



Designing gender- and youth-responsive agronomic solutions:

# **Accelerating the use of digital tools for delivering agronomic advice through a public-private partnership extension model in Rwanda**

Study Report for the Smart Nkunganire System- Rwanda Agriculture and Animal Resources Board Use Case

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This report is part of a study series offering insights into the potential of Excellence in Agronomy (EiA) Use Cases to adjust the agronomic solutions offered through the Minimum Viable Products (MVP) to better reach, benefit, and empower women and youths, and to transform norms that cause gender and social inequalities. These efforts are guided appropriately by the Reach-Benefit-Empower-Transform framework that highlights the importance of not only reaching women and young people, but also making sure that they benefit from any interventions, that the interventions further help increase their empowerment, and lead to a transformation of any restrictive attitudes, norms, and power relations that are the root causes of gender and social inequalities.

## Key Findings

This gender and youth diagnostic study was conducted in Rwanda, in support of the implementation of the Smart Nkunganire System (SNS) Fertilizer Recommendation Tool- Rwanda Agriculture and Animal Resources Board (RAB) Use Case of the Excellence in Agronomy (EiA) Initiative. The Use Case focuses on developing an optimized fertilizer recommendation tool for six key crops (cassava, maize, wheat, potato, rice, and beans). The areas covered in the study included the following provinces (and districts): Northern (Gicumbi and Musanze), Southern (Nyamagabe and Nyanza), Eastern (Bugesera, Nyagatare), and Western (Karongi and Rubavu). In total, 3,574 primary female and male adult decision-makers were interviewed (1,796 female and 1,778 male) within the 1,822 households that were sampled.

### Context

- The average age of men (45 years) was higher than that of women (42 years). About 67% of men and 61% of women had attained at least a primary school level of education. About 87% of men and 80% of women were literate. Majority of men (94%) were reported as household heads, compared to women (6%).
- The average number of parcels cultivated per household was three, with an average area of 1.5 ha per parcel. A larger proportion of households were involved in farming beans (91%), maize (79%), and potato (65%), than cassava (40%), wheat (6%), and rice (4%). There were more female household members who were involved in farming work associated with the main crops (maize, potato, wheat, beans, and cassava) than male household members.

### Reach

- Both men and women contribute significantly to agricultural production. However, men are more likely to be the main decision-makers than women on the farm. Similarly, non-youths contribute more on the farm than youths. In terms of decision-making, non-youths contribute more towards the decisions on the farm.
- Ninety-five percent and 81% of youth and non-youth respondents, respectively, were considered literate. More male non-youths (86%) are literate than female non-youths (77%), but male youths (94%) and female youths (95%) are equally literate, and the rates are higher than those of the non-youth respondents.
- Almost all youths and non-youths indicated that they most often receive agricultural advice from various formal sources. The most common source of agricultural information for all respondent groups was radio programs, followed by government extension. While 79% of men and 73% of women respondents were using cellphones, digital tools were rarely used for agricultural information.
- Men (87%) indicated they had more access than women (77%) to mobile devices for accessing information related to crop production, agricultural inputs and prices, and for purchasing agricultural products.
- Most youths (72%) and non-youths (73%) reported they owned cellphones or smartphones. However, more men (81%) than women (64%) indicated they owned smartphones or cellphones.
- More men (63%) than women (58%) received a training or learned skills in the past year that can help them improve their livelihoods.

### Benefit

- There were gender gaps found in the ownership of digital devices and agricultural land. More men (89%) reported owning agricultural land than women (75%). More men reported that they own digital devices (81%) compared to women (62%). No other gender differences in ownership of other such assets were found.
- The average productivity of the focal crops (measured in the value of production of harvest per hectare in Rwandan Franc (RWF)/ha) was around 2.0 million RWF/ha, which was equal to 1,660 USD/ha. Productivity was the highest in the Western province (2.7 million RWF/ha) and the lowest in the Eastern province (1.6 million RWF/ha). The productivity of plots in which women were the main decision-makers was slightly higher (~ 2.0 million RWF/ha) than plots in which men were the main decision-makers (1.9 million RWF/ha).

## Empower

- Almost all men (95%) and women (93%) contributed to making decisions on farming activities for the Use Case focal crops. Men reported making most of the contributions on the farming activity decisions compared to women. For example, 82% of men versus 62% of women reported that they had most contributions towards the decisions on which varieties to grow. These percentages were similar across men and women in terms of different farming activities, including agronomic practices, use of labor on the farm, and fertilizer application.
- More men (82%) than women (73%) had access to and made decisions on financial services. This result was similar across all four provinces. Youths and non-youths were equally likely to have taken loans in the last 12 months (84% versus 80%, respectively) and had mobile money accounts (71% versus 71%, respectively). On the other hand, more non-youths than youths made the decision to borrow most of the time (87% versus 75%, respectively), on what to do with the money borrowed (90% versus 79%, respectively), and have an account that can be used to save money and receive payments (64% versus 54%, respectively).
- Several dimensions of the Women's Empowerment in Agriculture Index (WEAI) were used as a measure of empowerment. There is a generally high level of empowerment among female and male respondents. Most female and male respondents are empowered and achieved adequacy in 5 dimensions of empowerment (input into productive decisions, ownership of land and other assets, control over the use of income, access to and control over financial resources, and group membership). There are subtle differences between women and men and between youths and non-youths. The dimension that shows a significant gender gap is the access to and control over financial resources, in which 73% women versus 82% of men achieved adequacy in this dimension. Slightly more non-youths than youths have achieved adequacy in the 5 dimensions, but both groups achieved high levels of empowerment overall.

## Transform

- Overall, most study respondents had attitudes supporting equal women's and men's engagement in agriculture and related activities. However, a non-negligible share of respondents supported gender-unequal statements: they believe that it is not equally important to improve women's productivity compared to men's (41% of men and 40% of women agreed with it), that women should not primarily be the ones to cultivate crops (25% of men and 27% of women agreed with it), and women should not be the primary income earners for their families (29% of men and 28% of women agreed with it). These indicate lingering unequal gender attitudes in agriculture, despite a generally more egalitarian system in Rwanda.

# 1. Introduction

Land pressure in Rwanda is among the most severe in Sub-Saharan Africa, and continued population growth results in further pressure on agricultural land available to smallholder farmers (Holden & Otsuka, 2014). This limits agricultural investment and commercialization opportunities (Ali et al., 2014). Fifty percent of rural households cultivate less than 0.35 ha and 85% cultivate less than 1 ha (MINAGRI, 2018). Yields per unit of land are far below attainable yields due to poor crop and nutrient management. In 2007, the Government of Rwanda launched its Crop Intensification Programme, aiming to increase the productivity of major crops through land use consolidation, improved distribution of seeds and inorganic fertilizers, and use of farmer-to-farmer extension approaches. With the introduction of the Crop Intensification Programme, production levels of six priority crops, namely maize, wheat, rice, Irish potato, beans and cassava, increased significantly (MINAGRI, 2018). However, additional efforts are needed to further close yield gaps and improve the sustainability of agricultural production.

The fertilizer subsidy scheme under the Crop Intensification Programme facilitates farmers' access to inorganic fertilizers based on blanket fertilizer recommendations promoted and used across the country. Rwanda is a highly heterogeneous country in terms of agro-ecological conditions, and the use of blanket fertilizer recommendations leads to inefficient use of expensive inputs, suboptimal responses to fertilizers, and low-profit margins. Based on experience in other countries, it is expected that site-specific fertilizer advisory could increase yields by at least 30%. Moreover, site-specific fertilizer recommendations would reduce environmental risks through more efficient use of fertilizers and maximize returns on investments in the fertilizer subsidy scheme under the Crop Intensification Program (MINAGRI, 2018).

Between 2018 and 2021, CGIAR in partnership with the Rwanda Agriculture and Animal Resources Development Board (RAB) worked on developing and testing site-specific fertilizer recommendations for potato and cassava in selected agro-ecologies in Rwanda. Data on variation in fertilizer response among environments were gathered through multi-location trials, using a digital data collection tool called SANdMan (Smart Agronomy Data Management). Crop models and machine learning algorithms were calibrated to generate fertilizer recommendations based on digital soil information and farmer-supplied input variables. Innovative approaches to validate site-specific fertilizer recommendations under on-farm conditions were also developed and implemented.

More recently, RAB embarked on a large-scale initiative called the Rwanda Soil Information System (RwaSIS) project, funded by the Bill & Melinda Gates Foundation. The RwaSIS project aims to develop a digital soil information system for Rwanda to support decision-making by policymakers, private investors, and other stakeholders on soil fertility management and erosion control strategies. Under the RwaSIS project, country-wide fertilizer response trials on six priority crops are rolled out over a period of three cropping seasons (2022A, 2022B, and 2023A, 800+ trials per season). The data gathered in those trials formed the basis for developing improved fertilizer recommendations. To achieve this, additional efforts will be needed to adapt and calibrate crop and spatial models to enable the formulation of site-specific recommendations for all six crops across all agro-ecologies in the country.

In the Strategic Plan for Agricultural Transformation (PSTA4, 2018), the Ministry of Agriculture in Rwanda has prioritized the digitalization of the agricultural extension system. Once improved fertilizer recommendations become available, a digital tool could effectively deliver the recommendations to farmers at scale. In 2018, Rwanda's agro-input supply chain and subsidy scheme implemented under the Crop Intensification Programme was digitized through the Smart Nkunganire System (SNS), developed through a private-public partnership between the company BKTechoose and RAB. SNS currently has more than 1.9 million registered users. Because of its large existing user base, RAB envisions the plugging in of advisory services in SNS as an effective way of digitizing the agricultural extension system.

The objective of the partnership of EIA Initiative with the Ministry of Agriculture through the SNS-RAB Use Case is to co-create a fertilizer recommendation tool for six priority crops (cassava, maize, wheat, potato, rice, and bean) plugged in the SNS. The tool will provide site-specific fertilizer recommendations tailored to farmers' locations and needs and be maintained and continuously updated by RAB. It will provide a proof-of-concept to pave the way for incorporating other types of agronomic advisories in SNS.

In addition to ensuring the technical accuracy of the fertilizer recommendation tool, there is a need to ensure that this tool will be useful for a wide range of smallholder farmers, including women and young farmers. For this reason, a gender and youth diagnostic study was undertaken to support the SNS-RAB Use Case, following the key components of the Reach-Benefit-Empower-Transform framework (Quisumbing et al., 2021) (see more below). This report shares the findings of this diagnostic study to support the design, scaling and dissemination phase of the fertilizer recommendation tool in Rwanda.

The remainder of the report is structured as follows. Section 2 describes relevant literature on gender and smallholder farming in Rwanda. Section 3 describes the dataset and key indicators explored within the reach-benefit-empower-transform framework. Section 4 presents the results, while Section 5 offers concluding remarks and recommendations.

## 2. Literature review on gender and smallholder farming in Rwanda

Rwanda is often highly ranked for gender equality and women's empowerment. It was ranked 6<sup>th</sup> in 2022 and 12<sup>th</sup> in 2023 out of 146 countries according to the Global Gender Gap Report by the World Economic Forum (2022, 2023). Rwanda's success is attributed to policy efforts targeted at addressing inequalities between women and men, including its National Gender Policy, first launched in 2010 and revised in 2021. The Government of Rwanda has also taken active steps to improve gender equality in land rights. In 1999, the government of Rwanda adopted an inheritance law which aimed at reducing women's disadvantage in land rights. Further efforts at eliminating gender inequality were made in the 2004 national land policy and the 2005 organic land law (Bayisenge et al., 2015; Djurfeldt, 2020). Rwanda's current land tenure regularization program tries to further set a legal framework that encourages gender equality and women's empowerment.

Despite Rwanda's success story of gender-equal parliamentary representation and legislative efforts, gender norms concerning socially acceptable masculine and feminine behaviors continue to strongly influence women and men's productive agricultural activities within households (Farnworth et al., 2023) and continue to limit women's access to land (Santos et al., 2014). Men are regarded as the breadwinners, the primary decision-makers with the final say, and the controller of household assets, and those who attempt to adopt gender-equitable behaviors may face scorn in their communities (Farnworth et al., 2023). Gains in gender equality achieved during its first-time land registration have since been eroded through informal land transactions (Ali et al., 2021). Women in rural areas still have less access to financial services and extension services, participate less in the marketing of agricultural commodities, and spend less time on productive work than men (Rosenbach et al., 2023).

Nevertheless, spouses will often consider their land to be owned jointly, and decision-making may occur jointly – even though they may not be exactly equal. Bayisenge (2018) found that 84% of the land was jointly owned by men and their wives. According to Okonya et al. (2019), most decisions regarding the production of cash crops and food crops were made jointly by men and women in male-headed households, whereas women reported that men participated more in decision-making for cash crop production. The gender gap in agricultural productivity in Rwanda is estimated at 11.7%, much lower than in Nigeria (>30%) but higher than in Kenya (8%) (Rodgers and Akram-Lodhi, 2019). Similarly, Ingabire et al. (2018) found a large gender gap within dual-headed smallholder households, where women play a major role in providing labor on agricultural farms but have limited decision-making and management power in farming, especially regarding cash crops.

## 3. Study design and data

Household survey data were collected for this diagnostic study. The questionnaire consisted of one part – the household-level questionnaire – to be answered by any knowledgeable household member(s), and second part – the individual-level questionnaire – to be separately answered by one male adult household member and one female adult household member.

The main respondent to the household-level questionnaire was the head of the household or his/her spouse. Under the individual-level questionnaire, both the household head and his/her spouse answered separately. Where there was only either a male or female in the household, then the individual questionnaire was only answered once. Where the household head had more than one spouse, the spouse present at the time of the interview served as the second respondent to the individual-level questionnaire.

Below we describe the sample design for the survey data collection, followed by a description of the key indicators used in our analysis.

### 3.1. Sampling strategy and framework

To determine the number of households to participate in the survey, the sample size was calculated by using the formula:

$$N = \frac{Z^2 P(1 - P)}{e^2}$$

Where N= sample size, Z= level of confidence, P= probability of response distribution, and e= margin of error.

Given the estimated risk factors, P= 0.50, Z= 1.96 (at 95% Confidence Interval), e= 2.3%, the estimated sample size was calculated as:  $n = (1.962)^2 \times 0.5(1-0.5) / (2.3\%)^2 = 1819$ .

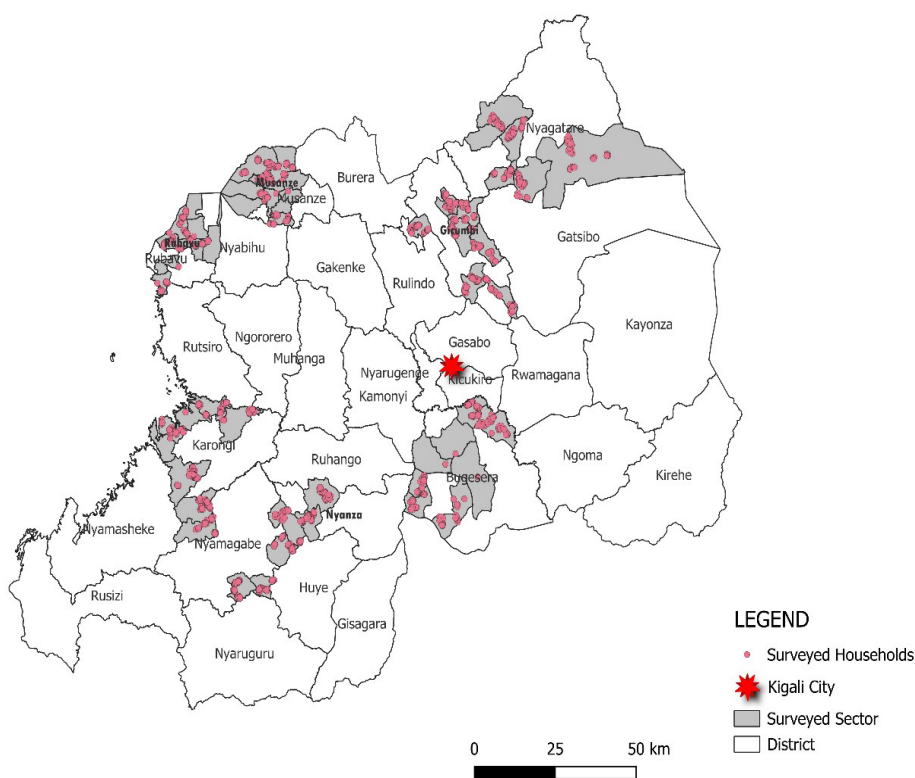
The target population for the study was rural households growing at least one of six main crops supported by the EIA Use Case implemented in Rwanda, including maize, beans, Irish potato, wheat, rice, and cassava. In practice, this included farm households across the entire country. Therefore, the sampling followed three stages. The first stage involved selecting geographical sub-populations of interest across the country, excluding urban and peri-urban areas. Within each province, two districts were randomly selected to reduce survey costs and duration of implementation. The second stage involved randomly selecting a total of 150 Enumeration Areas (EAs) within the selected districts (Table 1). This was based on the sampling frame of the 2012 Rwanda Census by the National Institute of Statistics Rwanda (NISR), in which each village was considered one EA.

**Table 1.** Selected enumeration areas by province and district

Province	District	Number of rural villages	Sampled villages
Eastern	Bugesera	536	20
Eastern	Gicumbi	561	28
Northern	Karongi	501	18
Northern	Musanze	324	19
Southern	Nyagatare	567	20
Southern	Nyamagabe	498	20
Western	Nyanza	346	12
Western	Rubavu	338	13
<b>Total</b>		<b>3671</b>	<b>150</b>

In the third stage, households that were eligible to participate in the survey were listed and in each village between 12 and 15 households were randomly selected from this list. Eligible households were those that were growing or have grown in the last 12 months one or more of the study target crops (cassava, beans, maize, wheat and/or potato). Enumerators verified, before starting an interview, whether a selected household had grown one or more of the target crops in the last 12 months. If not, the household was not interviewed and replaced by the next household on the list. Figure 2 shows an overview of the survey locations.

A total of 1,822 households took part in the survey and responded to the household-level questionnaire (Table 2). In addition, in most of these households (N=1,734) one male and one female respondent each responded to the individual questionnaire. In the remaining 88 households only one individual interview or interviews of respondents of the same sex took place. In total, 1,778 male respondents and 1,796 female respondents answered to the individual-level part.



**Figure 1.** Location of surveyed households in Rwanda  
Source: Authors' compilation



**Table 2.** Number and typology of household interviewees

Provinces/Districts	# households interviewed	# households with both male and female respondents	# households with only male respondent(s)	# households with only female respondent(s)
Northern Province (Amajyaruguru)				
Gicumbi	338	333	4	1
Musanze	229	206	8	15
Southern Province (Amajyepfo)				
Nyamagabe	249	239	4	6
Nyanza	145	140	0	5
Eastern Province (Iburasirazuba)				
Bugesera	240	222	7	11
Nyagatare	237	236	0	1
Western Province (Iburengerazuba)				
Karongi	209	199	4	6
Rubavu	175	159	7	9
Total	1822	1734	34	54

### 3.2. Training of enumerators and supervisors

The recruitment of supervisors and enumerators to carry out the study was based on their experience in conducting agricultural surveys. The supervisors and enumerators were selected from the list of enumerators who participated in different surveys that were conducted by the International Potato Center (CIP) and the International Center for Tropical Agriculture (CIAT) in the past. The training involved the use of a digital questionnaire programmed into Android tablets. The training of enumerators took five days. To make the training coherent and homogenous, the team that translated the questionnaire facilitated the training.

A practice run of the questionnaire was also carried out to allow enumerators and supervisors to be familiar with the questionnaire for one day after training. To achieve this a “fill in questionnaire” technique was used where one data collector conducted the interview while another acted as the respondent (mock interview). A pretest of the study tools was conducted after the training to ensure aspects of the study protocols were feasible to implement and to test the survey questionnaire. The pretest was carried out in the rural villages of Gasabo and Gicumbi districts close to the training site.

### 3.3. Data collection technique and quality control

The Computer-Assisted Personal Interviewing (CAPI) method was used to collect the data. The approved questionnaire was uploaded on Android devices (tablets) using Open Data Kit (ODK) software where data were directly recorded from the interview. Thereafter, the collected data were sent to the ONA server at the end of the day. The latter helps to collect field data on a mobile device and transmits them to a server from where they are extracted for analysis. The Global Positioning System (GPS) that is already incorporated in the ODK software was used to collect the location, assess the geographic coverage and progress of the interviews.

The interviews were conducted in Kinyarwanda or English. Survey materials, including the questionnaire and consent forms, were translated into Kinyarwanda prior to administering them.

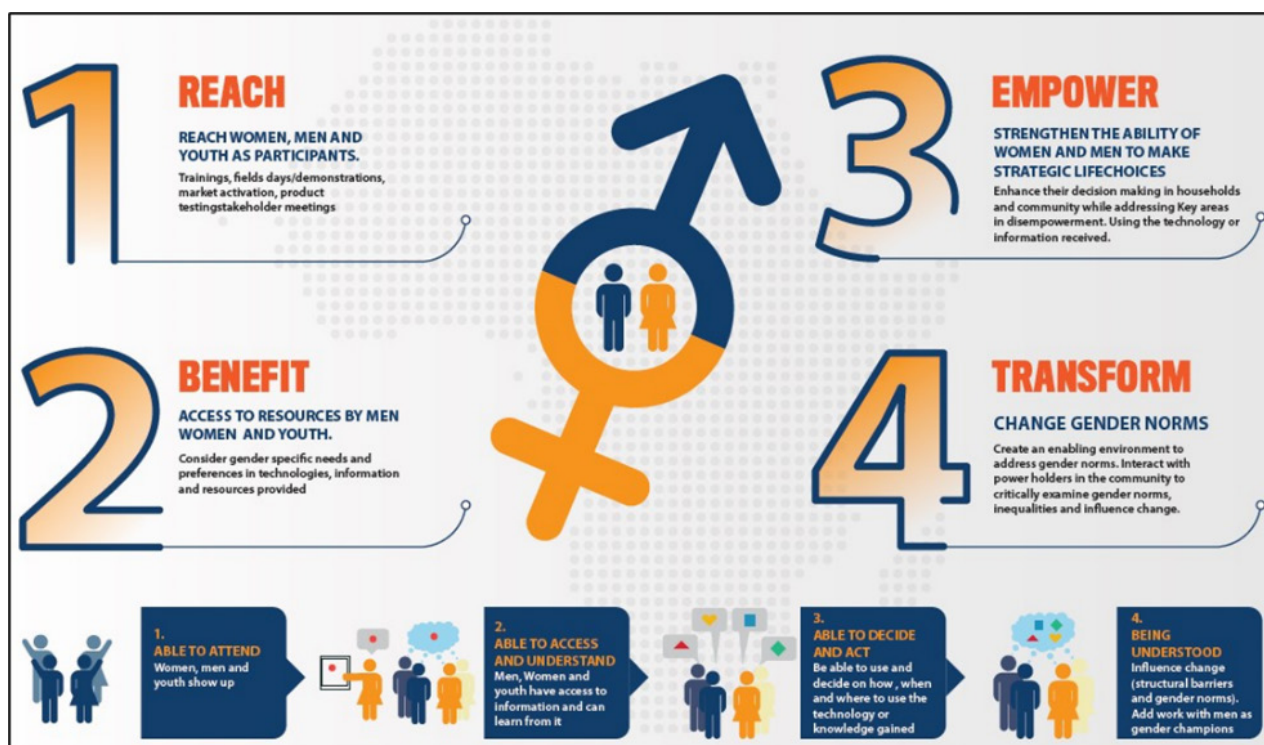
Quality control measures were employed to ensure accuracy during data collection. Enumerators filled out a maximum of 3 questionnaires per day. Supervisors were responsible for deploying enumerators, collecting the list of households, random sampling households within the village, conducting spot checks, and ensuring that accommodation was available near the community to be visited the following day. Enumerators checked the completeness of collected data and made any necessary edits while still in the presence of respondents. At the end of each day, supervisors reviewed each file for completeness and accuracy. The survey coordinator also randomly visited enumerators and produced daily high-frequency checks to detect discrepancies or outliers, which were immediately reported to the supervisors for quick correction while the team was still near the visited community. Data were also monitored via the ONA Data platform to assess data quality in real time.

### 3.4. Key indicators

We classify youth as those people between the ages of 16 and 30 years according to the Republic of Rwanda National Youth Policy (2015)<sup>1</sup>.

1 See <https://www.miniyouth.gov.rw/index.php?eID=dumpFile&t=f&f=79155&token=2f44650675b1aec39b26b7c89b528990ffc87db3>

Guided by the Reach-Benefit-Empower-Transform framework (see Figure 2) put forth by Quisumbing et al. (2023), we used the following indicators to especially show how women and youth are being reached, benefiting, and being empowered through agriculture and related institutions. We also assessed gender attitudes to showcase normative thinking about women’s involvement in agriculture that can create disadvantages for them, and thus, requiring interventions that transform these attitudes into more equitable ones.



**Figure 2.** A framework for reaching, benefiting, and empowering women and youth and transforming social relations (source: [Nchanji, n.d.](#))

### Reach

Reaching women and youths with agronomic solutions and associated extension approaches requires including them in Use Case activities. In the context of the SNS-RAB Use Case, we looked at the following aspects: (i) participation in agricultural activities, (ii) access to agricultural extension services, (iii) access to livelihood skill trainings, and (iv) access to digital technologies. To understand underlying constraints, we also assessed the preferences and demand for using technologies/solutions. Moreover, we looked at participation in agricultural groups, which are often a main mode of information dissemination (Ainembabazi et al., 2017).

### Benefit

Beyond reaching women and youths, Use Cases should aim to benefit women and youths through technologies and efforts. Such benefits could arise if the technology has effectively been adopted, or if the use of technology results in higher agricultural productivity, among other positive outcomes. In terms of benefit indicators used in this study, we explored risk behavior to understand to which extent we may expect gender or generational differences in risk-aversion or risk-taking toward new technologies. To assess the potential of benefitting from new technologies, we compared ownership of different kinds of agricultural assets, especially land, between sex and age groups. We also analyzed productivity levels by sex and age group of the plot contributors.

### Empower

Beyond reaching and benefiting women and youths, Use Cases should aim to help women and youths strengthen their agency or their abilities to make life choices and put them into action, for example, by participating in major decision-making processes in the household and beyond. We therefore rely on indicators related to inputs into making decisions on different farming activities, control over income, and access to and decisions on credit and financial services. We summarized the overall empowerment status of respondents by utilizing A-WEAI.

### Transform

Often, changing individual mindsets is not enough and Use Cases must design and employ social innovations to foster transformative change at a larger scale. Achieving this change requires addressing structural and institutional barriers perpetuating gender and social biases. In terms of indicators, we measured gender attitudes by asking respondents to rate various statements that support gender (in)equality in different agricultural activities and decision-making using a five-point Likert scale.

## 4. Results

This section is divided into five parts that include the presentation of results on household demographics, and the contributions of women and youths to agricultural production (subsection 4.1), reaching women and youths (subsection 4.2), benefiting women and youths (subsection 4.3), empowering women and youths (subsection 4.4), and lastly, transforming gender and generational norms, attitudes and behaviors (subsection 4.5).

### 4.1. Household demographics and contributions to agriculture

Table 3 presents the characteristics of the sampled households. The average household size of the sample was 5 members. The average was highest in Eastern province with 5.5 members and smallest in Northern province with 5.0 members. Almost all the households (~98 percent) consisted of both male and female adults, while <1 percent of the households did not have any female adults (i.e. male adult only household), and <2 percent did not have any male adults (i.e. female adult only household). The average age of the household head was 47 years, of which only 10 percent were classified as youth. The majority of the households (70 percent) included youth members. Half of the households had at least one female youth member, and 49 percent of the households had at least one male youth member.

In this study, all the sampled households were farm households. The average number of parcels cultivated by the households was 3.2. The number of parcels was highest in Northern province (3.8) and lowest in Eastern province (2.5). The average parcel size was 1.5 ha. The average total area of land cultivated was highest in Eastern province (2.4 ha) and lowest in Western province (0.4 ha).

**Table 3.** Characteristics of sampled households

	Total households	Northern	Southern	Eastern	Western
Average household size	5.31	4.96	5.07	5.54	5.52
Households with both male and female adults (%)	97.75	97	99	98	97
Male adult only household (%)	0.75	1	0	1	1
Female adult only household (%)	1.50	2	1	1	2
Average age of the household head (years)	46.85	45.37	47.36	47.90	46.23
Household head is youth (%)	10	12	7	10	11
Household has children under 5 years (%)	51	46	51	55	49
Household include youth members (%)	70	71	65	73	68
Household has female youth (%)	50	55	48	48	48
Household has male youth (%)	49	50	42	51	52
Youth-adult-only household (%)	9	11	6	9	10
Average number of parcels cultivated	3.17	3.84	3.60	2.48	3.19
Average total area of parcels cultivated (ha)	1.47	0.69	1.94	2.38	0.44
Number of households	1822	567	394	477	384

Table 4 indicates the demographic characteristics of respondents. Of the total respondents, 14 percent were male youths and 18 percent were female youths. The average age of men was 45 years, and women were younger than men with an average age of 42 years. About 4 percent and 2 percent of the men and women were single, respectively. More women than men had no schooling (28 percent and 21 percent, respectively), while more men than women had primary school education (67 percent and 61 percent, respectively). Men were more literate than women, as 87 percent of men and 80 percent of women were literate. The majority of men interviewed (94 percent) were regarded as household heads compared to only 6 percent of the women who were interviewed.

Dividing the sample respondents based on their age group, 56 percent of youths and 49 percent of non-youths were female. The average age of the youths was 26 years, while the mean age of the non-youths was 47 years. More youths than non-youths were single (15 percent and 1 percent, respectively), whereas more non-youths were in monogamous marriages than youths (94 percent and 85 percent, respectively). More non-youths (27 percent) than youths (12 percent) had no schooling, and more youths than non-youths had secondary school education (21 percent and 8 percent, respectively). The study had more non-youth respondents than youths who were household heads (54 percent and 31 percent, respectively). Meanwhile, more youths were spouses to the household heads than non-youths (53 percent and 45 percent, respectively).

**Table 4.** Household demographics by sex and age group

	Men (%)	Women (%)	Youths (%)	Non-Youths (%)
Female			56	49*
Youth	14	18*		
Age (mean, in years)	45.19	42.31***	25.79	47.17***
Marital status				
Single	4	2**	15	1***
Married (monogamous)	93	92	85	94***
Married (polygamous) <sup>2</sup>	1	0**	0	1***
Widowed	1	5***	0	3***
Divorced	0	1*	0	1
Highest Education Level Completed				
No schooling	21	28***	12	27***
Primary school	67	61**	66	64
Secondary school	10	9	21	8***
Tertiary school	1	1	1	1
Adult education	1	0	0	1
Literate	87	80***	95	81***
Position of the household head				
Household head	94	6***	31	54***
Spouse	1	91***	53	45**
Son or daughter	4	2**	14	1***
Grandchild	0	0	1	0*
Number of respondents	1778	1796	590	2984

Note: Asterisks indicate significant differences between male and female or youth and non-youth respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

Table 5 presents the data collected on all household members. The results presented indicated that both men and women were involved in agricultural activities. However, women were less likely to be the main decision-maker of the farm work than men. For youth inclusion in agriculture, results found that farming decisions were made by non-youths rather than youths in most households. The decisions on agricultural activities were made mostly by men and non-youths. Similar results hold when we analyzed these data at plot-level, as shown in Appendix Table A.1.

<sup>2</sup> Polygamy is legally prohibited in Rwanda according to the Rwanda Family Code.



**Table 5.** Gender and youth inclusion of household members working on-farm (% of households)

	All	Northern	Southern	Eastern	Western
Household members working on-farm are:					
Only men	2	2	1	2	2
Only women	5	5	3	5	4
Both men and women	94	93	96	92	94
Only youths	9	11	6	9	11
Only non-youths	55	45	61	58	56
Both youths and non-youths	35	43	33	33	33
Only youths <sup>a</sup>	13	16	9	13	16
Only non-youths <sup>a</sup>	36	24	41	42	35
Both youths and non-youths <sup>a</sup>	51	60	50	46	49
Decision-maker(s) of farm work is(are):					
Men	4	3	2	8	1
Women	4	6	2	3	5
Both men and women	92	91	96	89	94
Youths	9	11	6	8	10
Non-youths	76	72	77	78	77
Both youths and non-youths	15	17	17	14	13
Only youths <sup>a</sup>	13	16	9	10	15
Only non-youths <sup>a</sup>	66	62	65	70	66
Both youths and non-youths <sup>a</sup>	21	22	26	20	19
Main decision-maker(s) of farm work is(are):					
Men	82	80	81	86	79
Women	12	13	9	9	17
Both men and women	6	6	10	6	4
Youths	10	11	7	10	13
Non-youths	89	87	91	90	87
Both youths and non-youths	1	2	1	1	0
Youths <sup>a</sup>	15	16	12	13	19
Non-youths <sup>a</sup>	85	83	87	86	81
Both youths and non-youths <sup>a</sup>	1	1	1	0	0
Number of households	1822	567	394	477	384

Notes: Based on survey questions asked at plot level: 'Please indicate which household members worked on this plot in the last 12 months', 'When decisions are made regarding the agricultural management of plot, who is it that makes the decision?', 'Among those people, who would you say is the main decision-maker on plot?'. <sup>a</sup>Limited to households with at least one youth member.

That both women and men are involved in farming of the main Use Case crops is also evident from their responses to the individual questionnaire (Table 6). Across all provinces, over 90 percent of male and female respondents participated in farming in general, and in farming of each of the focal crops. A larger proportion of respondents were involved in farming maize, potato, or beans, than rice, wheat, or cassava.

**Table 6.** Participation in agricultural activities by sex and age group (% of respondents)

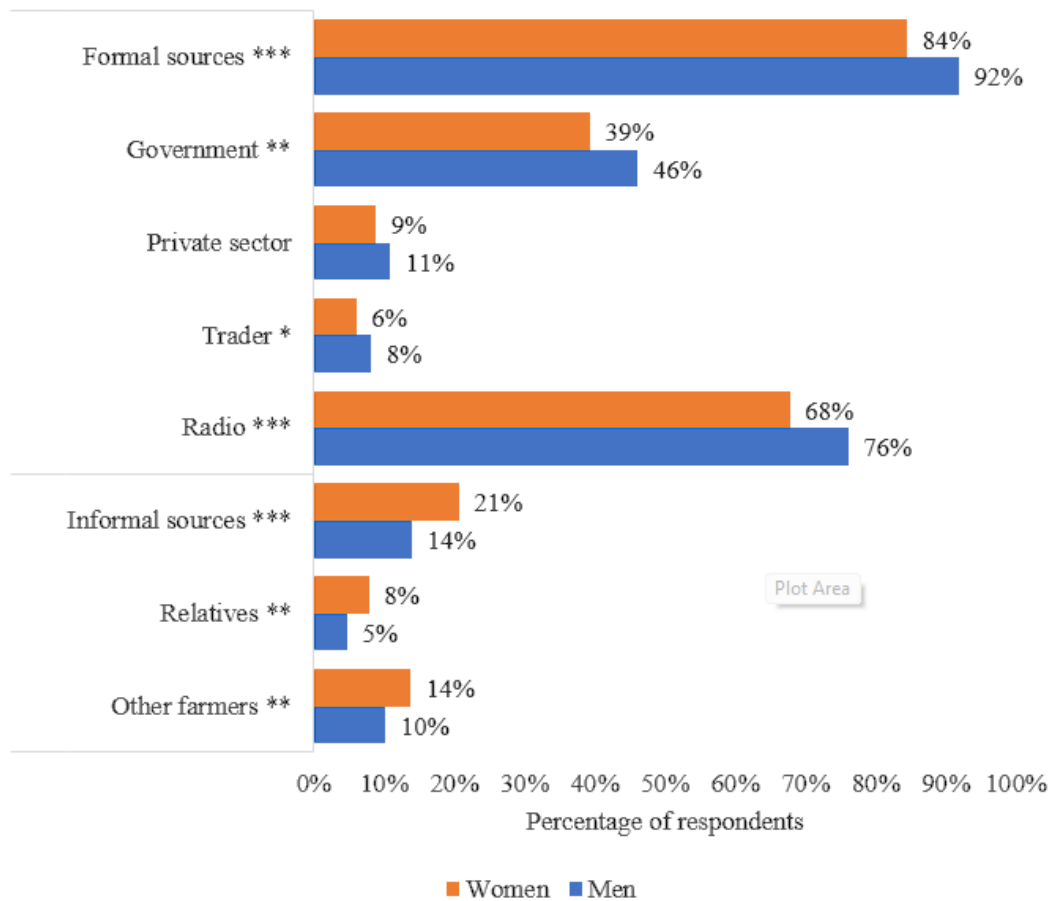
	All		Northern		Southern		Eastern		Western	
	M	W	M	W	M	W	M	W	M	W
Main crops farming activities <sup>a</sup>										
All	95	94	95	95	95	93	95	94	96	95
Youths	93	94	97	93	90	93	88	95	97	93
Non-youths	95	94	95	95	96	93	96	94	95	96
Use Case focal crops										
Maize	79	79	75	75	78	77	93	93	64	65
Rice	4	4	0	0	1	1	11	11	0	0
Potato	58	59	85	86	67	69	32	32	64	65
Wheat	5	5	8	8	13	13	0	0	2	2
Beans	89	90	86	86	95	95	83	84	95	97
Cassava	37	38	25	25	53	50	43	44	26	26
Number of respondents	1771	1789	550	552	384	392	468	473	369	372

Note: Asterisks indicate significant differences between male and female respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

<sup>a</sup>Main crops include the study focal crops: maize, rice, potato, beans, wheat, and cassava.

#### 4.2. Reaching women and youths

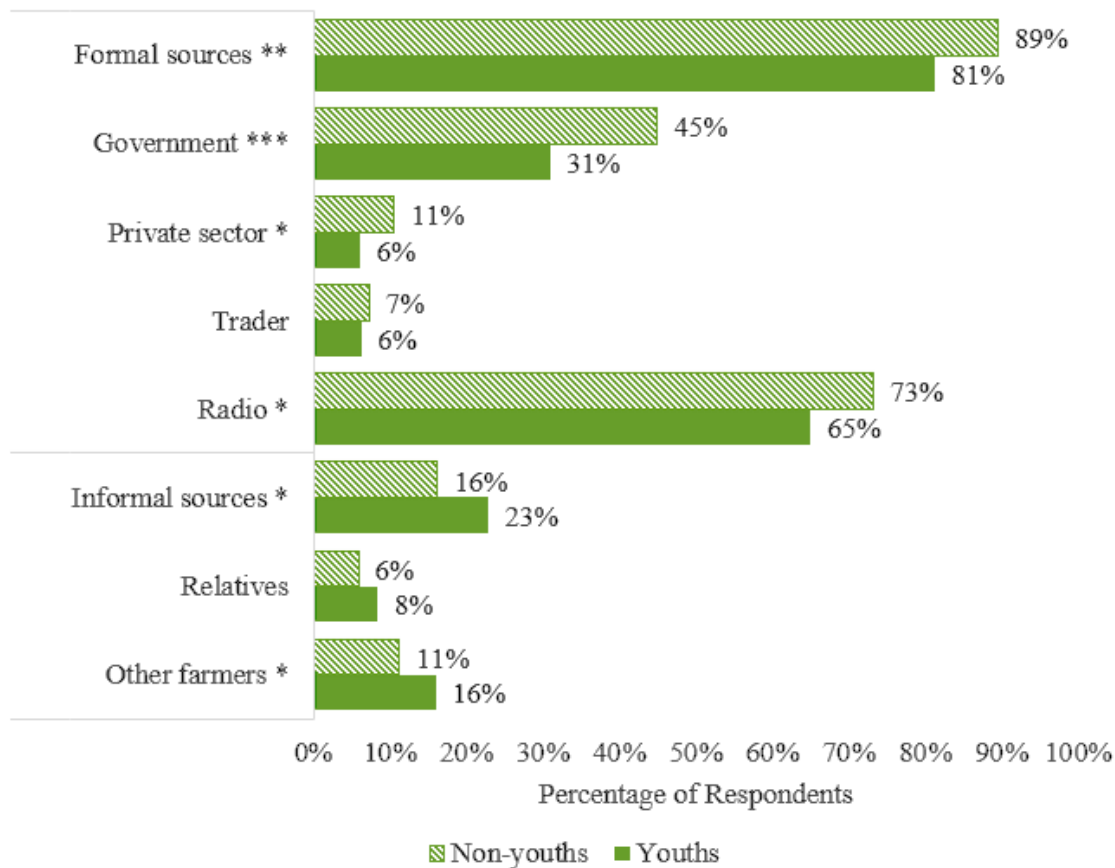
Figure 3 summarizes the proportion of respondents receiving agricultural advice from various sources. Almost all male and female respondents (95 percent and 91 percent, respectively) reported having access to agriculture advice or extension services in the past 12 months. The most common source of agricultural advice for women, men, youths, and non-youths was from radio. Men and non-youths, however, were more likely to receive information from radio than women and youths. Similarly, women were also less likely than men to receive agricultural advice from other formal sources such as government extension services, traders, and farmer association. Moreover, there was a similar pattern for skills training: 58 percent of female respondents versus 63 percent of male respondents attended any skills training in the past 12 months. Women were more likely than men to receive agricultural advice through interpersonal connections, such as their relatives and other farmers. In general, men received more agricultural advice from formal sources, whereas women received more agricultural advice from informal sources. Access to agricultural advice through digital apps is currently very low (1.3 percent for men and 1.2 percent for women).



**Figure 3.** Primary sources of agricultural advice, by sex (% of respondents)

Note: Asterisks indicate significant differences between male and female respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ . Graph does not show sources of advice used by less than 5 percent of respondents: farmer association, TV, social media, and agricultural apps. Sources were aggregated into two categories: formal sources (including government, private sector, traders, farmer associations, radio, TV, social media, and APPs), and informal sources (relatives and other farmers). The details of the primary sources of information include: a) Government: government extension agent, b) Private sector: private sector extension agent, c) Trader: traders, input suppliers, d) Farmer Association: farmer association/cooperatives, e) Relatives: relatives/family, f) Other farmers: farmers not already captured, g) Radio, h) TV, i) Social media: Wechat, Facebook, WhatsApp, Twitter, Instagram, etc., j) APP: Agricultural or weather Apps.

The primary sources of agricultural advice by age group are summarized in Figure 4. The most common sources of agricultural advice were radio and government services. These sources were more popular among non-youths than youths. In general, non-youths received more agricultural advice from formal sources, whereas youths received more agricultural advice from informal sources.

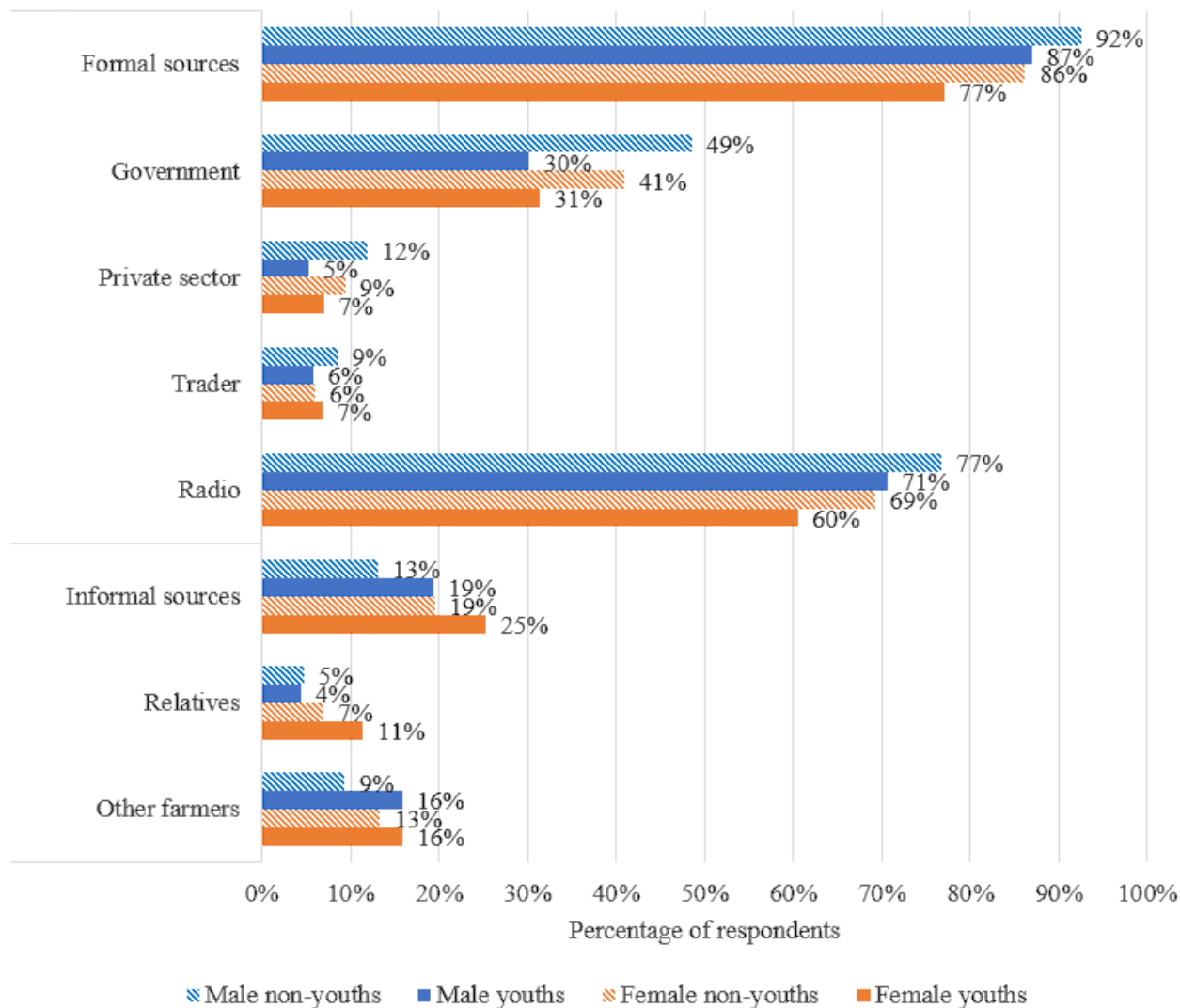


**Figure 4.** Primary sources of agricultural advice, by age group (% of respondents)

Note: Asterisks indicate significant differences between youth and non-youth respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ . Graph does not show sources of advice used by less than 5 percent of respondents: farmer association, TV, social media, and agricultural apps. Sources were aggregated into two categories: formal sources (including government, private sector, traders, farmer associations, radio, TV, social media, and APPs), and informal sources (relatives and other farmers). The details of the primary sources of information include: a) Government: government extension agent, b) Private sector: private sector extension agent, c) Trader: traders, input suppliers, d) Farmer Association: farmer association/cooperatives, e) Relatives: relatives/family, f) Other farmers: farmers not already captured, g) Radio, h) TV, i) Social media: Wechat, Facebook, WhatsApp, Twitter, Instagram, etc., j) APP: Agricultural or weather Apps.

Figure 5 summarizes the primary sources of agricultural advice by sex and age group. Results indicate that most of the respondents received information from formal sources, the most common ones being radio and government. Almost all male non-youth respondents received agricultural advice from formal sources. Female non-youth respondents were the most likely to have received agricultural advice from informal sources, including their relatives and other farmers. Digital tools are almost never used to access agricultural advice: social media (0.6% of male respondents and 0.07% of female respondents) and agricultural apps (1.3% of male respondents and 1.2% of female respondents) were less frequently used as information sources and therefore not shown in Figure 5. These patterns are similar across the four provinces (see Appendix Figures A.1 – A.4).

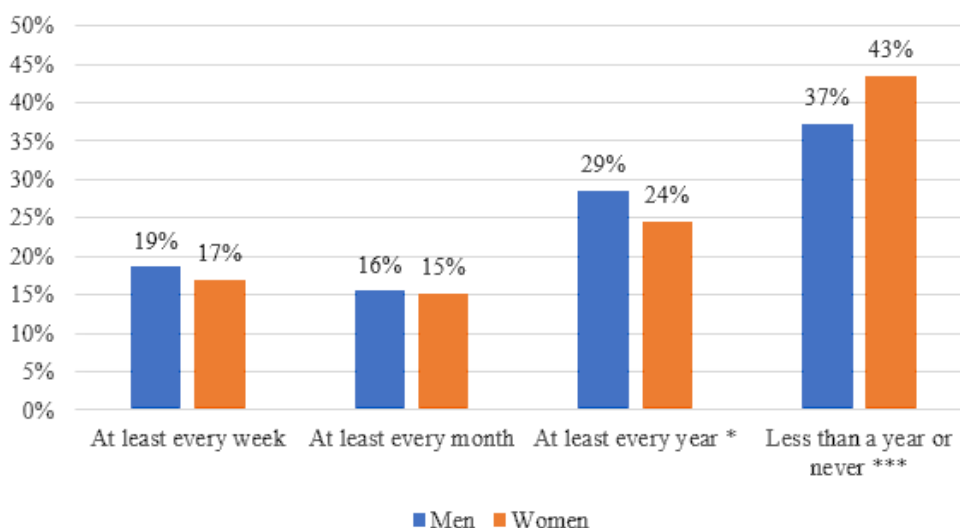




**Figure 5.** Primary sources of agricultural advice by sex and age group (% of respondents, all sample)

Note: Graph does not show sources of advice used by less than 5 percent of respondents: farmer association, TV, social media, and agricultural apps. Sources were aggregated into two categories: formal sources (including government, private sector, traders, farmer associations, radio, TV, social media, and APPs), and informal sources (relatives and other farmers). The details of the primary sources of information include: a) Government: government extension agent, b) Private sector: private sector extension agent, c) Trader: traders, input suppliers, d) Farmer Association: farmer association/cooperatives, e) Relatives: relatives/family, f) Other farmers: farmers not already captured, g) Radio, h) TV, i) Social media: Wechat, Facebook, WhatsApp, Twitter, Instagram, etc., j) APP: Agricultural or weather Apps.

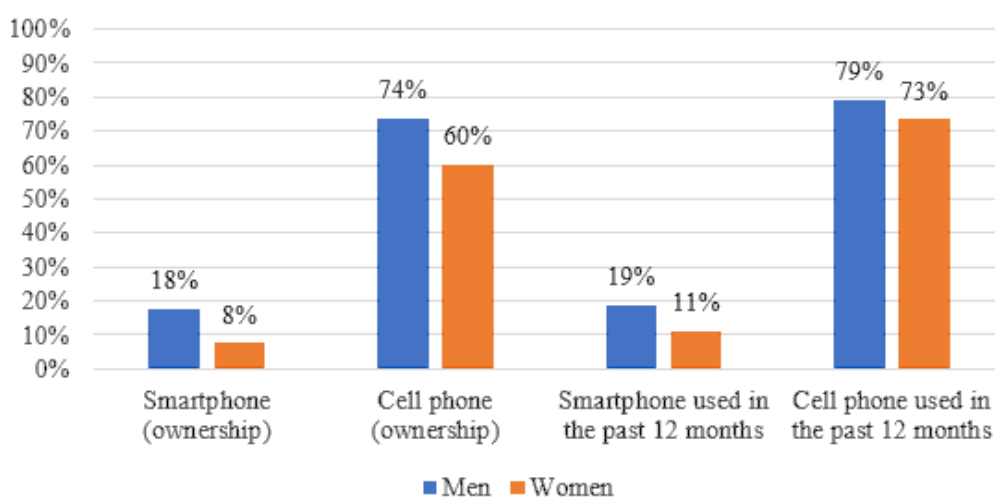
When considering a wider range of trainings, we continue to see that women received less training than men, respectively, at 29 percent and 24 percent (Figure 6).



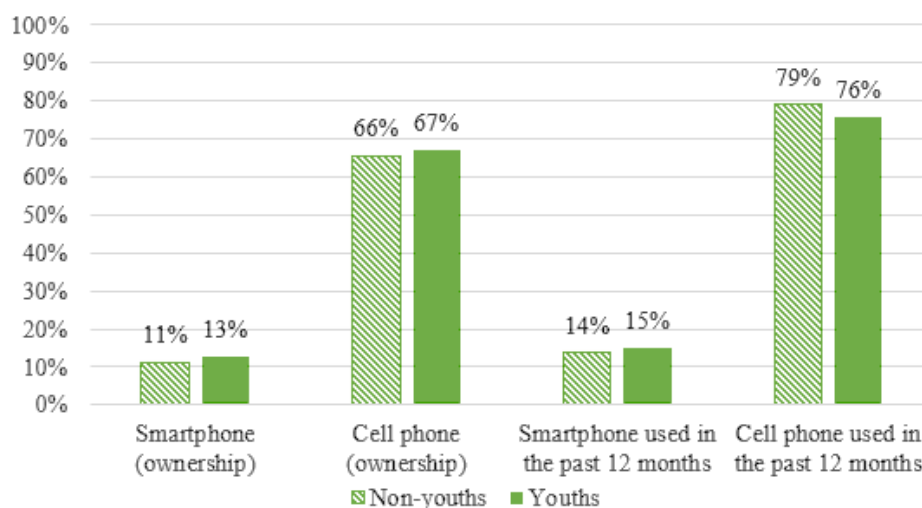
**Figure 6.** Frequency of receiving a livelihood skills training (% of respondents)

Note: Asterisks indicate significant differences between male and female respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

In terms of access to digital tools, more men than women owned and used smartphones and cell phones, whereas youths and non-youths own and use digital technologies equally (Figure 7). Sixty percent of female respondents versus 74 percent of male respondents reported owning a cell phone. Ownership of smartphones was much lower (only 8 percent of female respondents and 18 percent of male respondents). Both women’s and men’s cell phone use were higher than their ownership, but women’s use was still lower than that of men (73 percent of female respondents and 79 percent of male respondents used cellphone). Some respondents with such devices used social media. Men were more likely to have used social media than women (33 percent of female respondents and 41 percent of male respondents). However, only few respondents have heard of agriculture-related mobile applications (5 percent of female respondents and 10 percent of male respondents). Youths and non-youths had equal ownership and access to mobile devices (Figure 8).



**Figure 7.** Ownership and usage of mobile devices, by sex (% of respondents)



**Figure 8.** Ownership and usage of mobile devices, by age group (% of respondents)

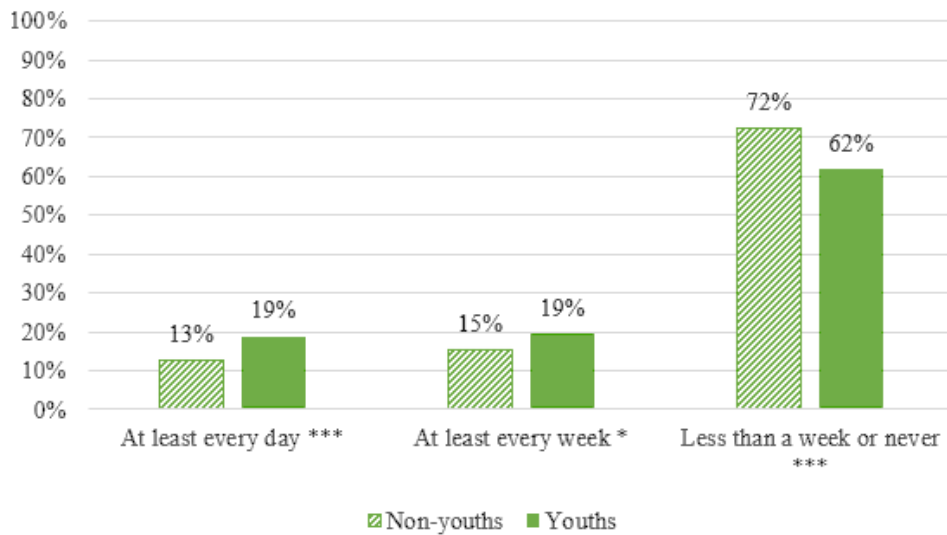
The gender difference in terms of ownership and usage of mobile devices varies across provinces (Table 7). The gap is significant in Northern province. In Southern province, men and women used smartphones equally, but men had more access to cell phones. In Eastern province, access to cell phones was not significantly different between men and men. In Western province, where respondents had higher access to cell phones than other provinces, men and women used cell phones at a similar frequency, but more men owned a cell phone or a smartphone than women.

**Table 7.** Ownership and usage of mobile devices, by sex and province (% of respondents)

	All		Northern		Southern		Eastern		Western	
	M	W	M	W	M	W	M	W	M	W
Smartphone										
Ownership	17	8***	17	6***	14	8*	19	9**	18	7***
Used in the past 12 months	19	11***	17	8***	15	11	21	13*	19	9**
Cell phone										
Ownership	74	60***	75	56***	69	53***	71	64	82	64***
Used in the past 12 months	79	73**	81	72**	77	69*	77	75	83	76
Number of respondents	1745	1763	550	552	358	366	468	473	369	372

Note: Asterisks indicate significant differences between male and female respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

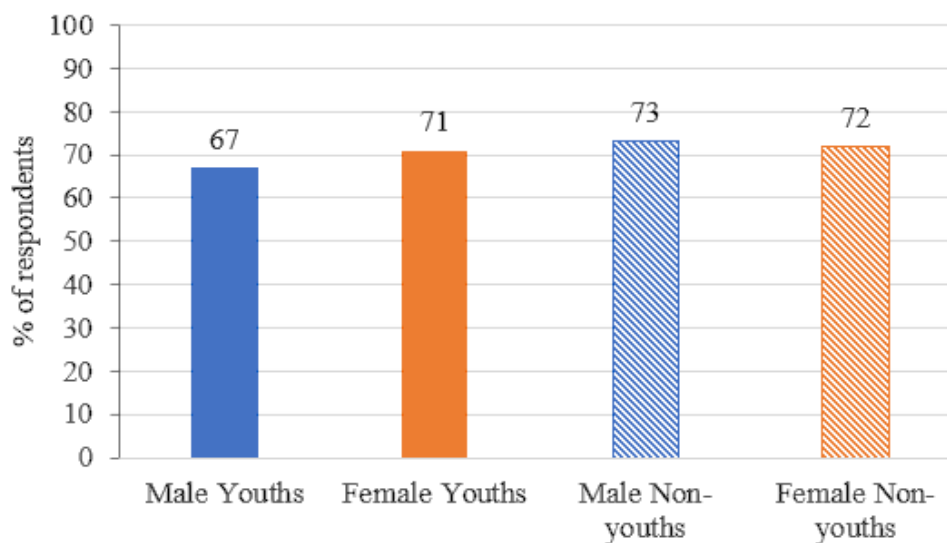
The majority of respondents (72 percent of non-youths and 62 percent of youths) used social media less than a week or never, meaning that it is still difficult to reach all the respondents through mobile messaging services (Figure 9). More youths used social media at least every day than non-youths (19 percent of youth and 13 percent of non-youth).



**Figure 9.** Frequency of using any social media or mobile messaging services (WhatsApp, Facebook, TikTok, WeChat, Viber, others) (% of respondents)

Note: Asterisks indicate significant differences between youth and non-youth respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

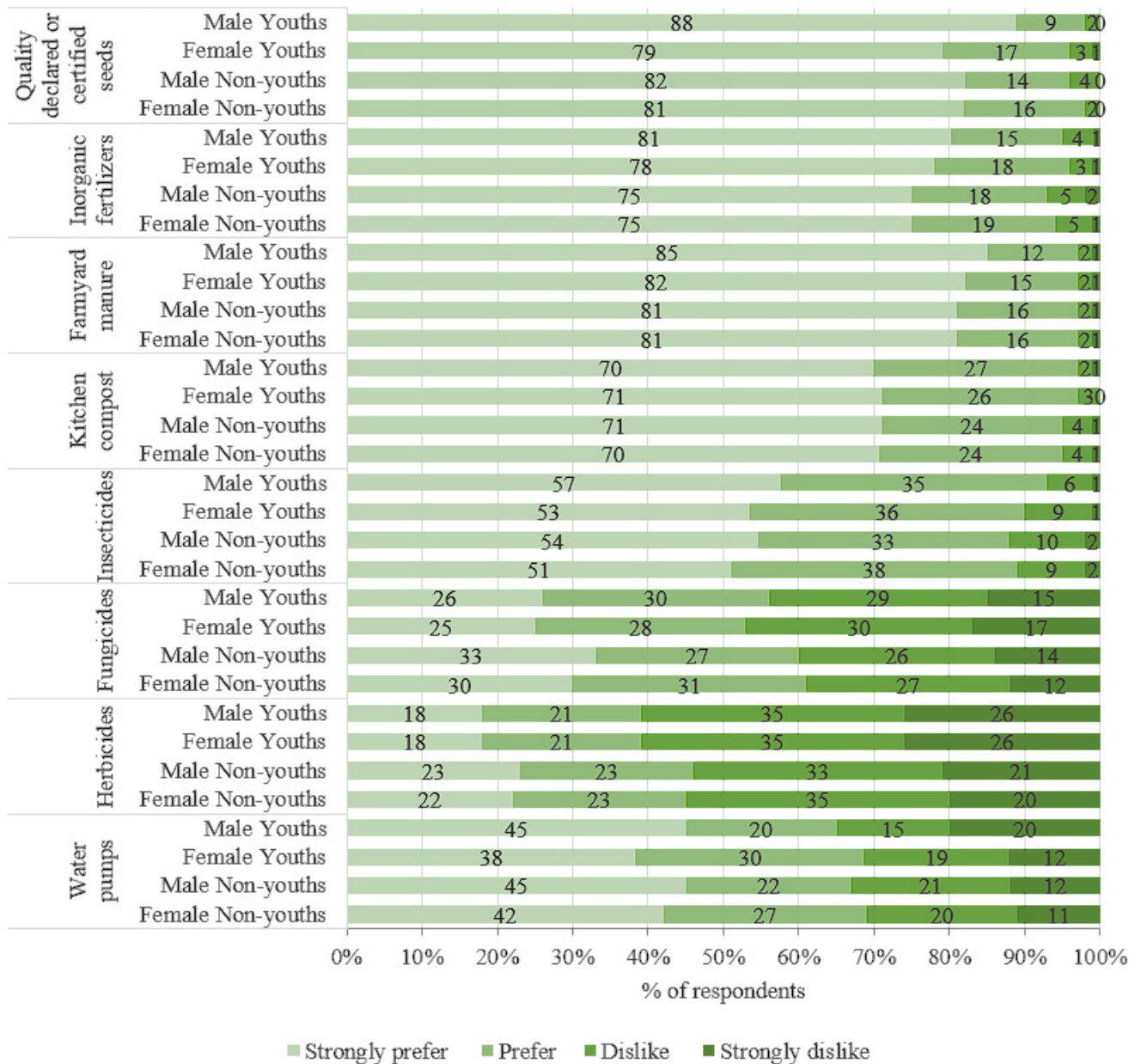
Most respondents were active members of any group, association, organization, committee or network (Figure 10). Male non-youth respondents are the most likely to be part of a group, but the difference across groups was not significant. While around 70 percent of the respondents were part of a group, less than 5 percent of the respondents reported receiving agricultural advice from farmer associations.



**Figure 10.** Active membership in any group (% of respondents)

Figure 11 shows that almost all the respondents in the study are in favor of using different farm inputs and farm management practices, such as quality seeds, inorganic fertilizer, and kitchen compost. Yet, fewer farmers were in favor of using pesticides, herbicides and fungicides. Perhaps, they are aware of potentially harmful effects of these inputs on the environment or on human health. Similarly, fewer farmers were in favor of using water pumps. This might be due to the cost implications of purchasing water pumps. The preferences for different sex or age groups were generally consistent.



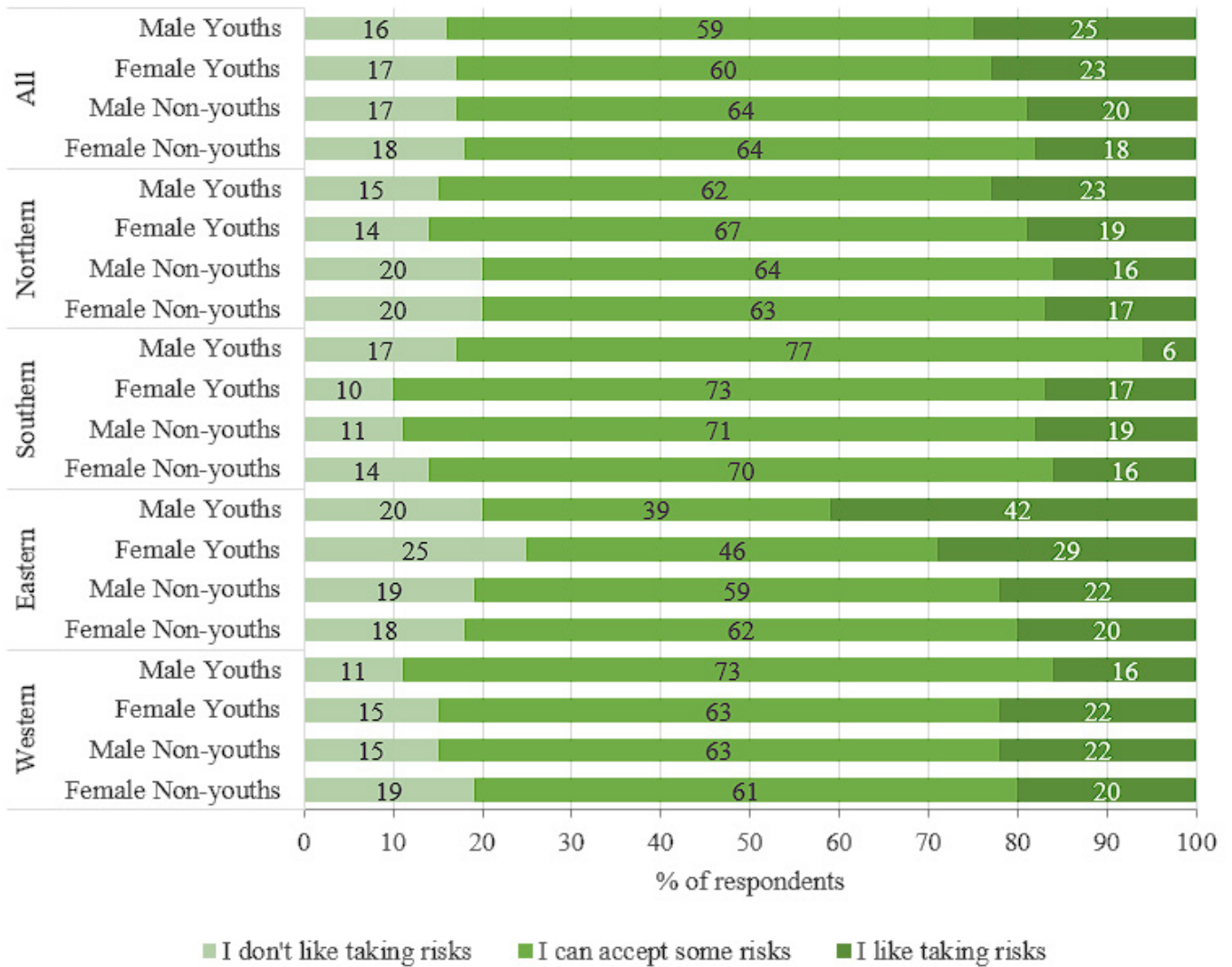


**Figure 11.** Preference to use different types of inputs, tools, and practices

Survey question: Now I am going to ask you about your preference to use different types of inputs, tools or practices. Please tell me to what extent you prefer or dislike to use the following inputs, tools or practices.

#### 4.3. Benefiting women and youths

Absent of direct indicators on the ability and willingness to innovate, we first consider indicators of risk aversion. This can give us an indication of how easily farmers may try out and adopt new technologies – given that adopting new technologies may feel inherently risky. Figure 12 shows the results for women and men respondents on risk aversion and risk taking. The question asked was “Are you willing to take some risks on your farm?”. Results indicate that about 17 percent reported not willing to take risks while about 22 percent reported that they like taking risks. Most respondents reported that they can accept some risks. Overall, respondents in Eastern province were more willing to take risk, especially the male youth respondents.



**Figure 12.** Willingness to take risks  
Survey question asked: “Are you willing to take some risks on your farm?”

Next, we look at ownership of different types of agricultural assets. Access to land and other agricultural assets are often necessary to apply and hence benefit from a new agricultural technology being introduced. Table 8 shows the percentage of women and men who owned different types of agricultural assets. Results indicate that most of the assets (non-mechanized equipment, mechanized equipment, business equipment, building, leisure items, big items, motorized vehicles, non-motorized vehicles, large livestock, small livestock, poultry, and other land) were owned at the same rate by men and women. This implies that respondents had the feeling that they owned these assets, either solely or jointly. Mainly, this consists of joint ownership of assets (as shown in Appendix Table A.2), and only in a few cases both male and female household members each own their own asset. However, for assets that are more commonly owned individually, such as digital devices (phones, laptops, and tablets), but also regarding ownership of agricultural land, men more often report to be owners compared to women. Female youths reported the least ownership in these assets.

**Table 8.** Ownership of agricultural assets by sex and age group (% of respondents)

Asset	All		Youths		Non-youths	
	M	W	M	W	M	W
Agricultural land	89	75***	61	45**	94	82***
Non-mechanized farm equipment (hand tools, animal-drawn plough, etc.)	87	87	82	88	88	87
Functioning smartphone or (non-smart) cell phone, laptop/tablet	81	64***	85	61***	81	65***
Large livestock (oxen, cattle)	46	45	22	30	50	48
Small livestock (goats, pigs, sheep)	57	57	39	40	60	61
Poultry and other small animals (chickens, ducks, turkeys, pigeons)	28	28	17	20	29	29
Mechanized farm equipment (tractor-plough, power tiller, treadle pump, etc.)	3	3	3	2	3	3
Nonfarm business equipment (solar panels, sewing machine, brewing equipment, fryers)	22	21	17	19	22	22
Building or structures (including shop, warehouse)	35	35	30	39	36	34
Leisure items (TV, radio, games)	71	67	58	62	73	68*
Big items for cooking and cleaning (refrigerator, cooker, stove, washing machine)	0	0	0	0	0	0
Other land not for agricultural purposes (residential or business plots)	48	46	40	48	49	46
Motorized transportation means (e.g., motor-bike, car)	5	5	2	2	5	5
Non-motorized transportation means (e.g., bike)	35	32	32	32	36	32
Aggregate: Ownership of land and other assets (using A-WEAI cutoffs) <sup>1</sup>	100	99	99	97	100	100
Number of respondents	1778	1796	260	330	1517	1466

Note: Asterisks indicate significant differences between male and female respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

<sup>1</sup>A-WEAI cut-off is 1, meaning that the respondent is considered to achieve adequacy in asset ownership if s/he owns at least one major asset (Malapit et al. 2017).

The productivity of focal crops in Rwanda measured in value of production was 1.96 million RWF/ha (or 1,660 USD/ha). The mean productivity of the focal crops was the highest in Western province and lowest in Eastern province (Table 9). Very few households did not have women involved in farming, therefore it is not relevant to compare the productivity of households with and without women's involvement. Plots with youth's involvement and those without youth's involvement had the same productivity (Appendix Table A.3).

**Table 9.** Productivity (1,000,000RWF/ha) of the Use Case focal crops in the plot by household type

	All			Northern		Southern		Eastern		Western					
	# obs	Mean	Median	# obs	Mean	Median	# obs	Mean	Median	# obs	Mean	Median			
All households	1778	1.96	1.19	552	2.00	1.36	386	1.69	1.03	464	1.58	1.00	376	2.71	1.69
By gender of the main decision maker related to crop production															
Women as main decision maker	312	1.95	1.21	92	2.00	1.50	73	1.14	1.00	75	1.47	1.05	72	3.24	1.87
Men as main decision maker	1293	1.91	1.13	391	1.90	1.19	313	1.82	1.05	344	1.66	1.04	245	2.49	1.55
By age of the main decision maker related to crop production															
Youths as main decision maker	177	2.28	1.09	62	2.41	1.75	35	1.57	0.73	41	2.03	1.00	39	2.93	1.02
Non-youths as main decision maker	1428	1.87	1.14	421	1.85	1.17	351	1.70	1.04	378	1.59	1.06	278	2.60	1.69

Note: During the time of data collection, the average exchange rate of RWF to USD is 1180.124. Plots where the main decision maker was not a household member were not included in the comparison by gender or age status of the decision maker.

#### 4.4. Empowering women and youths

This section summarizes the indicators on inputs in decision making, which are commonly used measures for (aspects of) women's empowerment. Among those who participated in farming, only about 1 percent of men and 2 percent of women did not contribute to farming decisions (Table 10) and most respondents reported that decisions were made both by men and women in their households (Appendix Table A.4). When considering the A-WEAI threshold for decision-making on agricultural activities, over 90 percent of men and women would be considered adequate. However, although both men and women make decisions regarding farming activities, the share of men (over 80 percent) reported to make the most contributions to farming decisions was much higher than the share of women who reported this, respectively 80 percent and 60 percent, reported to make the most contributions into the farming decisions.

**Table 10.** Decisions on farming activities for the Use Case focal crops, by sex of the respondents (% of respondents)

	Men	Women
Participated in varieties decision making	99	98
Contribution about varieties to grow		
Most	82	62***
Some	17	36***
No	1	2
Participated in agronomic practices decision making	99	98*
Contribution to decisions about agronomic practices		
Most	82	61***
Some	17	36***
No	1	2
Participated in labor decision making	96	94
Contribution to decisions about labor		
Most	80	59***
Some	16	35***
No	2	3
Participated in fertilizer application decision making	99	97*
Contribution to decisions about fertilizer application		
Most	83	61***
Some	15	36***
No	1	3
Aggregate: Input in productive decisions (using A-WEAI cutoffs) <sup>1</sup>	95	93*
Number of respondents	1778	1796

Note: Asterisks indicate significant differences between male and female respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

<sup>1</sup>A-WEAI cut-off is 1, meaning that the respondent is considered to achieve adequacy in input in productive decisions by making related decisions or having at least some input into the decisions (Malapit et al. 2017)

In terms of access to and control over financial resources (Table 11, Appendix Tables A.6-7 for regional differences), both men and women were able to take loans in the last 12 months. However, a much larger share of men (92 percent) made the decisions of borrowing most of the times compared to women (79 percent). Similarly, the decisions about what to do with the money borrowed most of the time was made by men more than women (95 percent and 81 percent, respectively). Compared to other provinces, this gender gap was lower in Western province (95 percent of men and 89 percent of women made the decisions). As for farming decisions, men and women often jointly participate in financial decision making, though in a non-negligible share of households where these decisions were made solely by male household members (15%) or female household members (8 percent) (Appendix Table A.4). Across the sample, there was a gender gap on having a mobile money account, with a greater percentage of men having an account than women (82 percent and 60 percent, respectively). Aggregating their access to financial services based on A-WEAI, the study found that men were more empowered compared to women (82 percent versus 73 percent).

**Table 11.** Access to and decisions on financial services, by sex of the respondents (% of respondents)

Survey questions	Men	Women
Are you or anyone in your household able to take a loan or borrow cash/in-kind if you want to?		
Yes <sup>1</sup>	82	80
Has anyone in your household taken any loans or borrowed cash/in-kind in the past 12 months?		
Yes	70	70
Did you make the decision to borrow most of the time? (Conditional on household borrowing)		
Yes	92	79***
You make the decision about what to do with the money/ item borrowed most of the time? (Conditional on household borrowing)		
Yes	95	81***
Do you, either by yourself or together with someone else, currently have an account at a bank or other formal institution (e.g., post office)?		
Yes	64	60
Do you have a mobile money account?		
Yes	82	60***
Aggregate: Has access to and makes decisions on financial services (using A-WEAI cutoffs) <sup>2</sup>	82	73***
Number of respondents	1778	1796

Note: Asterisks indicate significant differences between male and female respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .<sup>1</sup> We combined those who answered either “Yes” or “Maybe”;<sup>2</sup> Abbreviated Women’s Empowerment in Agriculture Index (AWEAI) indicator is considered adequate when the respondent 1) belongs to a household that used a source of credit in the past year and participated in at least one sole or joint decision about it, or 2) belongs to a household that did not use credit in the past year but could have if wanted to.

A similar proportion of youths and non-youths took loans in the last 12 months (70 percent for non-youths and 69 percent for youths) (Table 12). Youths and non-youths were equally able to take loans in the last 12 months (84 percent and 80 percent, respectively), but youths less often make decisions on borrowing (75 percent and 87 percent, respectively) and on what to do with the money (79 percent and 90 percent, respectively). Results established that youths less often have an account that can be used to save money, or to make or receive payments (54 percent and 64 percent, respectively). In terms of access to decisions on financial services, fewer youths than non-youths had access to financial services and made decisions on financial services (72 percent and 78 percent, respectively).

**Table 12.** Access to and decisions on financial services, by age group of the respondents (% of respondents)

Survey questions	Youths	Non-youths
Are you or anyone in your household able to take a loan or borrow cash/in-kind if you want to?	84	80
Has anyone in your household taken any loans or borrowed cash/in-kind in the past 12 months?	69	70
You made the decision to borrow most of the time?	75	87***
You made the decision about what to do with the money/item borrowed most of the time?	79	90**
Do you, either by yourself or together with someone else, currently have an account at a bank or other formal institution (e.g., post office)?	54	64**
Do you have a mobile money account?	71	71
Aggregate: Has access to and makes decisions on financial services (using A-WEAI cutoffs) <sup>2</sup>	72	78*
Number of respondents	586	2974

Note: Asterisks indicate significant differences between youth and non-youth respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ . We combined those who answered either “Yes” or “Maybe”;<sup>2</sup> Abbreviated Women’s Empowerment in Agriculture Index (AWEAI) indicator is considered adequate when the respondent 1) belongs to a household that used a source of credit in the past year and participated in at least one sole or joint decision about it, or 2) belongs to a household that did not use credit in the past year but could have if wanted to.



The elements were combined to calculate 5 dimensions of the abbreviated Women’s Empowerment in Agriculture Index (A-WEAI) (excluding work balance). Table 13 summarizes this information (Table A.8 shows the regional differences). Most female and male respondents were empowered or have achieved adequacy in various empowerment dimensions. There are subtle differences between women and men and between youths and non-youths. Female respondents were less empowered than men in terms of their input in productive decisions and control over use of income, though the differences were relatively small (2 percentage points). Women were also less empowered with respect to financial services, and this difference is more sizeable (9 percentage points). Women and men were equally empowered in other domains of the A-WEAI. Youths are less empowered than non-youths across most domains – except for group membership. While significant, the differences are generally modest – and do not exceed six percentage points. There are some areas of improvement needed in 2 dimensions (access to and control over financial resources and group membership), in which 18-31 percent of female and male respondents did not achieve adequacy in these dimensions.

**Table 13.** Percentage of respondents, by adequacy in A-WEAI indicators by sex and age group (% of respondents)

WEAI Adequacy	All		All	
	Men	Women	Youths	Non-Youths
Input in productive decisions	95	93*	90	95*
Ownership of land and other assets	100	99	98	100**
Access to and decisions on financial services	82	73***	72	78*
Control over use of income	99	97*	94	99*
Group membership	73	72	69	73
Number of respondents	1771	1789	586	2974

Note: Asterisks indicate significant differences between male and female respondents, and between youth and non-youth respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

#### 4.5. Transforming gender and youth norms, attitudes, and behaviors

This section summarizes respondents’ gender norms by exploring answers to whether one agrees or disagrees with some gender equality statements. These questions were framed either in a positive or a negative way. One set of questions was framed as supporting gender equality, and the other was supporting gender inequality. Respondents were randomly assigned to either frame. Answers from the negative frame were recoded, so that they are comparable to answers from the positive frame. All answers from both frames were summarized below in Table 14.

Overall, respondents seemed in favor of supporting women as farmers and in managing household-related activities. Most respondents (95 percent and 93 percent of men and women, respectively) agreed with the statement that “It is ok for women to interact with male extension agents”. Likewise, 91 percent and 88 percent of men and women, respectively, supported the statement that “husbands should help wives with household chores like cooking and taking care of children”. There was little variation across statements and a large share of respondents agreed with statements that favored gender equality.

**Table 14.** Agreement with the statements in favor of gender equality by sex and age group of the respondent (% of respondents)

Statement	Men	Women	Youths	Non-youths
It is ok for women to interact with male extension agents	95	93	95	94
It is ok for women to participate in agricultural extension trainings or activities	96	95	95	96
It is ok for women to use information and communication technology (e.g. mobile phones, internet, Facebook, apps ...)	95	95	94	95
Women should be encouraged and supported as farmers	95	94	94	95
It is equally important to improve productivity on women’s plots as it is on men’s plots	56	56	59	55
It is ok for women to be primarily the ones who cultivate crops	67	66	65	67
It is ok for women to engage in agricultural marketing activities/trade at the market	93	93	94	93
It is ok for women to be the primary income earners for their families	63	65	62	64
Women should be encouraged to be owners and managers of non-farm businesses	93	93	94	93
Husbands should help wives with household chores, like cooking and taking care of children	91	88*	89	90
Number of respondents	1771	1789	586	2974

Note: Agree includes both respondents who indicated agree or strongly agree. Asterisks indicate significant differences between male and female or youth and non-youth respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

Patterns less supportive of gender equality emerge when we look at questions that seek to elicit answers on prioritization of men's activities versus women's activities. For example, much fewer respondents (56 percent) agreed that it is equally important to improve productivity on women's plots as it is on men's plots. Similarly, there is less universal support for the statement that women should be primarily the ones to cultivate crops, or be the primary income earners for their households, although disagreement there could also be related to equity – whereby respondents do not only acknowledge the privilege but also the burden of being the primary farmer or income earners in the household. The general pattern of the gender attitudes reported by respondents was consistent across provinces, though with some minor differences (see Appendix Table A.8 and Table A.9).

## 5. Summary and recommendations

Farmers in Rwanda cultivate small areas of land only and yields per unit of land are far below expected averages due to poor crop and nutrient management. Together with these “technical” constraints, social and gender issues can limit agricultural production and productivity and overall participation in and benefits derived from agriculture in Rwanda. This gender and youth diagnostic study was carried out to explore gender and generational differences in agricultural development outcomes, with the aim of informing how the SNS-RAB Use Case can better reach, benefit, and empower women and youths with their agronomic solutions and transform underlying attitudes, norms, and power relations that causes gender and generational inequalities. This objective is especially important given the nature of the minimal viable product (MVP) – a fertilizer recommendation tool for six priority crops (cassava, maize, wheat, potato, rice, and bean) that the SNS-RAB Use Case is developing with the Ministry of Agriculture. The tool will provide site-specific fertilizer recommendations tailored to farmers' locations and needs and be maintained and continuously updated by RAB. It will provide a proof-of-concept to pave the way for incorporating other types of agronomic advisories in SNS.

The gender and youth diagnostic study surveyed a total of 1,822 households, and in most cases (N=1,734), two individual interviews were conducted with a male respondent (N=1,778) and a female respondent (N=1,796).

Overall, differences between men and women are subtle, and in many cases not as sizeable as in other EIA Use Case settings and countries. These subtle differences found are consistent with other studies that show Rwanda is ranked 6th and 12th in 2022 and 2023, respectively, in terms of gender equality measures based on the Global Gender Gap (WEF 2022, 2023). Nevertheless, these subtle differences found in this gender and youth diagnostic study are relatively significant in a few dimensions and should be addressed by the SNS-RAB Use Case and partners or relevant stakeholders to help support the achievement of gender and generational equality in Rwanda.

### Reaching women and youths

#### Educational levels

- More women than men had no schooling (28 versus 21 percent, respectively).
- Fewer women were literate than men (80 versus 87 percent, respectively).

### Involvement in agriculture

- Both women and men were heavily involved in agricultural activities (over 90 percent).

### Access to agricultural advice or extension services

- Almost all female and male respondents (91 and 95 percent, respectively) reported having access to agricultural advice or extension services in the past 12 months.
- Women and youths received more agricultural advice from informal sources (e.g., relatives, neighbors), especially female non-youths. Male non-youths received more agricultural advice from formal sources (e.g., government extension agents).
- Fewer women than men owned a cell phone (60 versus 74 percent, respectively) or a smartphone (8 versus 17 percent, respectively). No generational gaps were found in phone ownership.
- Access to agricultural advice through digital apps is currently very low (< 2% for women and men).

### Participation in groups

- Most respondents, regardless of their age/sex, were active members of a group, association, organization, committee or network.

### Benefiting women and youths

#### Willingness to take risks on farm

- While most respondents reported that they can accept taking some risks, 17 percent indicated they are not willing to take risks.

### Ownership of agricultural assets

- Women and men own key agricultural (and non-agricultural) assets at similar rates.
- More men own agricultural land than women (89 versus 75 percent, respectively) and female youths are less likely to own agricultural land (45 percent) compared to other groups.

## Empowering women and youths

### Decision making on farming matters

- Majority of men (over 80 percent) reported that they make the most contributions to farming decisions, while around 60 percent of women believed they make most contributions to farming decisions.

### Access to and making decisions on financial services and products

- Both men and women indicated they were able to take loans or borrow money in the past 12 months, and often decisions are made jointly. Yet more men (92 percent) make the decisions to borrow compared to women (79 percent).
- More men make decisions about what to do with the money borrowed than women (95 versus 81 percent, respectively).
- More men have a mobile money account than women (82 percent and 60 percent, respectively).
- Most of these results were equal across age groups, although fewer youths make decisions on borrowing compared to non-youths (75 versus 87 percent, respectively) and on what to do with the money (79 versus 90 percent, respectively), and fewer youths have a bank account that can be used to save money or make/receive payments than non-youths (54 versus 64 percent, respectively).

## Transforming unequal gender attitudes/norms

### Gender (un)equal attitudes

- Patterns of gender attitudes concerning women's participation in agriculture and men's support in managing household-related activities were relatively equal.
- Patterns were less supportive of gender equality concerning: 1) the importance of improving the productivity on women's plots versus on men's plots, 2) women primarily being the ones to cultivate crops, and 3) women being the primary income earners for their households.

## Recommendations

Area of focus	Recommendation
Reach	
<p>Educational levels</p> <ul style="list-style-type: none"> <li>Men were more literate than women and more women than men had no formal schooling.</li> </ul>	<p>To reach and benefit more women with Use Case agronomic solutions and related resources and information, Use Cases need to use/design a variety of communication products to ensure those who lack literacy can engage, understand, and utilize.</p> <p>In addition to developing traditional products such as text brochures or putting information in a digital app that requires literacy, Use Cases should develop videos, radio programs and other non-text formats alongside traditional materials like brochures and apps to guide, train, or communicate with those involved in their Use Case activities. Radio programs are the major source of agricultural advice for both women and men and should be continued in the mix of tools in reaching rural producers.</p>
<p>Access to agricultural advice or extension services</p> <ul style="list-style-type: none"> <li>Women and men both reported having access to agricultural advice or extension services, but male non-youths received more agricultural advice from formal sources and women and youths received more agricultural advice from informal sources, especially female non-youths.</li> <li>More men than women currently own a cellphone (74 versus 60 percent, respectively) or a smartphone (17 versus 8 percent, respectively) and access to agricultural advice through digital apps is currently very low.</li> </ul>	<p>Often, men take up positions as government extension officers and target male farmers given local gender norms that create challenges when women speak with male officers or attend their trainings, which lowers women’s access to formal extension services. The Use Case must explicitly engage with or train female extension officers who could support government efforts and sensitize male officers about gender-responsive service provision. Encourage men and women extension agents to collaborate and work together to reach more women.</p> <p>The provision of agricultural advice via formal sources via government and/or Use Case-supported extension services should be gender- and youth-responsive to reach women and young people. This is also important as very few farmers currently use digital apps (and smartphones) to access agricultural advice. Hence, extension agents may remain important intermediaries of bringing agricultural information to the farmers soon. More importantly, radio programs are the major source of agricultural advice for both women and men and should be continued in the mix of tools in reaching rural producers.</p>
<p>Participation in groups</p> <ul style="list-style-type: none"> <li>Most respondents, regardless of their age/sex, were active members of a group, association, organization, committee or network.</li> </ul>	<p>The Use Case should consider working with or mobilizing women, men, and youth farmers through different groups, associations, organizations, etc. given high participation rates in such groups in the Use Case regions of focus. Agricultural and marketing advice and training can be channeled through these groups. In this training and extension provision, consider including household members (e.g., spouses and other adults) in addition to the members of these groups.</p>
Benefit	
<p>Ownership of agricultural assets</p> <ul style="list-style-type: none"> <li>Women and men own key agricultural (and non-agricultural) assets at similar rates, except that more men own agricultural land than women and even fewer female youths own agricultural land.</li> </ul>	<p>Many agricultural assets are jointly owned by women and men in the household. However, agricultural land is not always registered in both spouses’ names, and youths are less often registered as landowners than non-youths. The Use Case can further investigate female and male youths’ access to and ownership of land and whether they are limiting factors in achieving productivity and income improvements. If so, the Use Case teams can explore how to utilize communal lands for more inclusive land use. Alternately, strategies can be explored to engage more women and youths in other nodes of the value chains (e.g., marketing and processing), especially within groups and associations.</p>
Empower	

Area of focus	Recommendation
<p>Decision making on farming matters</p> <ul style="list-style-type: none"> <li>Farming decisions are mainly made jointly, but men have more decision-making power than women in these decisions.</li> </ul>	<p>Men and women often – but not always – make farming decisions jointly. However, men are more often accepted as the main decision-makers regarding farm activities in the household. However, the Use Case needs to be aware of and encourage information sharing and joint decision-making within the household. It should avoid unintentionally contributing to sole or unequal power relations by working with the households’ ‘main agricultural decision-maker’ only or by providing gender-biased or gender-stereotyped messages. The Use Case can provide training to build women’s confidence and help strengthen their bargaining power to influence farming-related decisions.</p>
<p>Access to and making decisions on financial services and products</p> <ul style="list-style-type: none"> <li>Both men and women take loans or borrow money, and often make decisions jointly, yet more men make decisions to borrow and what to do with the money borrowed by themselves, compared to women.</li> <li>More men have a mobile money account than women.</li> <li>Fewer youths make decisions on borrowing compared to non-youths and on what to do with the money.</li> <li>Fewer youths have a bank account than non-youth.</li> </ul>	<p>The Use Case should use <a href="#">gender transformative approaches</a> to address the unequal norms that discriminate against women and youths as decision-makers over financial services/products. The Use Case can engage men using <a href="#">household methodologies</a> or other similar approaches (see <a href="#">Farnworth et al., 2020</a>) to bring about greater intra-household joint decision-making on utilizing financial services or products and on other financial matters, including opening individual mobile money and/or bank accounts.</p>
<b>Transform</b>	
<p>Gender (un)equal attitudes</p> <ul style="list-style-type: none"> <li>Patterns of gender attitudes concerning women’s participation in agriculture and men’s support in managing household-related activities were relatively equal, except for 1) the importance of improving the productivity on women’s plots versus on men’s plots, 2) women primarily being the ones to cultivate crops, and 3) women being the primary income earners for their households.</li> </ul>	<p>The Use Case should also use gender transformative approaches to address the negative stereotypes or gender unequal attitudes around women’s status as main growers of crops in their household or their contribution to household income generation. Messages should reinforce the importance of maximizing the agricultural productivity at the household level, including men’s and women’s productivity when they produce crops on their own.</p> <p>The Use Case can showcase successful women farmers and highlight their contributions to household income generation, countering negative stereotypes. These can be done through radio programs, radio or community dramas, videos or text messages, or gender awareness campaigns at household or community levels.</p>

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## 7. Appendix

**Table A.1.** Gender and youth inclusion of household members working on the farm (% of plots)

	Share of plots	Northern	Southern	Eastern	Western
Household members working on the farm:					
Only men	2	2	2	4	2
Only women	5	6	3	6	5
Both men and women	92	92	95	90	94
Only youths	8	10	6	8	7
Only non-youths	60	52	66	62	60
Both youths and non-youths	32	38	28	30	32
Only youths (% of plots in households having youth members)	11	14	8	11	11
Only non-youths (% of plots in households having youth members)	42	32	49	46	42
Both youths and non-youths (% of plots in households having youth members)	47	54	43	43	48
Decision-maker(s) to farm work is(are):					
Men	5	5	2	11	1
Women	4	5	2	4	4
Both men and women	91	90	96	85	95
Youths	8	10	6	9	7
Non-youths	81	81	81	81	83
Both youths and non-youths	11	9	13	10	10
Youths (% of plots in households having youth members)	12	14	9	12	10
Non-youths (% of plots in households having youth members)	73	73	71	73	75
Both youths and non-youths (% of plots in households having youth members)	15	13	20	15	15
Main decision-maker(s) to farm work is(are):					
Men	84	85	82	87	81
Women	12	13	8	11	15
Both men and women	4	2	10	2	4
Youths	9	10	7	9	9
Non-youths	91	90	92	91	91
Both youths and non-youths	0	0	1	0	0
Youths (% of plots in households having youth members)	13	14	11	12	13
Non-youths (% of plots in households having youth members)	87	85	88	87	87
Both youths and non-youths (% of plots in households having youth members)	0	1	1	0	0
Number of plots	6254	2247	1406	1381	1219

Notes: Based on survey questions asked at plot level: 'Please indicate which household members worked on this plot in the last 12 months', 'When decisions are made regarding the agricultural management of plot, who is it that makes the decision?', 'Among those people, who would you say is the main decision-maker on plot?' Questions pertaining to youth involvement are analyzed both for the full sample, as well as for the sample that includes youth members only (as indicated in brackets).

**Table A.2.** Joint ownership of agricultural assets (% of households)

Asset	Solely by men (%)	Jointly (%)	Solely by women (%)	Not owned (%)
Agricultural land	18	71	5	6
Non-mechanized farm equipment (hand tools, animal-drawn plough, etc.)	4	84	6	10
Functioning smartphone or (non-smart) cell phone, laptop/tablet	N/A	N/A	N/A	N/A
Large livestock (oxen, cattle)	4	42	3	54
Small livestock (goats, pigs, sheep)	3	54	4	42
Poultry and other small animals (chickens, ducks, turkeys, pigeons)	2	25	2	72
Mechanized farm equipment (tractor-plough, power tiller, treadle pump, etc.)	0	4	0	96
Nonfarm business equipment (solar panels, sewing machine, brewing equipment, fryers)	0	23	1	76
Building or structures (including shop, warehouse)	1	36	1	62
Leisure items (TV, radio, games)	4	68	3	28
Big items for cooking and cleaning (refrigerator, cooker, stove, washing machine)	0	0	0	100
Other land not for agricultural purposes (residential or business plots)	1	48	1	50
Motorized transportation means (e.g., motorbike, car)	0	4	0	95
Non-motorized transportation means (e.g., bike)	4	32	1	64
Number of households				1815

Note: Joint ownership is defined as either of the male and female respondent of the same household reporting jointly owned the asset. In few households both the male and female respondent said they owned an asset solely, and these are classified both as solely by men and solely by women.

**Table A.3.** Productivity (1,000,000RWF/ha) of the Use Case focal crops in the plot by household type

	All		Northern		Southern		Eastern		Western						
	# obs	Mean	Median	# obs	Mean	Median	# obs	Mean	Median	# obs	Mean	Median			
All households	1778	1.96	1.19	552	2.00	1.36	386	1.69	1.03	464	1.58	1.00	376	2.71	1.69
By involvement of youth household members in crop production															
With youth involvement	817	1.97	1.15	298	2.10	1.40	157	1.55	0.99	202	1.50	0.86	160	2.81	1.83
Without youth involvement	961	1.95	1.23	254	1.89	1.28	229	1.77	1.05	262	1.64	1.09	216	2.64	1.69

Note: During the time of data collection, the average exchange rate of RWF to USD was 1180.124.

**Table A.4** Joint decisions on farming activities for the Use Case focal crops and financial services (% of households)

Make decisions on...	Number of households	Solely by M (%)	Jointly (%)	Solely by W (%)	Not applicable (%)
Crop varieties to grow	1781	3	94	3	0
Agro-inputs or agronomic practices	1781	3	93	3	0
Use of hired or household member's labor for farming	1781	3	92	4	2
Fertilizer application	1781	3	92	4	1
Take loans or borrow cash/in-kind (Conditional on household borrowing)	1345	15	74	8	2
Use of loans (Conditional on household borrowing)	1345	13	80	6	2

Note: Joint decision-making is defined as either of the male and female respondent of the same household reporting making decisions with others in the household.

**Table A.5.** Access to and decisions on financial services, by sex and region (% of respondents)

Survey questions	Northern		Southern		Eastern		Western	
	Men	Women	Men	Women	Men	Women	Men	Women
Are you or anyone in your household able to take a loan or borrow cash/in-kind if you want to?								
Yes <sup>1</sup>	85	83	80	76	83	81	78	77
Has anyone in your household taken any loans or borrowed cash/in-kind in the past 12 months?								
Yes	71	71	68	70	69	68	72	73
Did you make the decision to borrow most of the time? (Conditional on household borrowing)								
Yes	94	78***	87	81	92	72***	92	87
You make the decision about what to do with the money/ item borrowed most of the time? (Conditional on household borrowing)								
Yes	96	76***	95	87**	94	75***	95	89
Do you, either by yourself or together with someone else, currently have an account at a bank or other formal institution (e.g., post office)?								
Yes	68	64	59	57	59	57	73	65*
Do you have a mobile money account?								
Yes	80	51***	73	57***	84	65***	89	65***
Aggregate: Has access to and makes decisions on financial services (using A-WEAI cutoffs) <sup>2</sup>	84	71***	80	74	82	69**	81	79
Number of respondents	556	558	384	392	468	473	370	373

Note: Asterisks indicate significant differences between male and female respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .<sup>1</sup> We combined those who answered either “Yes” or “Maybe”;<sup>2</sup> Abbreviated Women’s Empowerment in Agriculture Index (AWEAI) indicator is considered adequate when the respondent 1) belongs to a household that used a source of credit in the past year and participated in at least one sole or joint decision about it, or 2) belongs to a household that did not use credit in the past year but could have if wanted to.

**Table A.6** Percentage of respondents, by adequacy in A-WEAI indicators by sex and region (% of respondents)

WEAI Adequacy	Northern		Southern		Eastern		Western	
	Men	Women	Men	Women	Men	Women	Men	Women
Input in productive decisions	94	93	95	94	95	91	97	96
Ownership of land and other assets	100	99*	99	99	100	99*	100	99
Access to and decisions on financial services	84	71***	80	74	82	69**	81	79
Control overuse of income	98	98	99	98	99	95*	98	99
Group membership	76	76	67	70	76	73	68	68
Number of respondents	550	552	384	392	468	473	369	372

Note: Asterisks indicate significant differences between male and female respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

**Table A.7** Percentage of respondents, by adequacy in A-WEAI indicators by age group and region (% of respondents)

WEAI Adequacy	Northern		Southern		Eastern		Western	
	Youths	Non-youths	Youths	Non-youths	Youths	Non-youths	Youths	Non-youths
Input in productive decisions	92	94	88	95*	86	95	95	97
Ownership of land and other assets	98	100	98	99	98	100	98	100
Access to and decisions on financial services	80	77	65	79*	73	76	67	82*
Control overuse of income	94	99*	97	99	91	98	94	99
Group membership	77	76	64	69	74	75	58	70
Number of respondents	199	903	117	659	149	792	121	620

Note: Asterisks indicate significant differences between youth and non-youth respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

**Table A.8.** Agreement with the statements in favor of gender equality by sex and region (% of respondents)

Statement	Northern		Southern		Eastern		Western	
	Men Agree	Women Agree	Men Agree	Women Agree	Men Agree	Women Agree	Men Agree	Women Agree
It is ok for women to interact with male extension agents	94	91*	100	97*	93	92	94	93
It is ok for women to participate in agricultural extension trainings or activities	95	94	100	98	95	96	95	93
It is ok for women to use information and communication technology (e.g. mobile phones, internet, Facebook, apps ...)	95	93	98	97	94	95	93	93
Women should be encouraged and supported as farmers	96	94	99	98	94	93	92	92
It is equally important to improve productivity on women's plots as it is on men's plots	59	57	57	55	52	55	58	57
It is ok for women to be primarily the ones who cultivate crops	72	75	68	65	61	62	70	66
It is ok for women to engage in agricultural marketing activities/trade at the market	93	92	98	98	92	94	91	90
It is ok for women to be the primary income earners for their families	69	68	63	66	58	60	66	67
Women should be encouraged to be owners and managers of non-farm businesses	92	92	96	96	94	93	91	91
Husbands should help wives with household chores, like cooking and taking care of children	89	85	98	97	89	84	92	90
Number of respondents	550	552	384	392	468	473	369	372

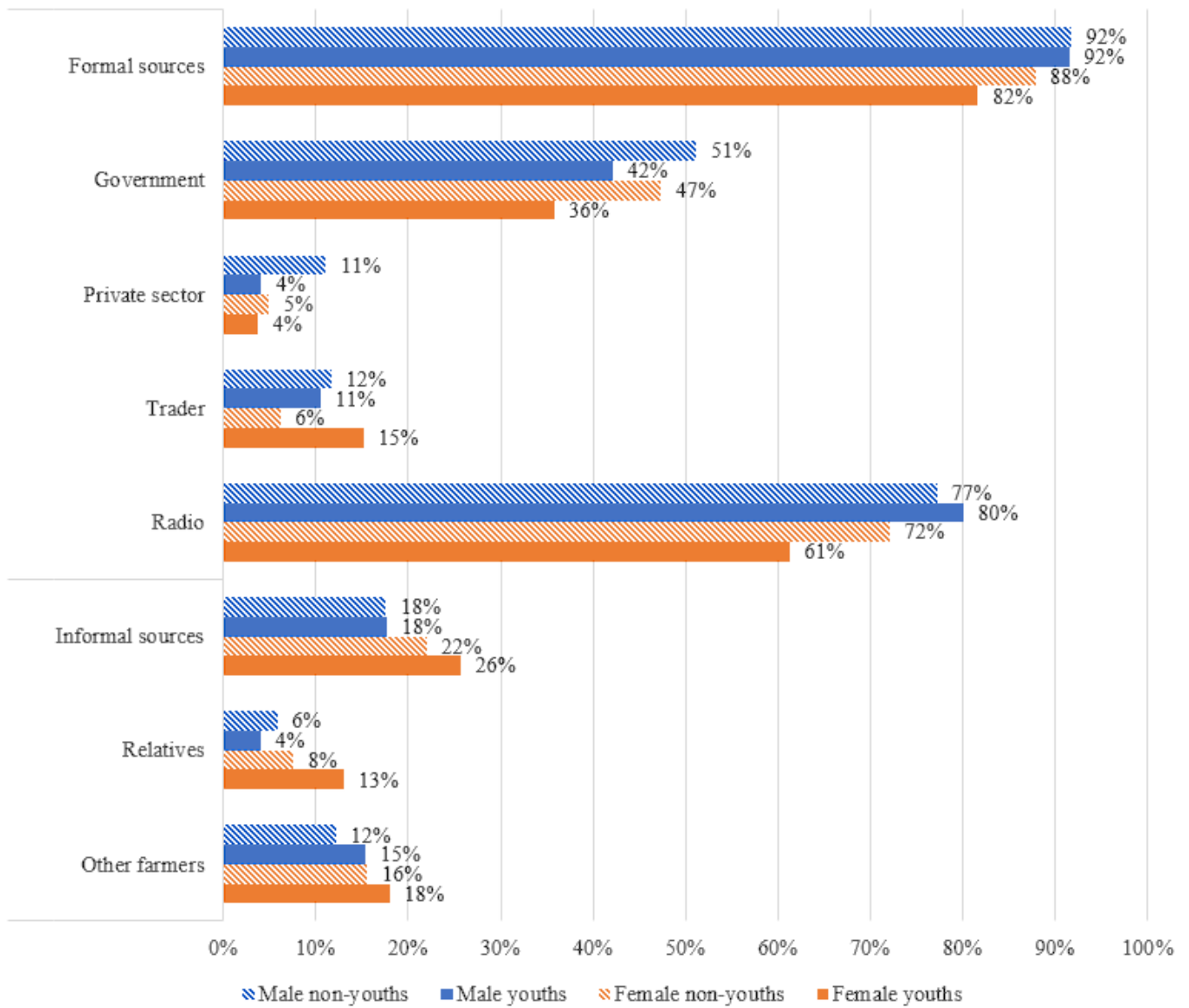
Note: Agree includes both respondents who indicated agree or strongly agree. Asterisks indicate significant differences between male and female respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

**Table A.9.** Agreement with the statements in favor of gender equality by age group and region (% of respondents)

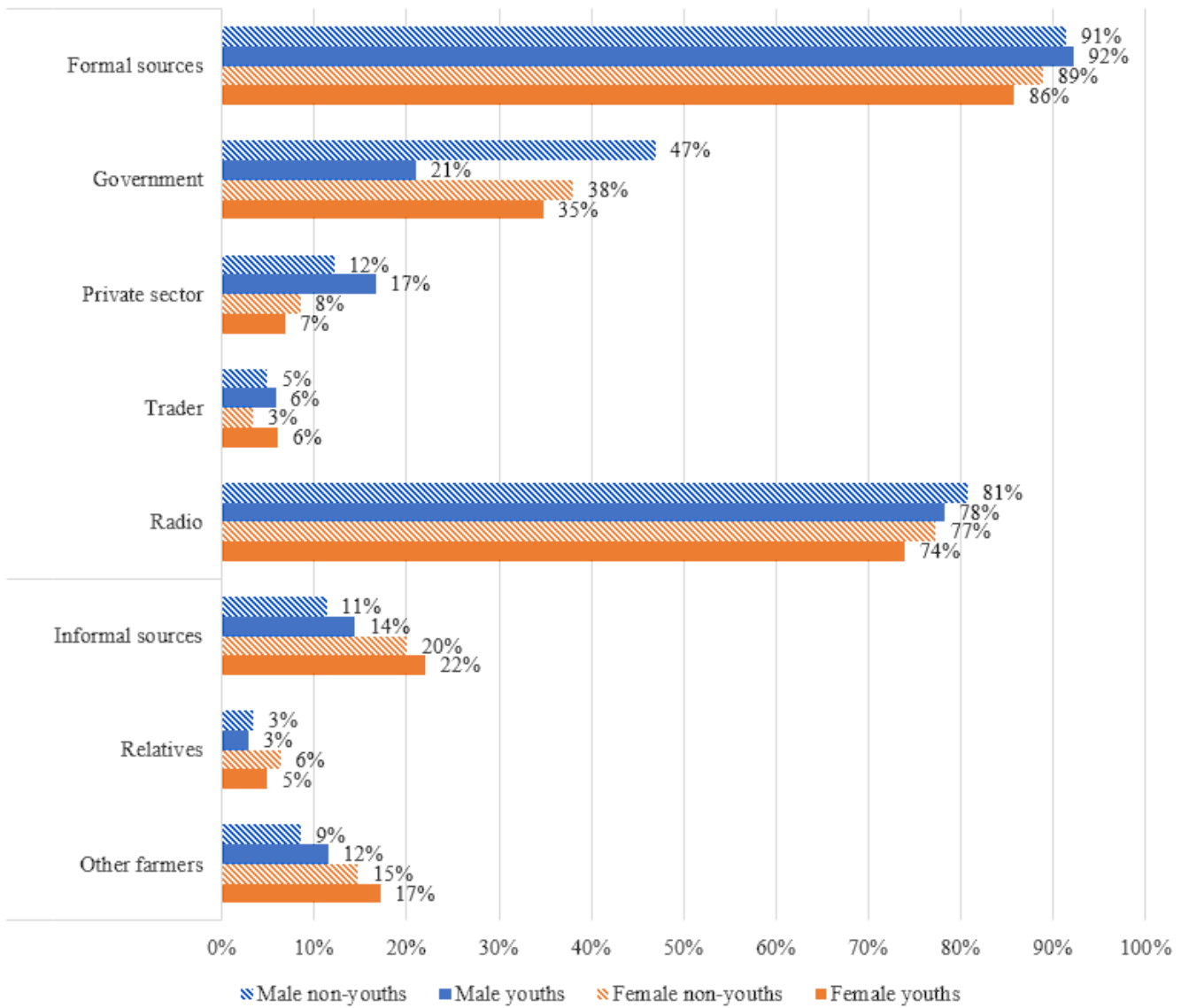
Statement	Northern		Southern		Eastern		Western	
	Youths Agree	Non-youths Agree	Youths Agree	Non-youths Agree	Youths Agree	Non-youths Agree	Youths Agree	Non-youths Agree
It is ok for women to interact with male extension agents	94	92	99	98	94	92	96	93
It is ok for women to participate in agricultural extension trainings or activities	95	94	99	99	93	96	97	94*
It is ok for women to use information and communication technology (e.g. mobile phones, internet, Facebook, apps ...)	94	94	98	98	93	95	94	93
Women should be encouraged and supported as farmers	95	95	97	99	94	93	90	93
It is equally important to improve productivity on women's plots as it is on men's plots	59	58	57	56	62	52	57	57
It is ok for women to be primarily the ones who cultivate crops	71	74	58	68	63	61	67	68
It is ok for women to engage in agricultural marketing activities/ trade at the market	92	92	100	98***	93	93	95	90*
It is ok for women to be the primary income earners for their families	64	69	52	66*	64	58	63	67
Women should be encouraged to be owners and managers of non-farm businesses	94	92	95	96	94	93	94	90
Husbands should help wives with household chores, like cooking and taking care of children	90	86	97	97	80	88	95	90*
Number of respondents	199	903	117	659	149	792	121	620

Note: Agree includes both respondents who indicated agree or strongly agree. Asterisks indicate significant differences between youth and non-youth respondents at \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$ .

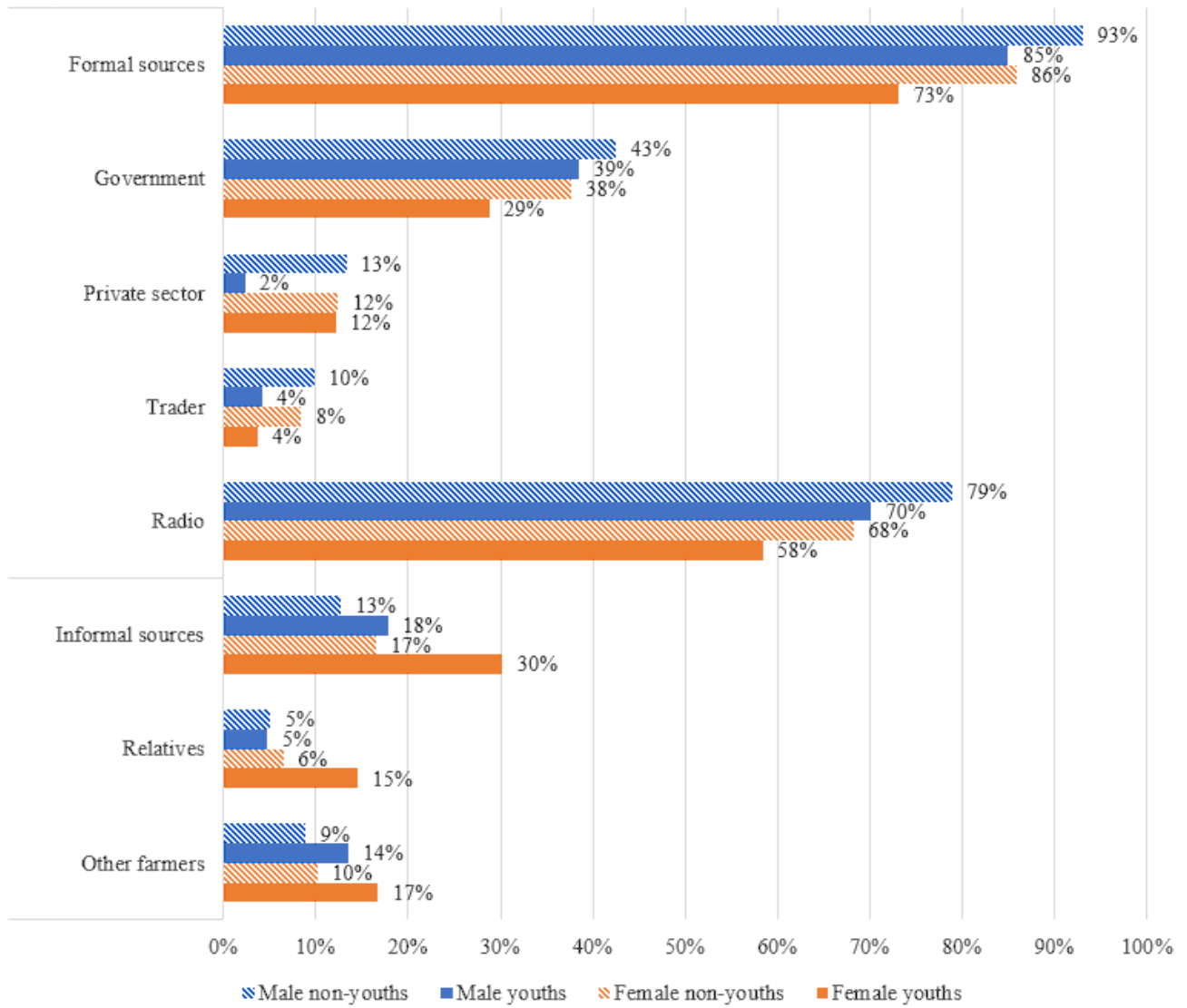




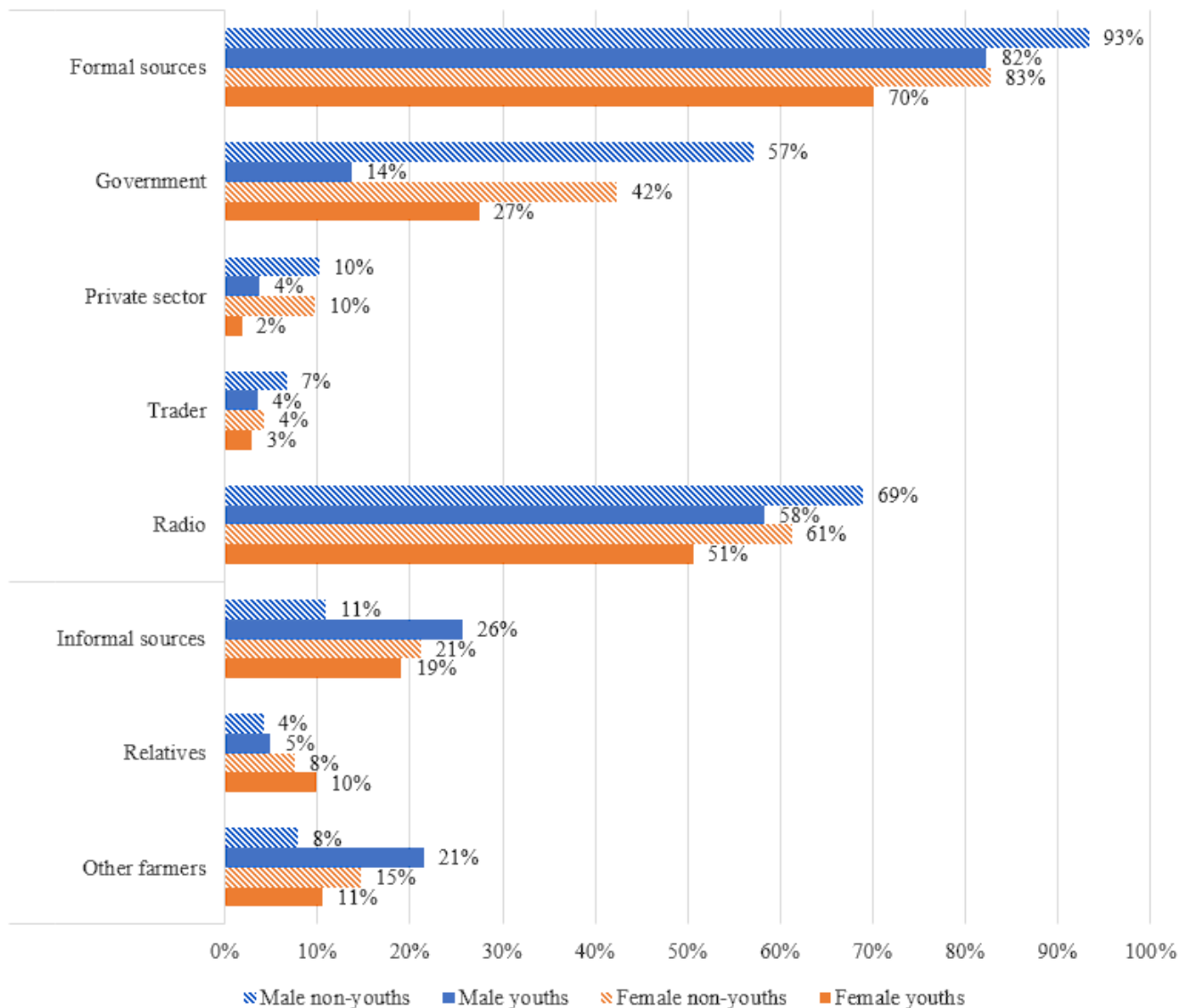
**Figure A.1.** Primary sources of agricultural advice, by sex and age group (% of respondents, Northern Province)



**Figure A.2.** Primary sources of agricultural advice, by sex and age group (% of respondents, Southern Province)



**Figure A.3.** Primary sources of agricultural advice, by sex and age group (% of respondents, Eastern Province)



**Figure A.4.** Primary sources of agricultural advice, by sex and age group (% of respondents, Western Province)  
 Note: Graph does not show sources of advice used by less than 5 percent of respondents: farmer association, TV, social media, and agricultural apps. Sources were aggregated into two categories: formal sources (including government, private sector, traders, farmer associations, radio, TV, social media, and APPs), and informal sources (relatives and other farmers). The details of the primary sources of information include: a) Government: government extension agent, b) Private sector: private sector extension agent, c) Trader: traders, input suppliers, d) Farmer Association: farmer association/cooperatives, e) Relatives: relatives/family, f) Other farmers: farmers not already captured, g) Radio, h) TV, i) Social media: Wechat, Facebook, WhatsApp, Twitter, Instagram, etc., j) APP: Agricultural or weather Apps.