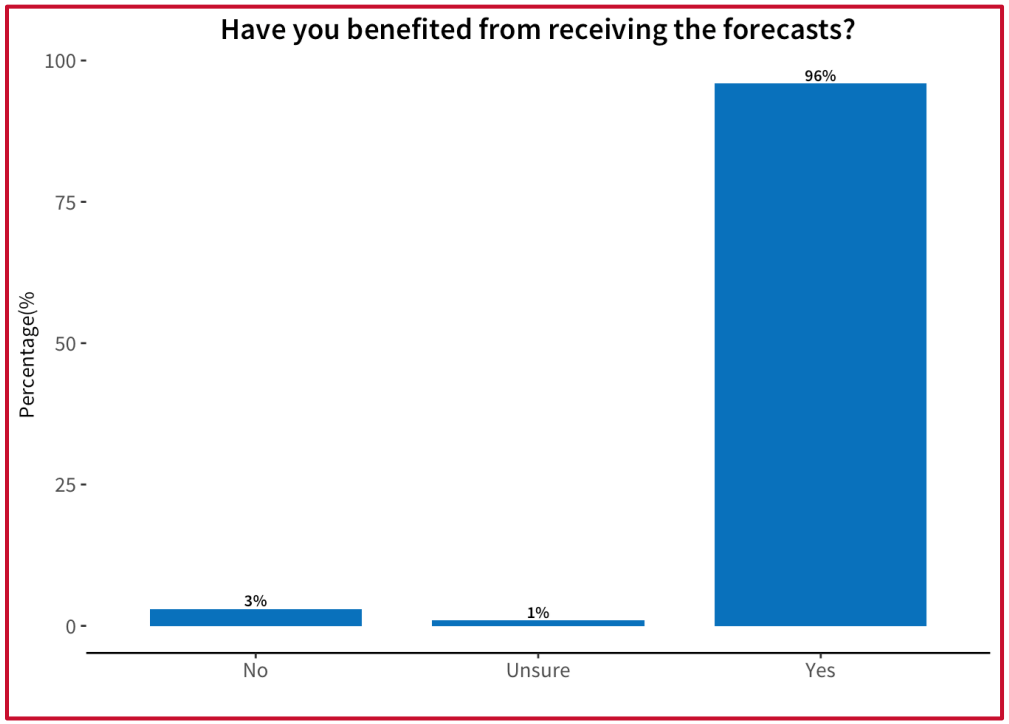

Behaviors & Practices

2 in 3 farmers say they used the forecasts for other activities beyond farming

Ghana + Mali (2018 direct subscribers)



Ghana + Mali (2018 direct subscribers)



- 66% of the farmers use the services for other activities beyond farming suggesting the usefulness of the service in their everyday lives
- In the same trend, 96% say they benefited from the forecasts

Findings: A focus on Nigeria farmers - 2019

Demographic Breakdown

Nigerian farmers interviewed received this service through a farming program supported by an MNO in Nigeria

Nigerian beneficiaries(2019 survey)

124
Nigerian farmers

14%
female farmers

86%
male farmers

Most popular crops farmed

Onions

Quick facts about the Nigerian farmers

81%
male farmers

13%
are within the 18-29 age group

69%
have a household size of at least 6 people

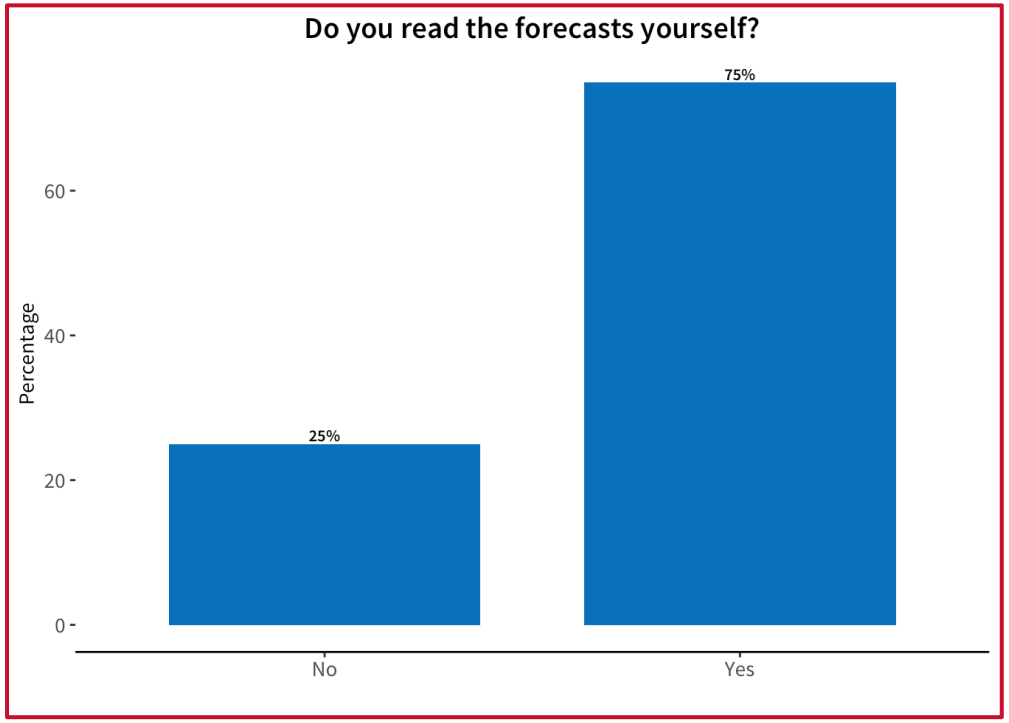
19%
female farmers

79%
received some form of education

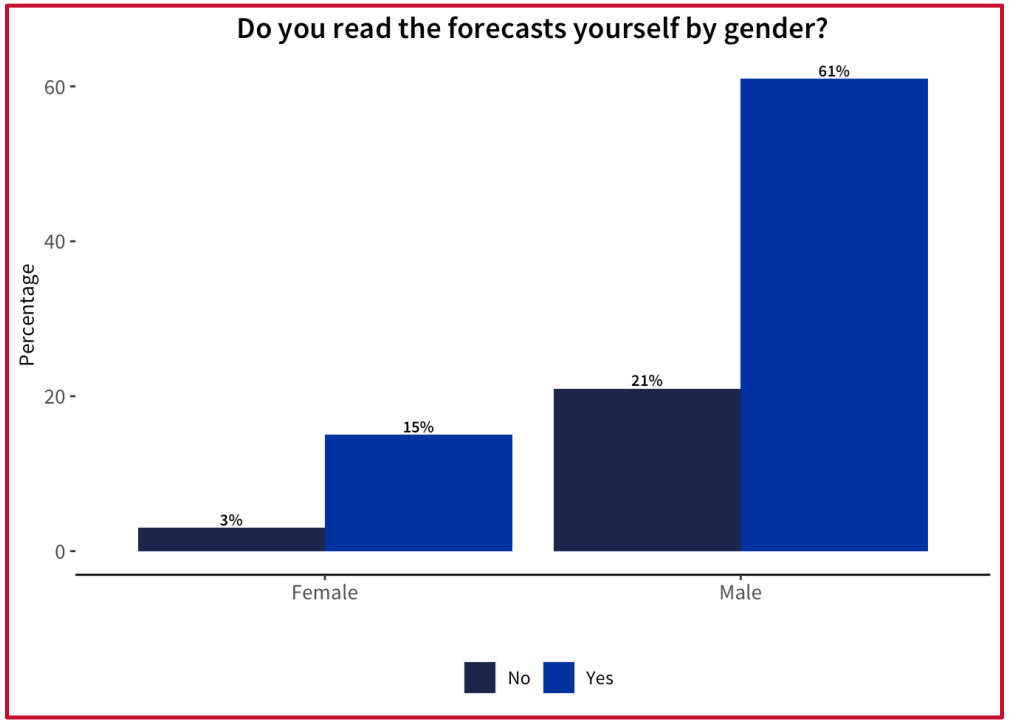
83%
received 5-7 forecasts in a week

Majority of the farmers in Nigeria read the forecasts themselves

Nigerian beneficiaries(2019 survey)



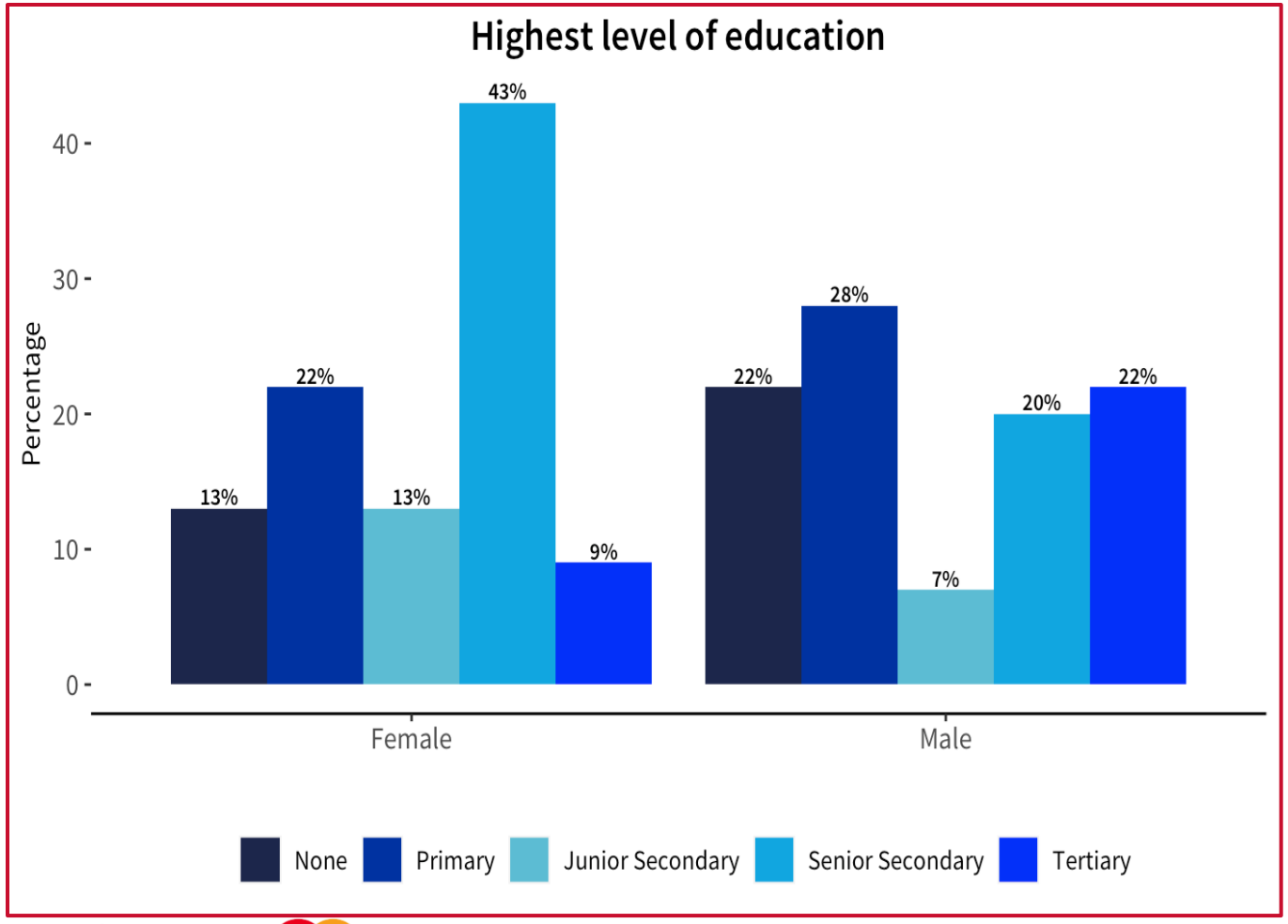
Nigerian beneficiaries(2019 survey)



- Compared to female Ghanaian farmers, majority of the female Nigerian farmers read the messages themselves
- 80% of the female farmers onboarded through the MNO farming program read the messages themselves compared to 74% of the male farmers.

The gender difference in the farmers that read the messages can be explained by the difference in the education level of the farmers interviewed

Nigerian beneficiaries(2019 survey)



- 87% of the female Nigerian farmers interviewed were educated, compared to 78% of the male farmers.
- Given that farmers with higher level of education are more likely to read the forecasts, and this group of female farmers were more educated than the male farmers, the gender difference can be explained by the difference in the level of education

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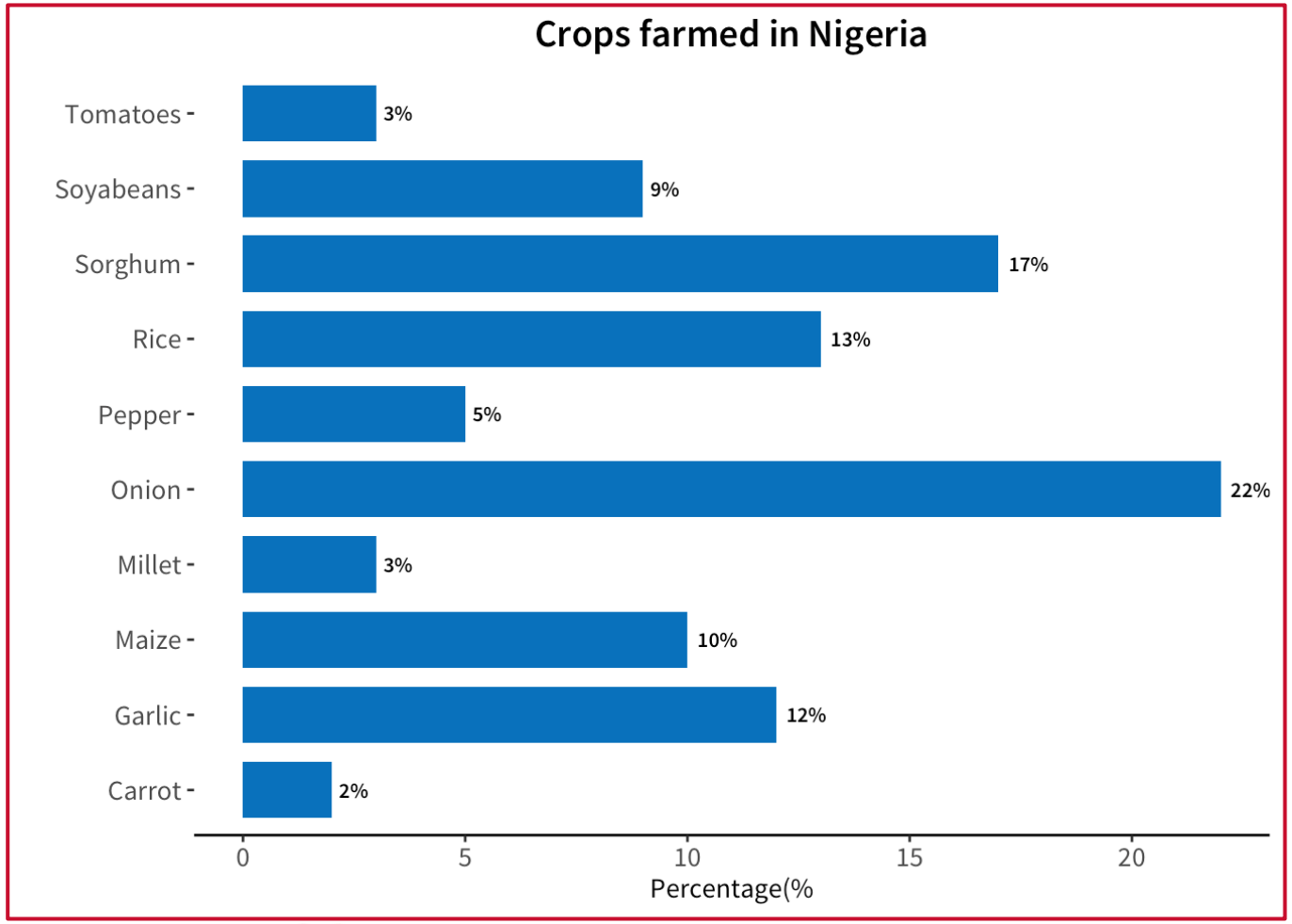
Farmers in the Onion and sorghum value chain are the most popular users in Nigeria

Nigerian beneficiaries(2019 survey)



- Farmers in the onion and sorghum value chain are the most popular users
- Rice, garlic, maize and soya beans are also quite popular

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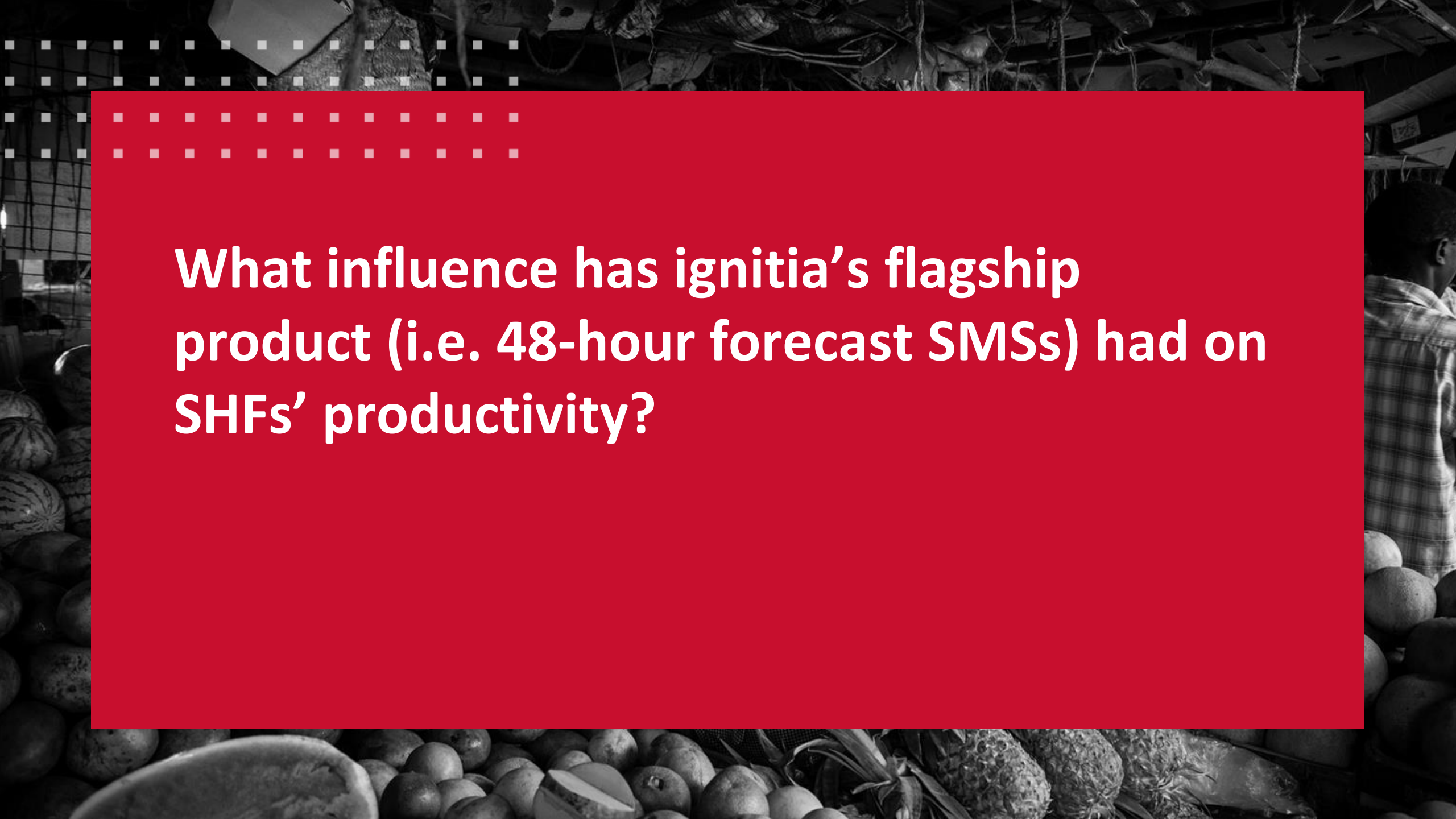
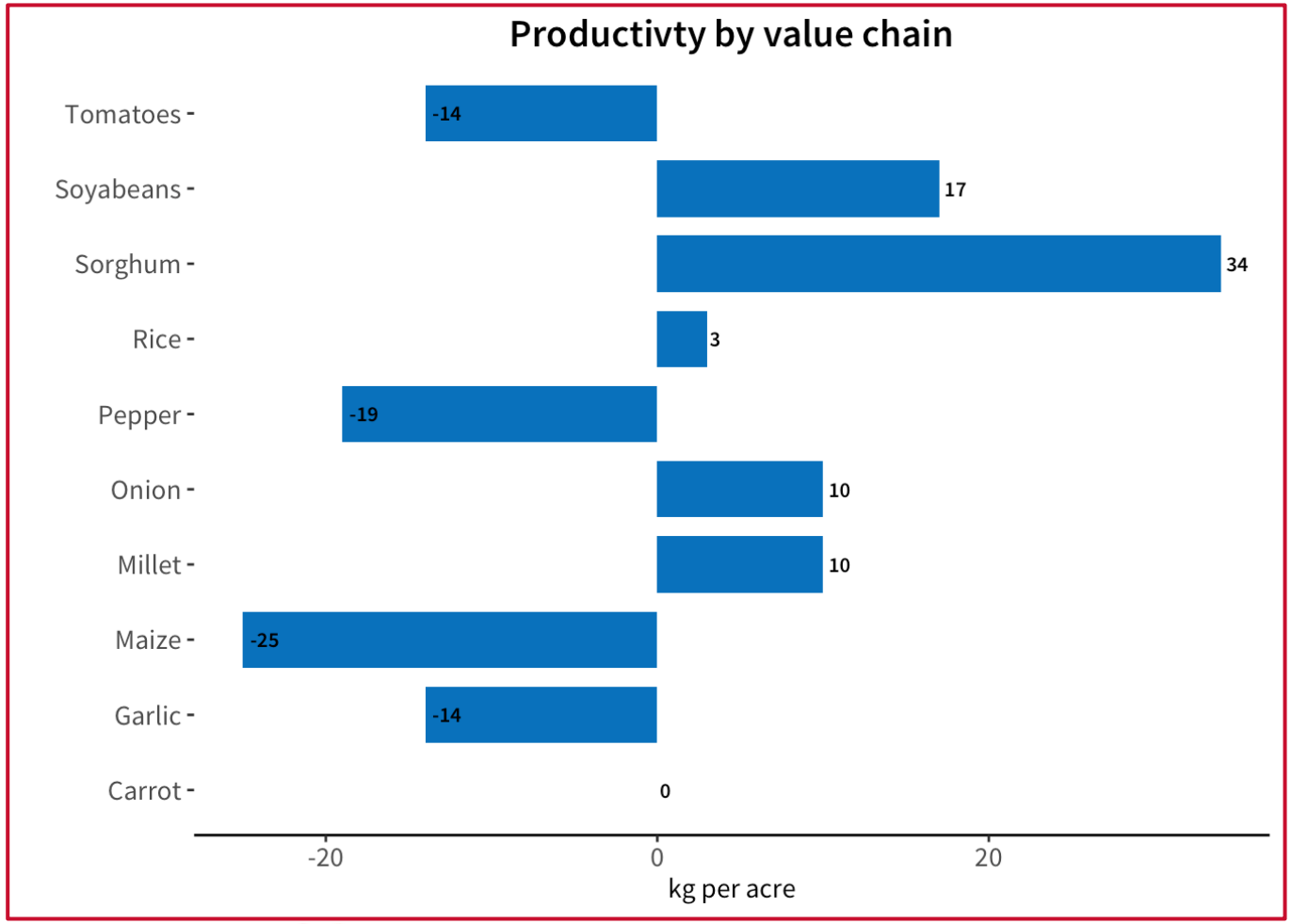


What influence has ignitia's flagship product (i.e. 48-hour forecast SMSs) had on SHFs' productivity?

However, farmers in the sorghum and soya beans value chain recorded the highest change in productivity post-iska

Nigerian beneficiaries(2019 survey)



- Farmers in the sorghum and soya beans value chain saw their productivity rate increase by 34% and 17% respectively, post-iska
- While farmers in the tomatoes, pepper, maize and garlic value chains recorded negative changes in their productivity rate post-iska
- It is not clear why this drop was experienced in these value chains. However, it is important to note that garlic, onion and tomatoes (some part of the season) are dry season crops which is not relevant to Ignitia's service

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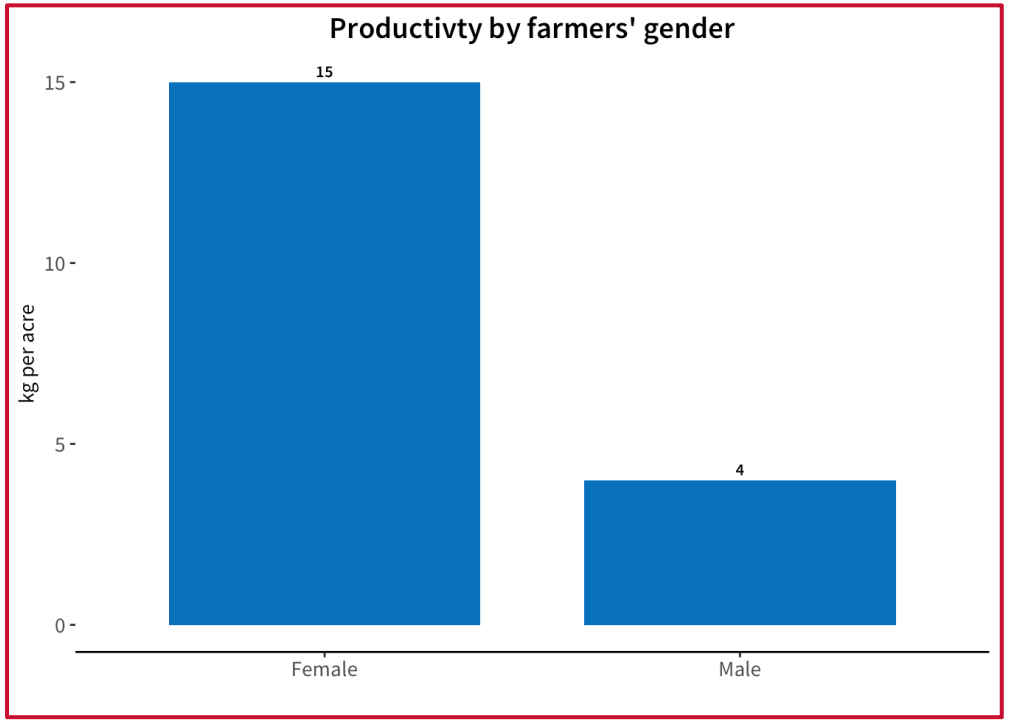
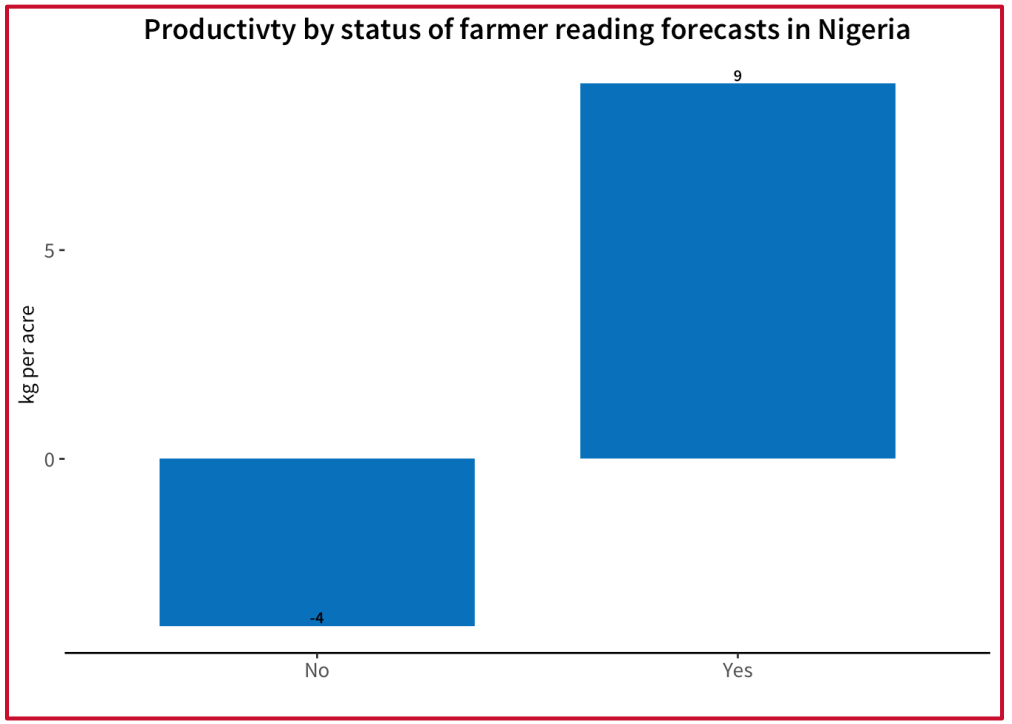
In Nigeria, female farmers, on average, recorded higher growth in their productivity rate compared to male farmers

Nigerian beneficiaries (2019 survey)



Nigerian beneficiaries (2019 survey)



- Female farmers recorded higher productivity rates than male farmers, with a difference of 11 percentage points
- Farmers who read forecasts themselves were more likely to record higher growth in their productivity rate compared to farmers who did not.

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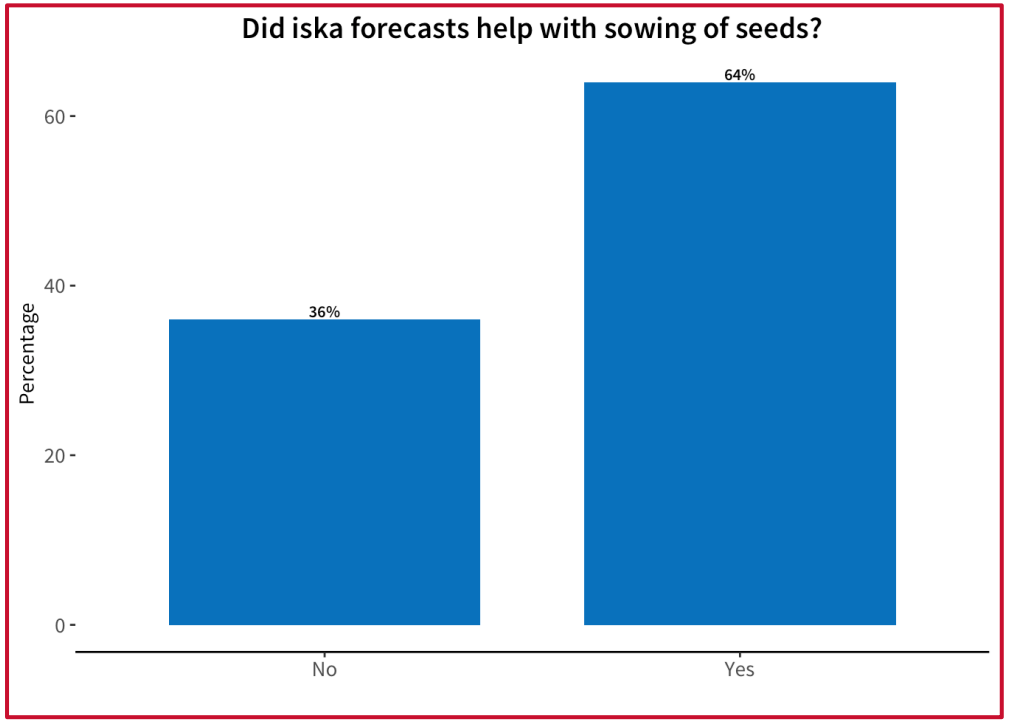
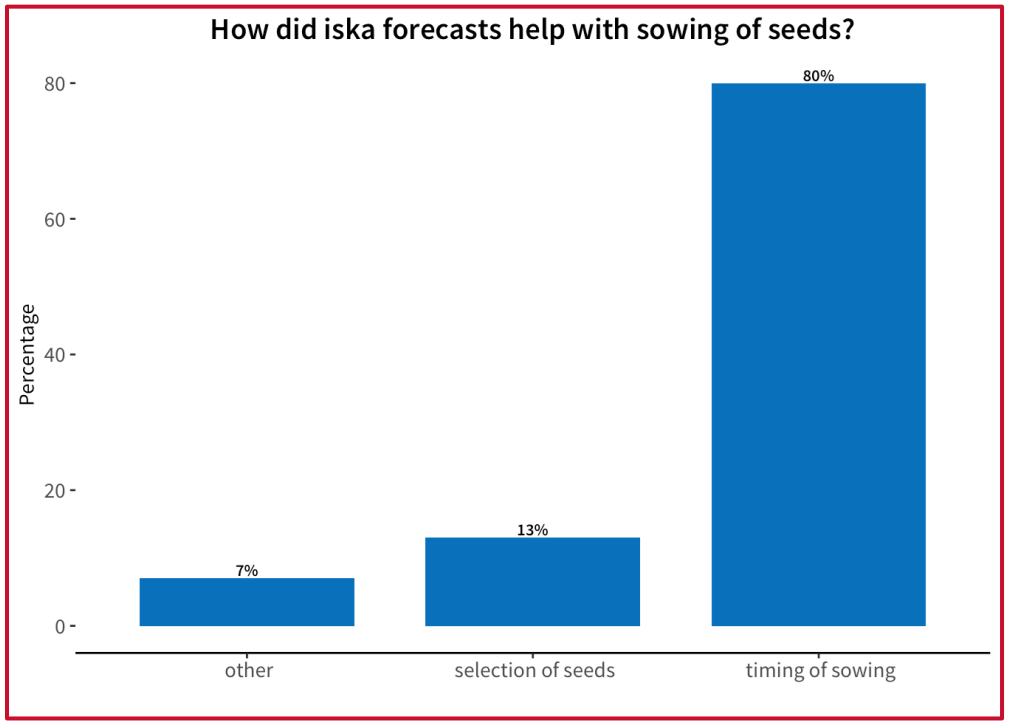
Behaviors & Practices

Iska has also helped to improve farmers practices around sowing seeds

Nigerian beneficiaries (2019 survey)



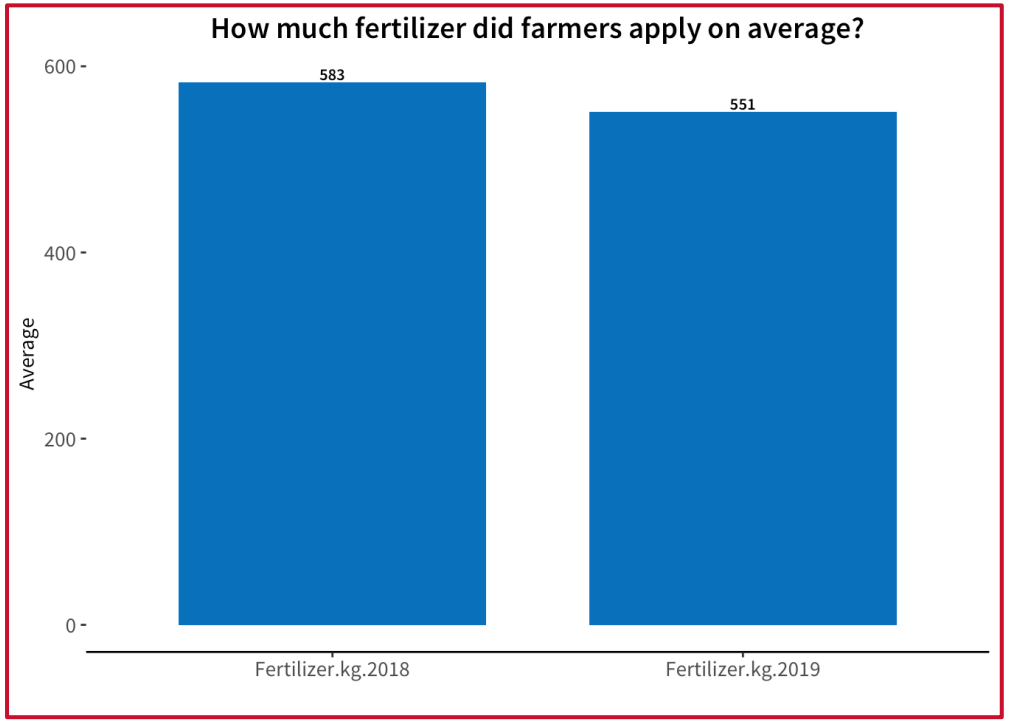
Nigerian beneficiaries (2019 survey)



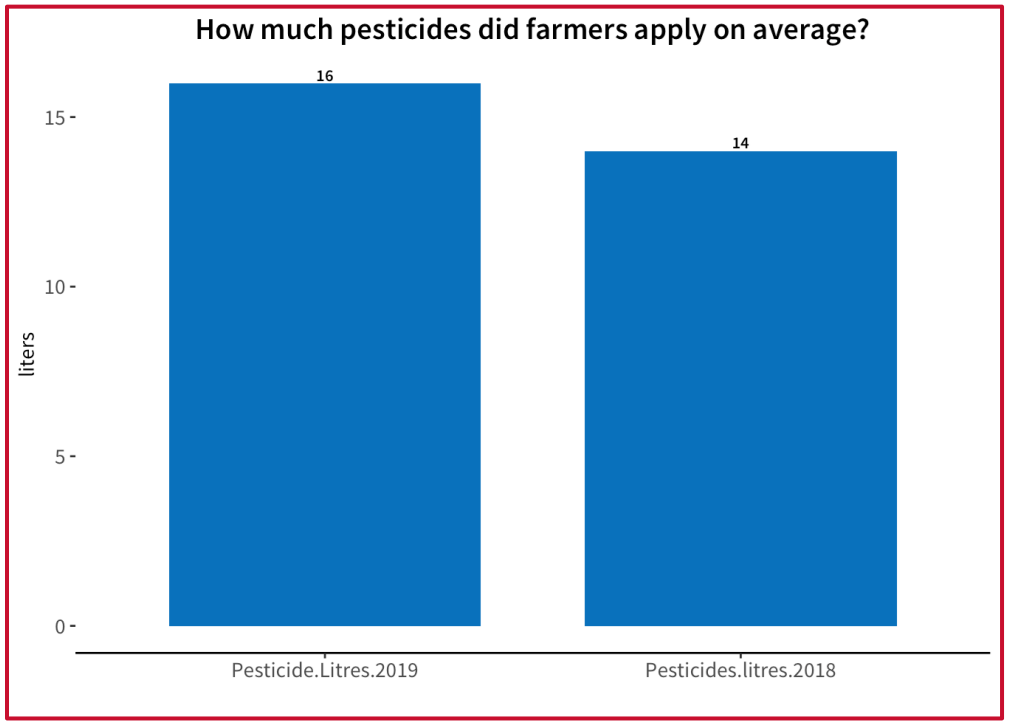
- Approximately 2 in 3 farmers say iska helped them with sowing of seeds
- Out of this group, the major change has come in the timing of sowing these seeds

The average amount of fertilizers used by farmers dropped in 2019 compared to 2018, however the amount of pesticides increased

Nigerian beneficiaries (2019 survey)



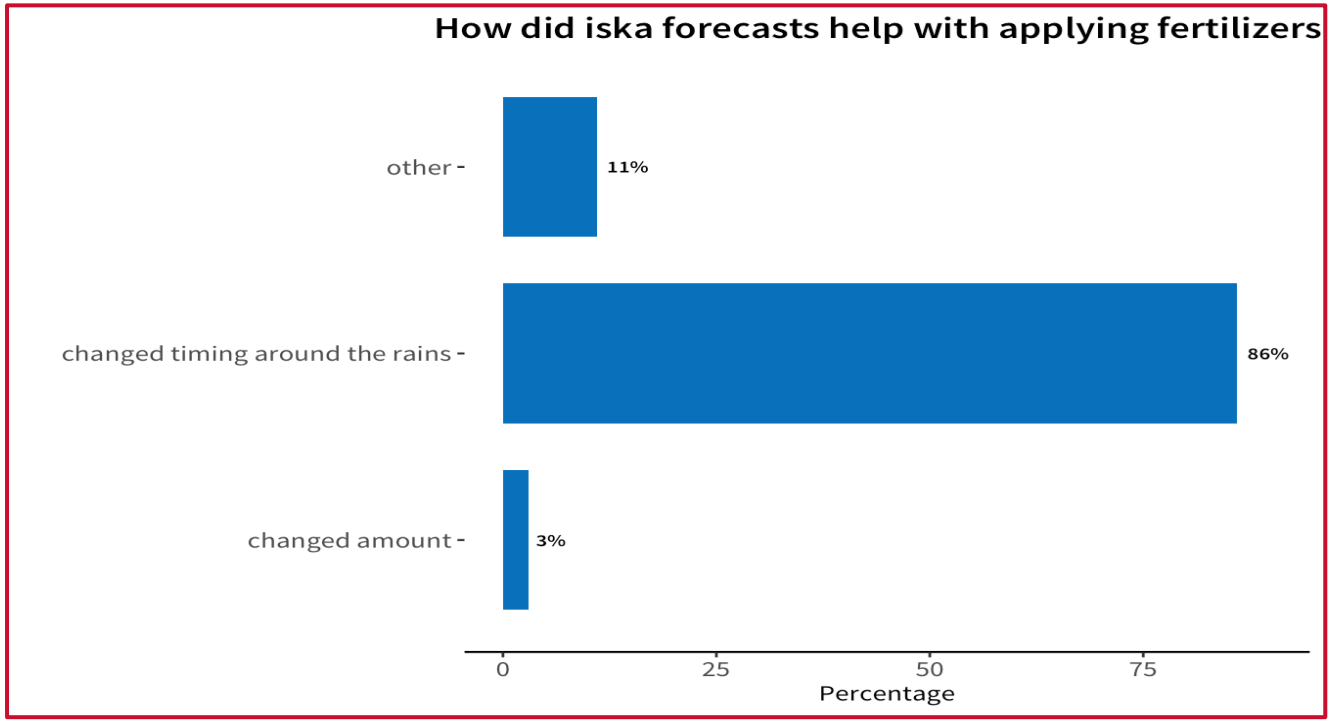
Nigerian beneficiaries (2019 survey)



- The average amount of fertilizers dropped in the 2019 planting season compared to 2018.
- However, the average amount of pesticides used increased

The drop in the amount of fertilizers used could be due to the effect of iska, as farmers report iska's influence on changing the timing of use during rainfall

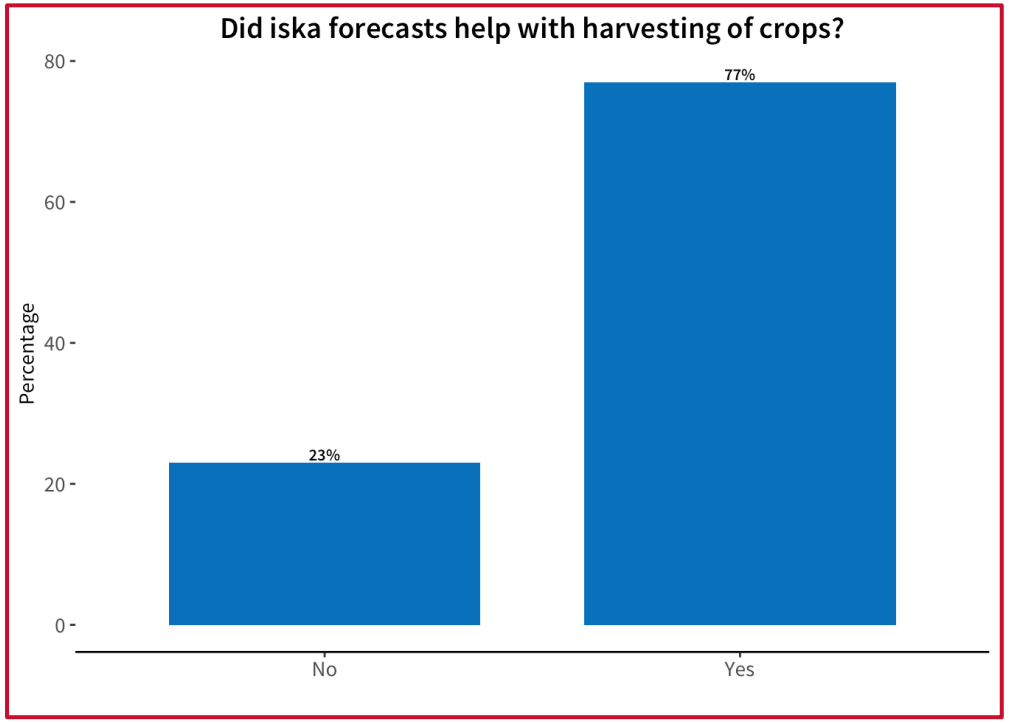
Nigerian beneficiaries (2019 survey)



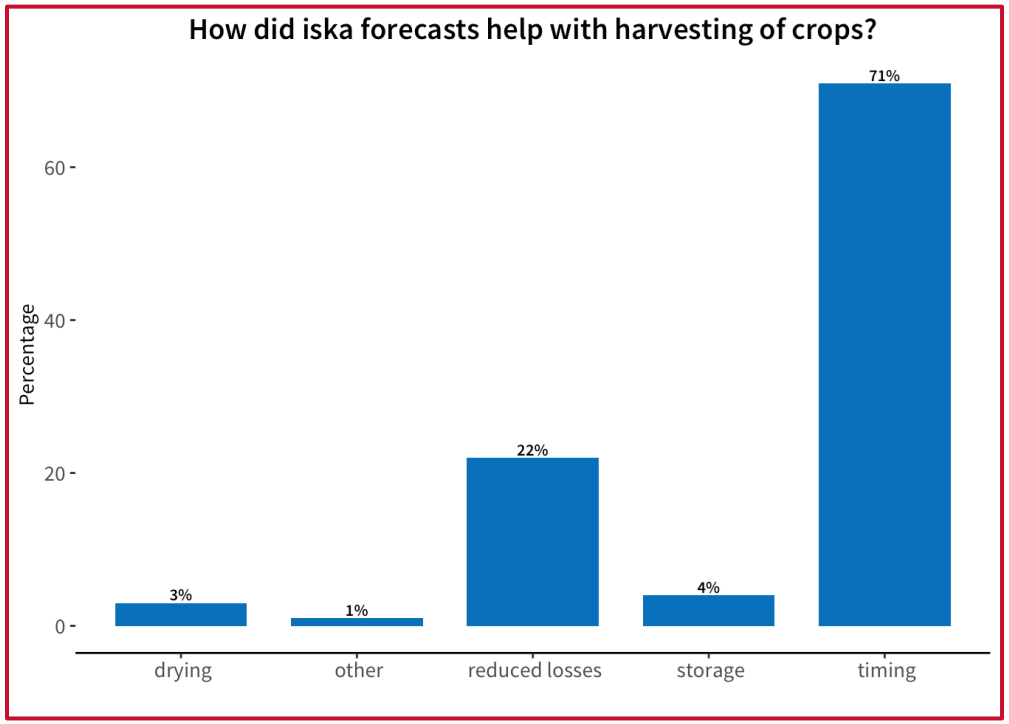
- 86% of farmers mentioned that iska changed how they apply fertilizers by influencing the way they use fertilizers during the raining season

Most farmers reported that Iska helped them with harvesting their crops

Nigerian beneficiaries (2019 survey)



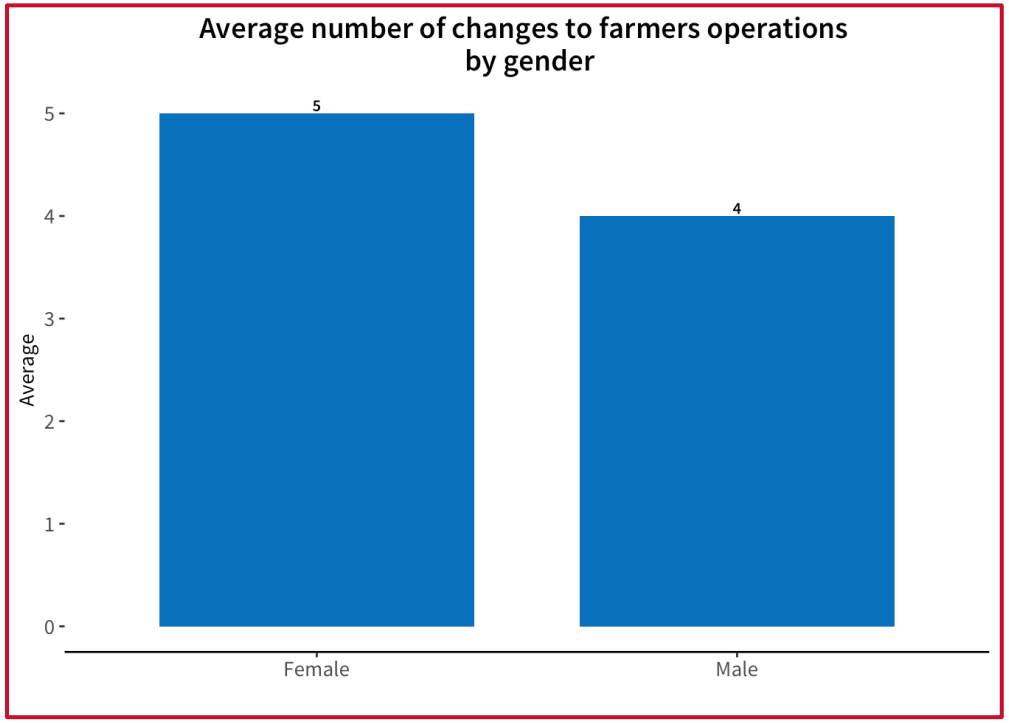
Nigerian beneficiaries (2019 survey)



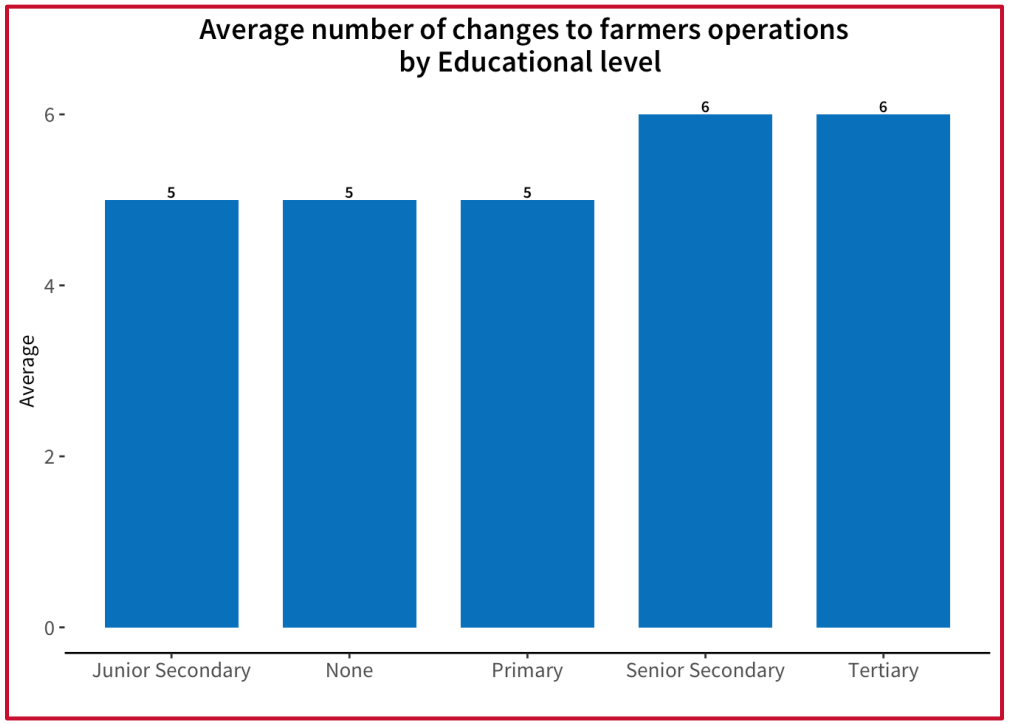
- Iska's greatest improvement around harvest has come in the form of improving the timing of when farmers harvest, as well as helping farmers in Nigeria reduce losses

Female farmers, on average, make slightly higher changes to their farming operations compared to male farmers

Nigerian beneficiaries (2019 survey)



Nigerian beneficiaries (2019 survey)



- Of the major farming activities, female farmers in Nigeria made an average of 5 changes in their farming operations compared to 4 by male farmers
- Farmers with higher education levels also appear to make slightly more changes than farmers in lower levels

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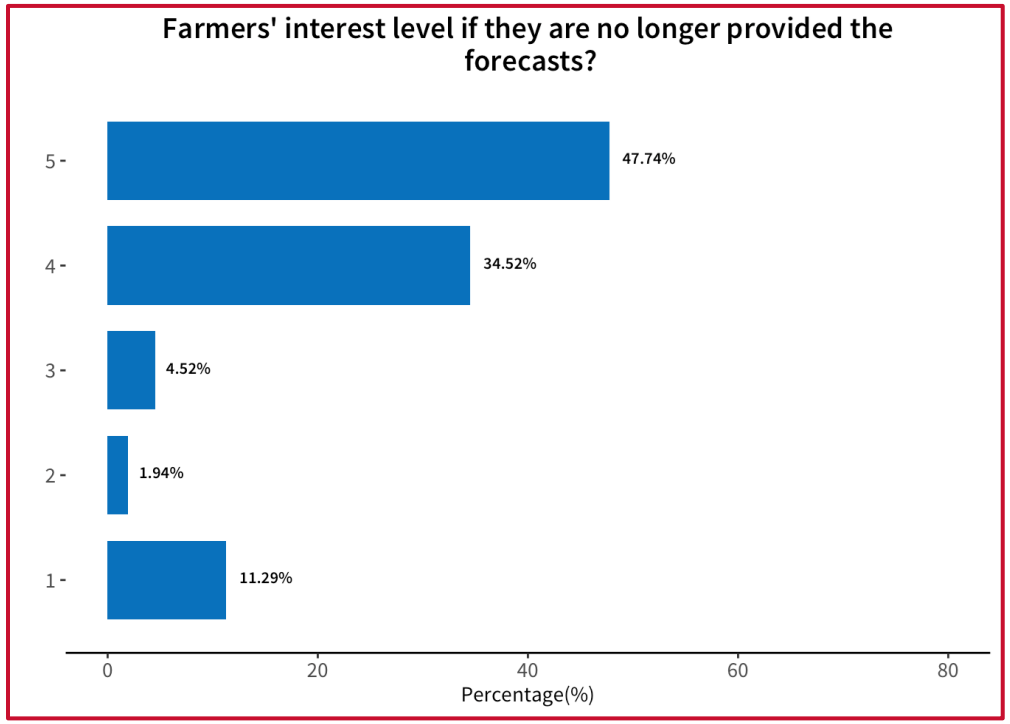
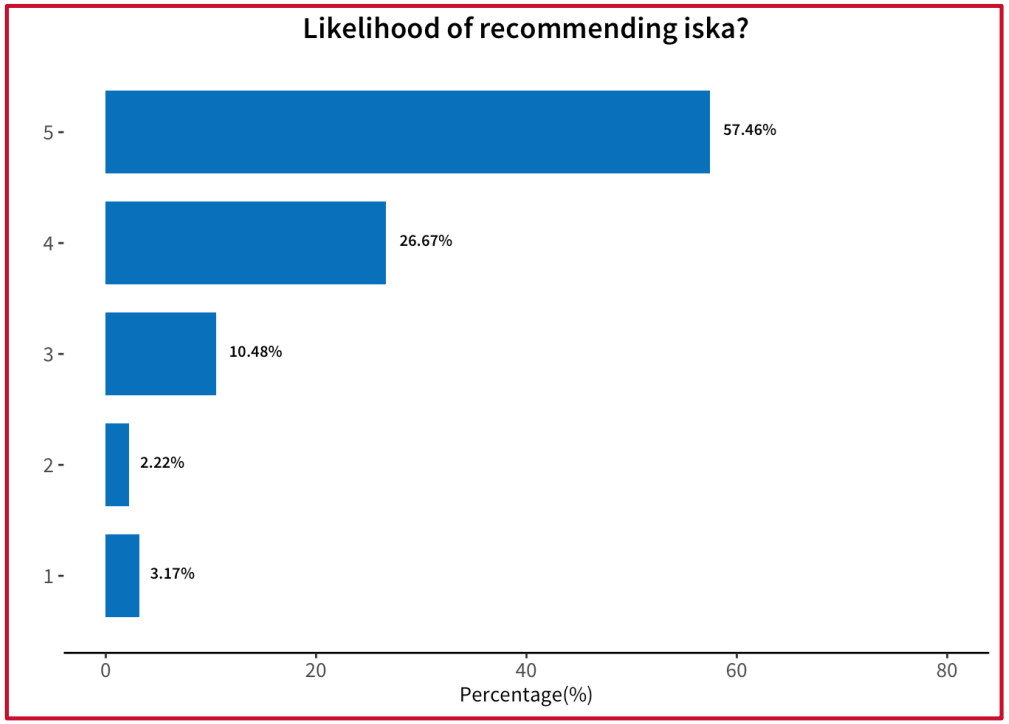
Majority of the farmers said they are willing to pay for the forecasts if they stopped receiving it for free

Nigerian beneficiaries (2019 survey)



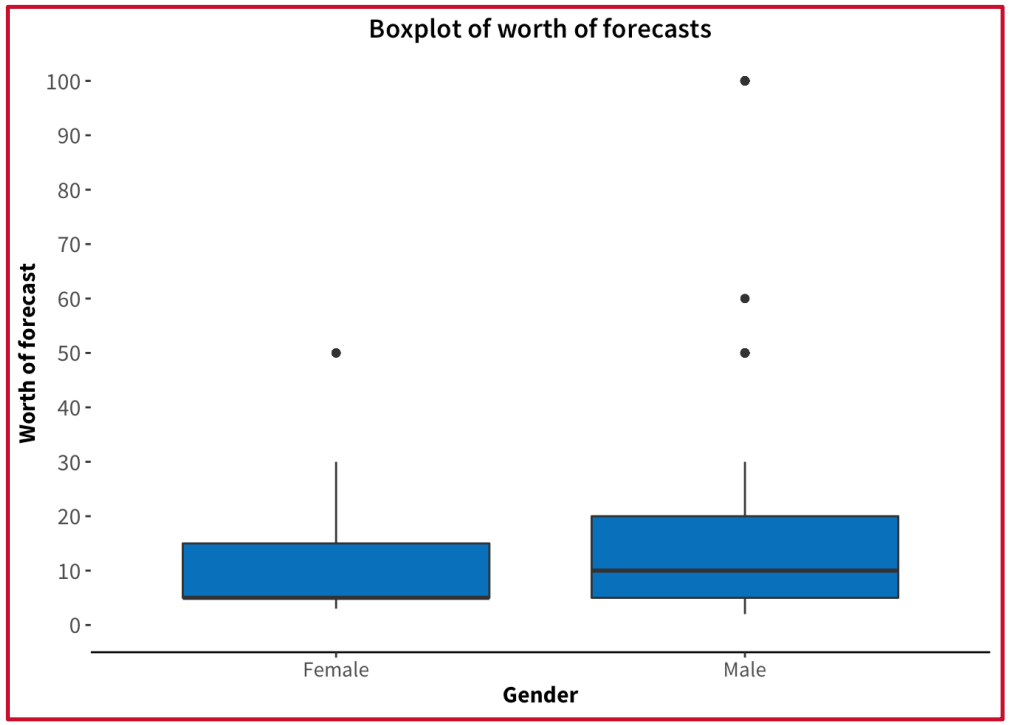
Nigerian beneficiaries (2019 survey)



- At least 81% of the farmers will be willing to pay for the forecasts if they stopped receiving the service
- Similarly, 83% of the farmers said they are likely to recommend iska to their family members in NIgeria

3 in 4 farmers in Nigeria think each forecast (message) is worth at least 5 Naira

Nigerian beneficiaries (2019 survey)



Nigerian beneficiaries (2019 survey)

NGN10

median value of message worth

- 75% of the farmers think the value of the messages they receive is at least NGN5 per message
- The median value of the message is NGN10 per message

Findings: A focus on Burkina Faso farmers - 2019

Demographic Breakdown

Burkina Faso farmers interviewed were onboarded as beneficiaries through two partnerships:

1. SOFITEX (Société Burkinabè des Fibres Textiles) and Ignitia.

2. GIZ's ProCIV (Programme global Centres d'innovations vertes)

Burkina Faso beneficiaries (2019 survey)

40
farmers

2%
female farmers

98%
male farmers

Most popular crops farmed

Corn

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Quick facts about the Burkina Faso farmers

98%
male farmers

10%
are within the 18-29 age group

57%
received information through a training program

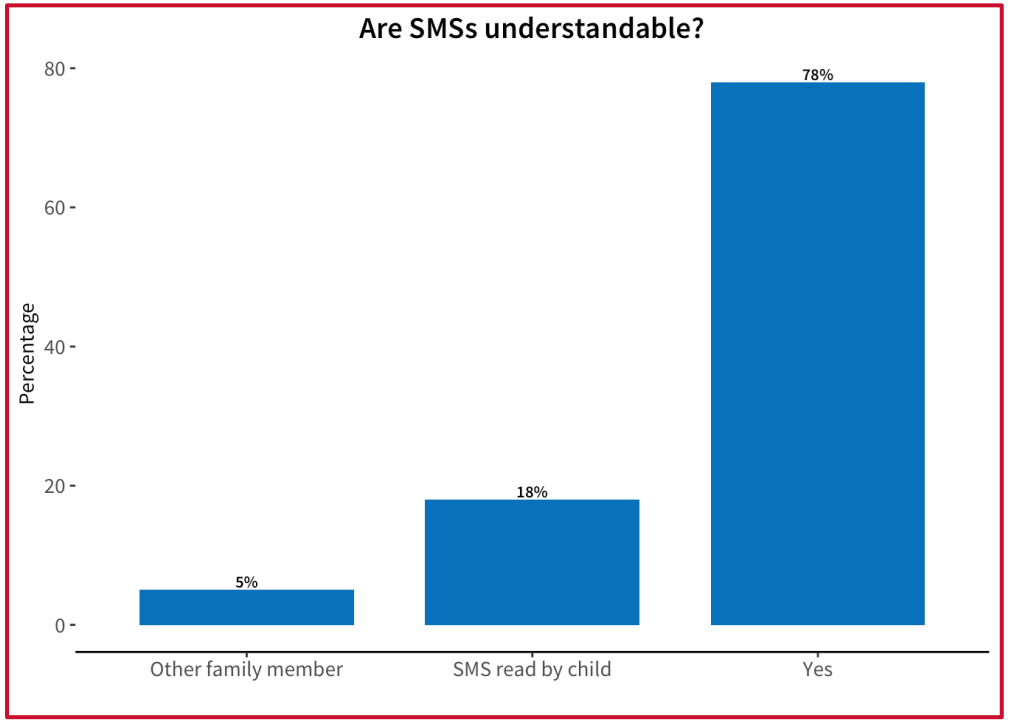
2%
female farmers

75%
received some form of education

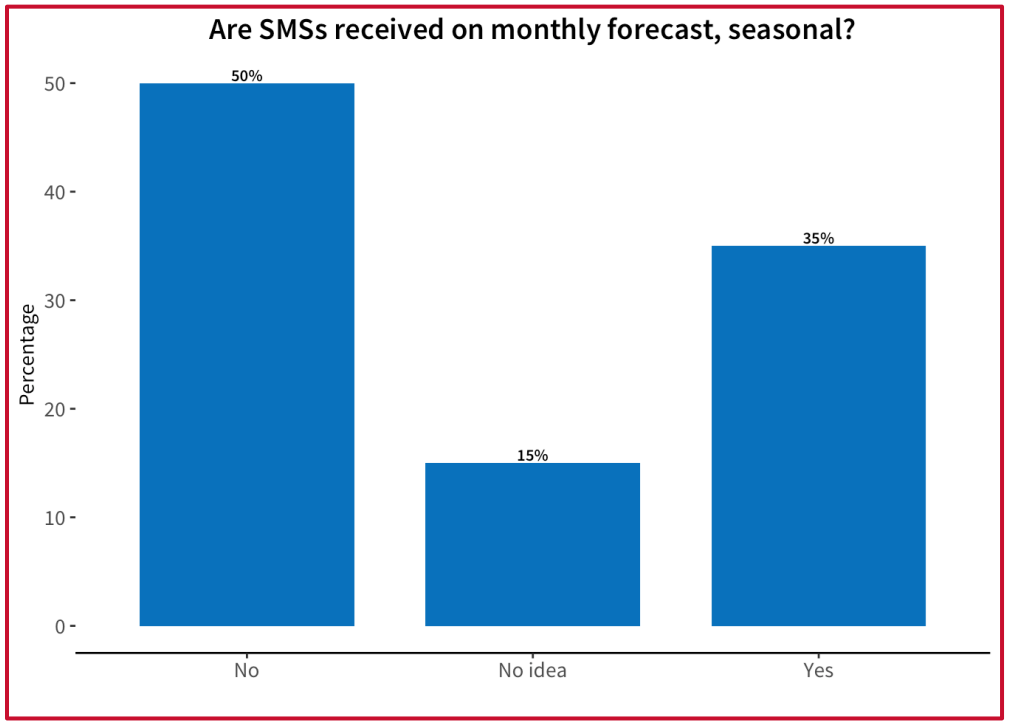
82%
received 5-7 forecasts in a week

Majority of the farmers in Burkina Faso read the forecasts themselves

Burkina Faso beneficiaries (2019 survey)



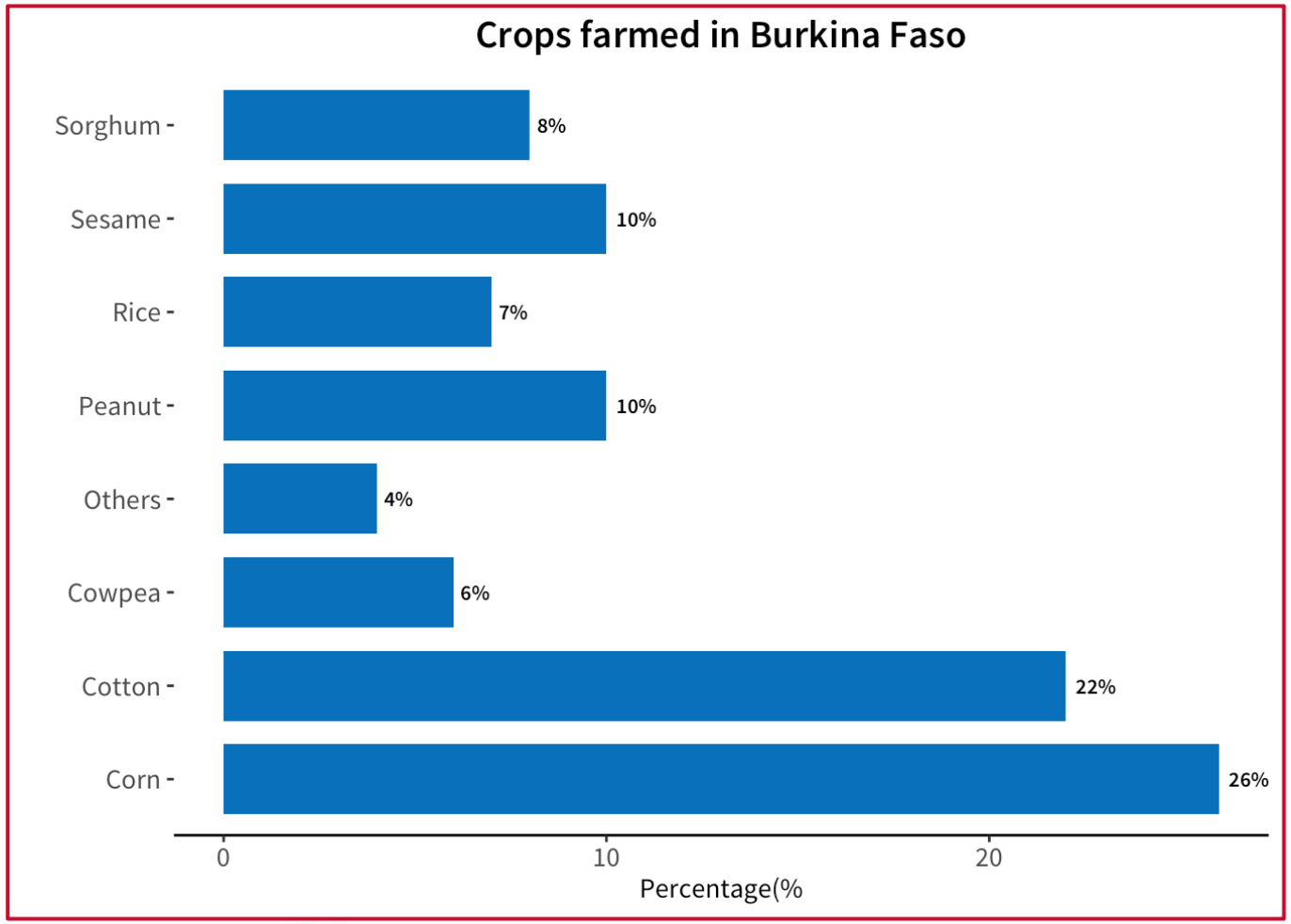
Burkina Faso beneficiaries (2019 survey)



- 78% of the farmers in Burkina Faso read the messages themselves
- 50% of the farmers say the SMSs they receive on a monthly basis is not seasonal

Farmers in the corn and cotton value chain are the most popular users in Burkina Faso

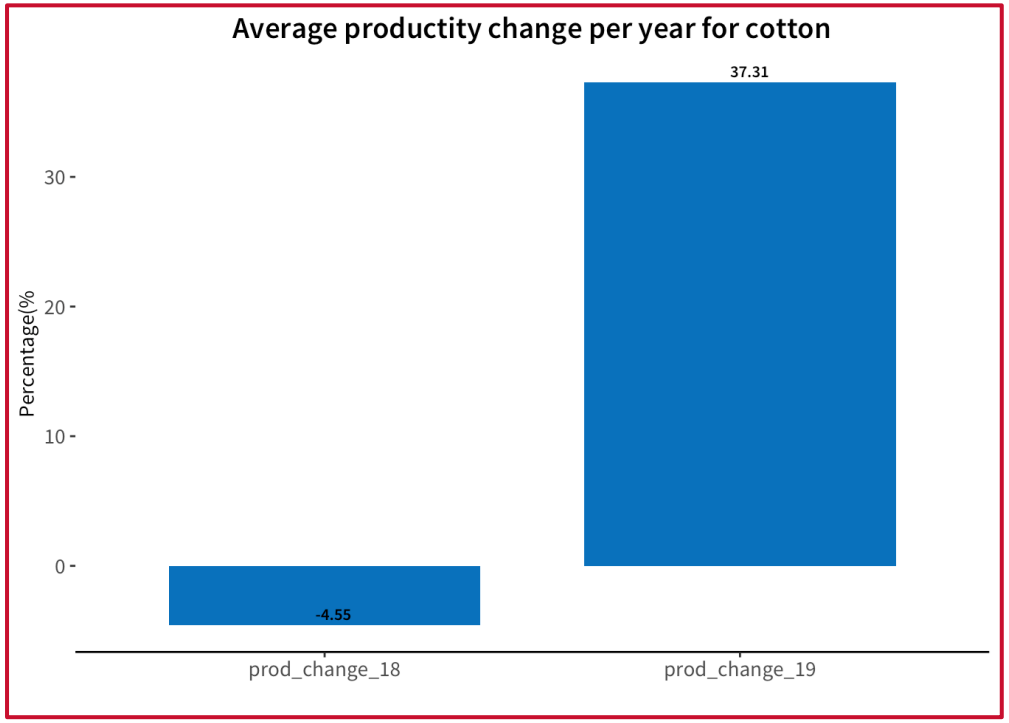
Burkina Faso beneficiaries (2019 survey)



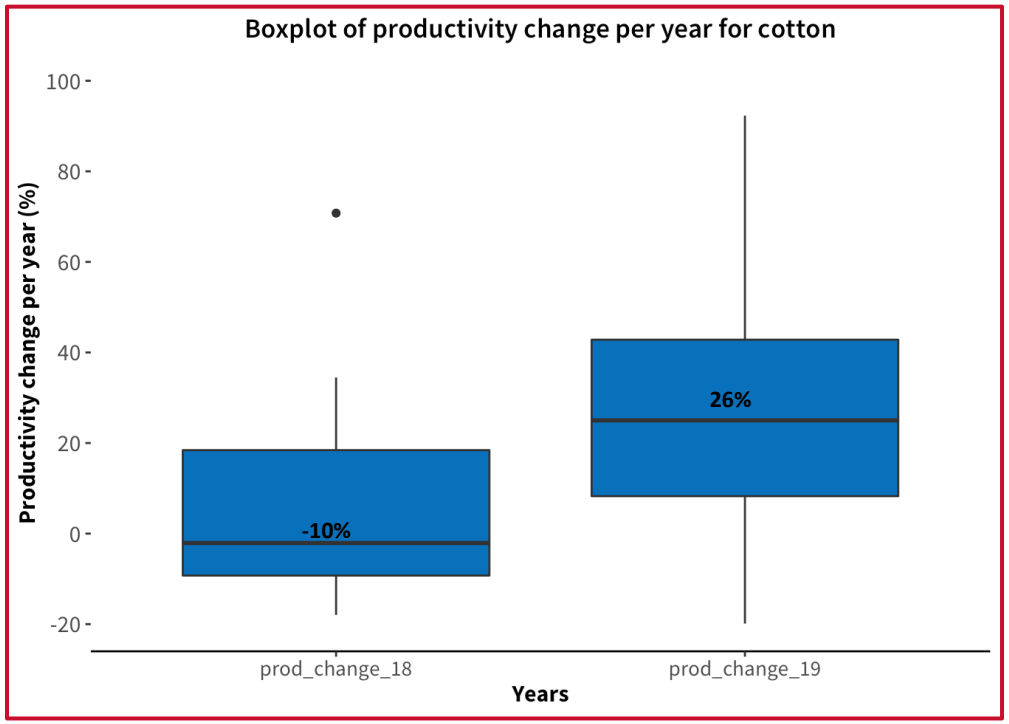
- Farmers in the crop and cotton value chain are the most popular users. Together they constitute almost half of the farmers that benefited from the program

In cotton farming, farmers' productivity growth rate in Burkina Faso improved by 37% in 2019

Burkina Faso beneficiaries (2019 survey)



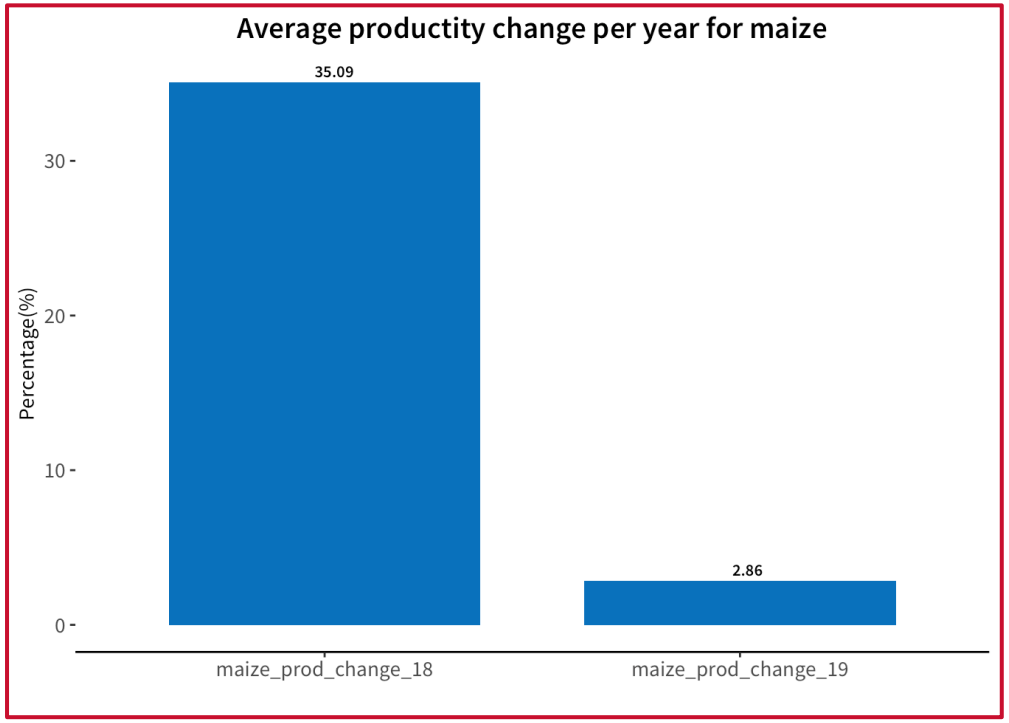
Burkina Faso beneficiaries (2019 survey)



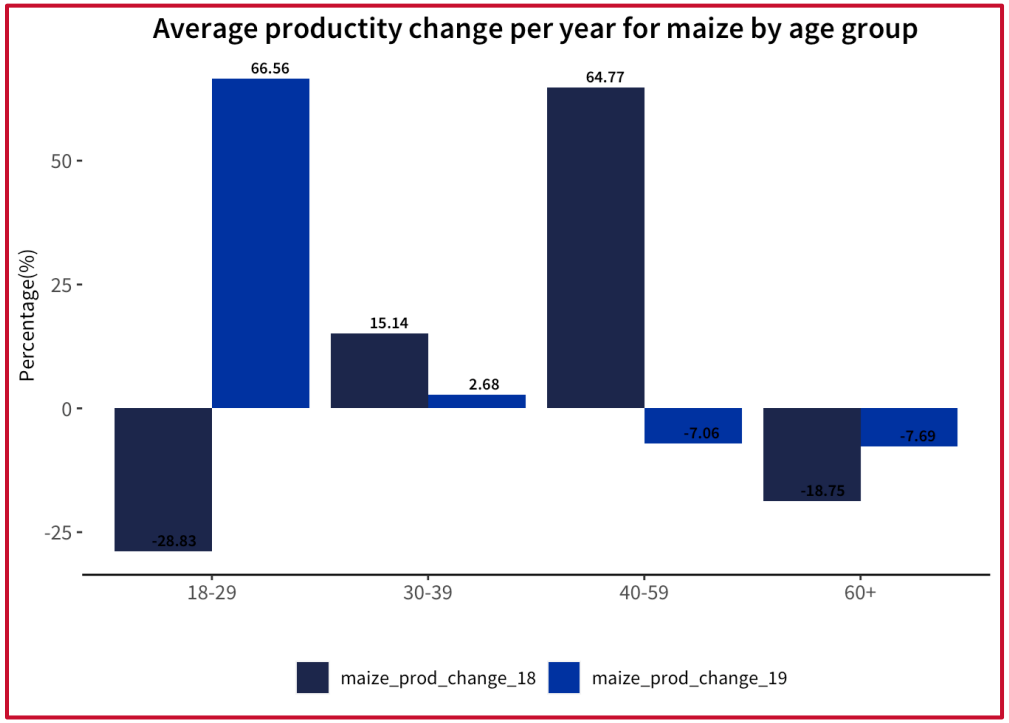
- Change in farmers' productivity in cotton farming improved in 2019 by 37% compared to 2018 figures

However, for maize farming, farmers productivity growth in 2019, was marginal

Burkina Faso beneficiaries (2019 survey)



Burkina Faso beneficiaries (2019 survey)



- Maize farming productivity in 2019 increased slightly, on average. This could be due to the strong performance in 2018's productivity rate against 2017's


Key Takeaways

Summary of the findings

1.

Farmers' productivity

In Ghana and Mali, we **observe positive association between the use of the Iska forecasts and improved farmers' productivity** in most of the value chains with consistent significant growth among farmers in the pepper and rice value chains. However, growth in female farmers productivity falls short of male farmers.

In Nigeria, 4 out of the 10 value chains recorded negative productivity changes post-iska. However, 2 out of these 4 value chains are dry season crops, therefore, Ignitia's services may not correlate with their productivity.

Female farmers perform significantly better than male farmers with respect to growth in productivity. The difference between the productivity results in Ghana and Nigeria could be because of the value placed on it by Ghanaians. While Nigerian farmers got the service for free, Ghanaians took actions to subscribe and pay for the service, given they heard about iska mostly through SMS based adverts and word of mouth.

2.

Usage of service

Reading the message is significantly positively correlated with increased productivity rates Nigeria. Farmers who share similar characteristics but only differ in that they read the messages**,** are more likely to **record a change in their productivity rates by 33 percentage points,** compared to farmers with the similar characteristics but fail to read the messages.

Farmers in Ghana report that they use the services for activities beyond farming suggesting Ignitia has positive externalities to other parts of the farmers' lives.

3.

Behaviors and practices

Farmers report that Ignitia has helped them change the timing at which they harvest and apply chemicals like fertilizers and pesticides suggesting improved farming practices following the receipt of the SMSs'

Generally, farmers have made changes to their farming practices as a result of the iska forecasts. However, **female Nigerian farmers report more changes** to their farming practices compared to male farmers in Nigeria.

Recommendations

Recommendations for future assessments

While an RCT is considered the gold standard to fully estimate the impact of a program on farmers' outcomes, there are some methods that can help Ignitia assess its influence on farmers' outcomes

	Data should be collected on farmers' outcomes before the intervention of the project	Collecting data before farmers receive the intervention helps farmers to better recollect information on key outcomes, and also allows Ignitia to have a strong baseline of the farmers' outcomes and knowledge on key farming practices. A follow-up data collection at endline will better help in gauging impact by comparing at baseline. Also, survey instruments should move away from framing questions that make it obvious Ignitia is measuring changes in outcomes post-iska. e.g avoid the use of post-iska to prevent any social desirability bias or experimenter demand effect. Use more of "last season", "this season", "last harvest season" etc.
2.	**Quasi-experimental designs**	Beyond RCTs, Ignitia can compare beneficiaries' average outcomes with other farmers within the same region that have similar characteristics with Ignitia farmers that make them eligible for the program, but aren't receiving the intervention. This leads to results that lend better credibility to the impact of the intervention or product.

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