

Gender Gaps in Agriculture Productivity and Public Spending in Nigeria

NIGERIA GENDER INNOVATION LAB¹

KEY MESSAGES

- Women farmers produce 30 percent less per hectare than their male counterparts.
- Among various factors, there are three key drivers of gender gaps in agriculture productivity in Nigeria: women use fewer inputs and have limited participation in extension services, farm less-valuable crops, and hire less productive labor.
- The four value chains receiving the largest budget allocations are among those with the lowest participation of women farmers.
- These gaps can be closed via adjustments at fundamental stages of budget allocation and policy formulation, such as the following:
 - » Increasing spending on direct provision of physical inputs and training to women farmers via reallocation of any inefficient spending under other budget headers
 - » Increasing the budget allocated toward agriculture extension services designed to meet women farmers' information, input, and market needs
 - » Identifying innovative solutions and organizations for public-private partnerships to increase women's access to markets
 - » Targeting more funds to incentivize women to cross over to high-value crops
 - » Investing in gender-disaggregated data collection, especially budget and expenditure data, to facilitate analytics and evidence-based policy making



"Harvesting cassava root" by Milo Mitchell/IFPRI



photo credit: Olubukola Olayiwola / World Bank

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1 - Women's Participation in Agriculture

In Nigeria, 20 percent of the workforce is engaged in the agriculture sector, and the sector is characterized by low female participation. Women are 10 percent less likely to work in the agricultural sector than men (World Bank 2022). Compounding on and contributing to women's lower participation, women are 25 percent less likely to be primary plot managers (i.e., persons primarily responsible for making decisions for the plot) than their male counterparts, and among women who do manage plots, they produce less per hectare than male plot managers do. Nationally, women plot managers produce 30% less than their male counterparts, while regionally, women plot managers in the North produce 35% less, and women plot managers in the South produce 25% less than male plot managers (World Bank 2022). Women's low participation and productivity in the agricultural sector come at a high economic cost to Nigeria. As per findings from a Gender Diagnostic analysis conducted by the Nigeria Gender Innovation Lab (NiGIL)—using the 2018–19 Nigeria General Household Survey (GHS)—it is found that the forgone earnings resulting from the gender gap in agricultural productivity are 0.6 percent of the total gross domestic product (GDP), or US\$2.3 billion annually (World Bank 2022). Further, accounting for GDP multipliers, closing the gender gap in agriculture could represent a total annual increase of up to 2 percent of the GDP, approximately US\$8.1 billion (World Bank 2022). Thus, it is imperative for Nigeria to target investments toward boosting women farmers' participation and productivity to capitalize on the potential economic gains.

While multiple factors contribute to gender gaps, three key factors emerge which are salient for women's lower productivity, as per findings from the Nigeria Gender Diagnostic, namely (i) limited use of inputs such as fertilizer and herbicides, (ii) engagement in less valuable crop value chains, and (iii) use of less productive farm labor (World Bank and ONE Campaign 2014). Among various policy solutions, one fundamental and essential step to close the gender gap in the agriculture sector in Nigeria is to adopt gender-equitable budgeting and create fiscal space to address the drivers of the aforementioned productivity gaps.

This technical note aims to analyze the gender dimensions of participation, input distribution, and budget allocation across various crop value chains supported by the Federal Ministry of Agriculture and Rural Development (FMARD). Specifically, the underlying analysis aims to (i) examine women's participation in the crop value chains for which FMARD provides input support; (ii) quantify the gender gaps in agricultural input use, extension services, and labor productivity; (iii) examine women's participation and inputs use against budget allocations; and (iv) thereby, formulate recommendations for increasing fiscal space and investments to close the agricultural gender productivity gaps in Nigeria.



photo credit: Arne Hoel / World Bank

DESCRIPTION OF DATA

This technical note utilizes two data sources, FMARD budget data and 2018–19 Nigeria GHS data. The analysis in this note focuses on crops for which we have data from GHS and the Budget Office.

Budget data provided by the Budget Office of the Federation, Government of Nigeria include (i) macro-level budget appropriations to value chain development from 2016 to 2020, (ii) youth and gender extension programming that provides inputs and training, and (iii) gender-disaggregated input distribution within priority value chains. The macro-level budget appropriations provide a macro view of budget appropriations by crop value chain, yet cannot be directly correlated with the micro input provision data. As such, the macro- and micro-level analyses are conducted and presented separately. Additionally, the extension programming budget data are incomplete. Seemingly only training programs that explicitly target women and youth were included and, for the most part, were not gender disaggregated. To conduct a thorough gender analysis of extension programming, gender-disaggregated data would be required for all extension programming funded by FMARD. Finally, additional data providing a comprehensive understanding of spending on input provision would deepen this analysis and its interpretation.

Survey data from the 2018–19 wave of the Nigeria General Household Survey (GHS) conducted by the National Bureau of Statistics (NBS) represent a nationally representative data set of 5,922 plots managed by 2,852 plot managers, of whom 21 percent are women (37 percent in the South and 9 percent in the North). GHS data analysis is conducted at the plot level and focuses on gender gaps between female and male plot managers. The GHS data includes data from postplanting and postharvest stages of the agricultural cycle, encapsulating household characteristics, labor and time use, plot and crop information, and input use. The GHS data can shed light on women plot managers' participation in value chains and quantifies gender gaps in productivity and input use. Findings from the GHS survey are layered over the budget data provided by the Budget Office to identify gaps and opportunities in public spending and provide recommendations for directing investment toward closing the gender gap in agricultural productivity. Details on specific measures and indicators can be found in the appendix.

Gender Gaps in Farm Participation

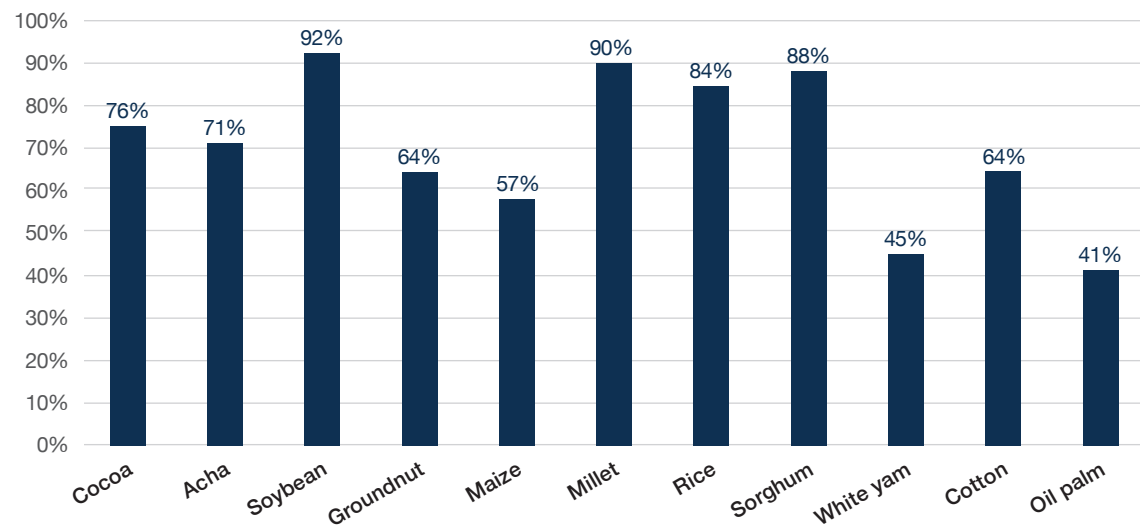
The GHS data analysis depicts gender gaps at all levels of farm participation. This analysis is focused on the 21 percent of primary plot managers who are women and identifies trends in their agricultural participation. There are consistent differences between male and female plot managers and their engagement in crop value chains. Differences in the household characteristics of women plot managers are essential to understanding the constraints to agricultural productivity that women plot managers face. Women plot managers live in houses with, on average, 0.64 fewer adults than their male counterparts; most are either widowed, separated, or divorced. In contrast, nearly all male plot managers are married. On average, women plot managers are four years older and 13 percentage points less likely to have attended school than male plot managers.

The gender gap in farm participation across various crop value chains is measured using the proportion of plots managed by women versus men cultivating specified crops. This analysis includes only those crop value chains supported by FMARD through budget allocation rather than all crops included in the GHS data set or all crops sold in markets. The analysis is organized by crop value (value per kg before processing). Based on GHS data, returns to production are highest among cocoa, acha, and soybean and lowest in the oil palm nut, creating the basis of our high-value and low-value description of crops in this note. Hence, this analysis will reflect certain crops that are high value after processing, such as oil palm, at a lower value. Cocoa and oil palm differ from the rest as plantation or permanent crops, meaning that they are harvested from the same plant for many seasons rather than planted annually, like arable crops. The smallest gender gaps are among the least valuable crops, such as oil palm and white yam (figure 1.1). Women primarily grow staple food crops, while men engage more in cash crops. For example, women plot managers are 38 percentage points more likely to farm roots and tuber crops, many of which are lower in value, and 19 percentage points less likely than male farmers to cultivate cereals, which are higher in value (World Bank 2022). Women's limited access to labor, labor-saving machinery, extension services, and ability to travel contribute to their participation in less valuable crops (World Bank 2022). Several high-value crops, such as

cocoa, also require up-front investments. Due to limited access to credit and finances, women farmers often cannot make targeted investments at the appropriate time of the agricultural cycle. Additionally, crop choices may be influenced by gender differences in risk preference around crops traditionally cultivated by men and associated with higher risk due to their higher value and up-front investment (World Bank 2022).

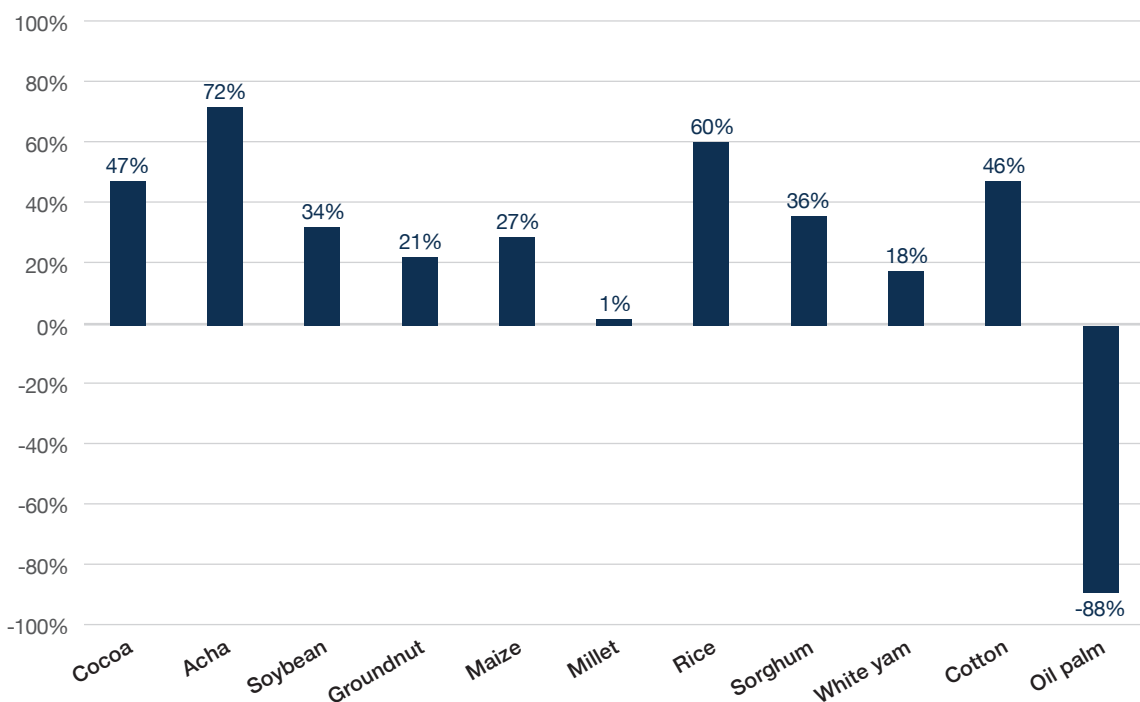
Figure 1.2 depicts the gender gap in yield. With the exceptions of rice, acha, and cotton, which all spike upward, the gender gaps in yield decrease as the crop value decreases. The relatively higher participation of women in less valuable crop value chains, such as white yam and oil palm (figure 1.1), and their lower productivity in more valuable value chains (figure 1.2) demonstrates gender segregation by crops, likely contributing to gender differences in earnings in the Nigerian agricultural sector. Some gender differences may also exist at different stages of production. For example, processing oil palm yields a higher return than harvesting. The negative gender gap in yields within oil palm compared to a similar plantation or permanent crop, such as cocoa, may be connected to women's concentration in the processing stage of the value chain. Women dominate oil palm processing and usually lease oil palm plantations for a fee. This form of backward integration, occupying the processing stage of the value chain, may explain why women are more productive in the oil palm value chain.

Figure 1.1 - Gender gap in value chain participation



Note: The gender gap in value chain participation is the difference between the share of plots managed by men and women that harvest a particular crop. The crops are listed by value/kg prior to processing, in descending order.

Figure 1.2 - Gender gap in yield



Note: The gender gap in yield is the difference between men's and women's harvest value/hectare. In descending order, the crops are listed by value/kg before processing.

2 - Gender Gaps in the Use of Agricultural Inputs

Low input use among women managing crop cultivation is one of the contributing factors, among others, to women's lower agricultural productivity. This note focuses on three critical aspects of input use: (i) use of physical inputs such as fertilizer, pesticides, and certified seeds; (ii) participation in extension services, which increase awareness of and access to inputs; and (iii) use of labor. Women face myriad constraints in accessing and using farm inputs, such as restrictive gender norms, limited resources to purchase inputs, and unequal distribution of information and resources between men and women within and between households (World Bank 2022).

2.1 Physical Input Use

Increasing the use of physical inputs is critical to increasing agricultural productivity. On average, doubling the quantities of fertilizer and herbicide used increases agricultural productivity by 6 percent and 18 percent, respectively (World Bank 2022). Additionally, regional evidence indicates that the provision of certified and improved seeds, coupled with information, can increase seed adoption and yields of farmers (Quarshie, Abdulai, and Fraser 2021; IFPRI 2022; World Bank 2022). There are substantial costs to not using adequate physical inputs, including lower yields, lower ability to scale production or transition to market-based produce, and increased risk of producing crops with unsafe contaminant levels, such as aflatoxin, due to using uncertified seeds, which are considered to be less safe. Critically, a result of women using fewer physical inputs than men is that the gender productivity gap widens as men adopt inputs at a greater rate than women.



"This road in Obudu, Nigeria weaves back and forth up the steep mountainside." by ©IFPRI/Ian Masias

Fertilizer

The use of fertilizer and the amount used vary significantly by region. Nationally, 25 percent of women plot managers and 47 percent of male plot managers report using any fertilizer on their plots, yielding a gender gap of 22 percentage points (figure 2.1).² The national average obscures some regional disparities. Notably, fertilizer use is higher among women farmers than their male counterparts in Southern Nigeria, as women use 34 percent more fertilizer per hectare and slightly more women plot managers than men use any fertilizer. Further, these gaps are wider when considering the quantity of fertilizer used (in kilograms). Nationally, men use an average of 87 percent more fertilizer (kg/ha) than women plot managers; again, gender gaps are wider in the North.

As depicted in figure 2.2, for most value chains, the gender gap in the quantity of fertilizer used is larger and varies more by crop than the gender gap in fertilizer use. The gender gap concerning fertilizer use and quantity of fertilizer used is among the highest for maize. White yam is an exception to this trend; despite fewer women who cultivate white yam using fertilizer, those who do use more per hectare than male plot managers. Notably, the smaller gender gaps in fertilizer use among the millet (-2 percent) and white yam (6 percent) value chains likely contribute to those crops having some of the smallest gender yield gaps (figure 1.2).

² The tree crops, cocoa, and oil palm are excluded from this fertilizer use analysis as fertilizer is only used at the time of planting for these tree crops, while fertilizer use for arable crops is annual.

Figure 2.1 - Regional gender gaps in the use of fertilizer

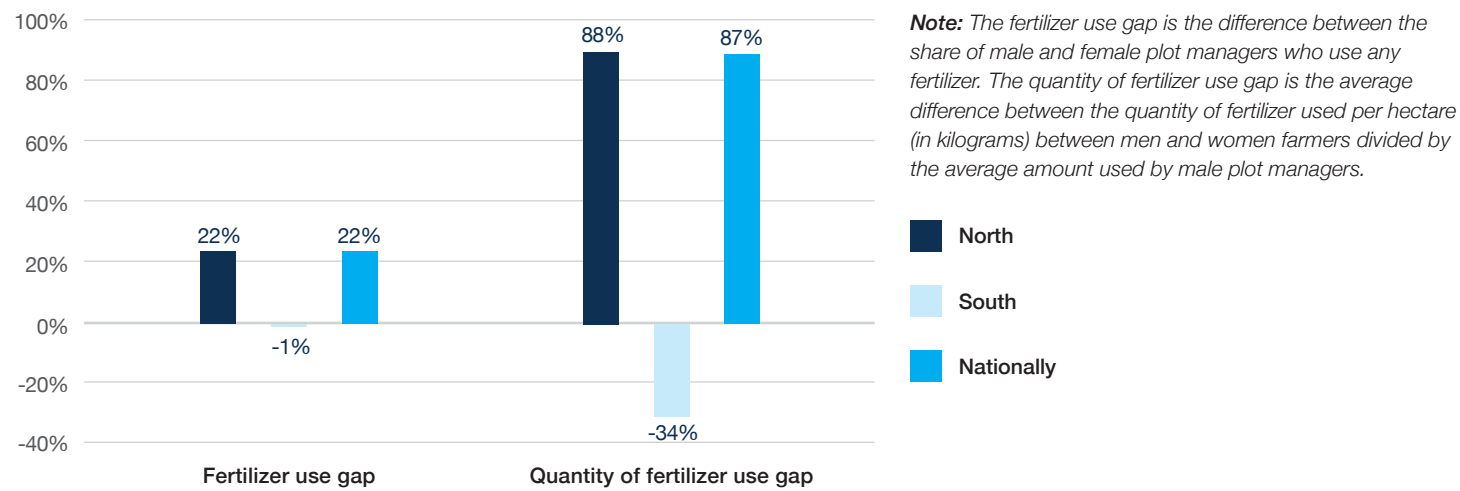
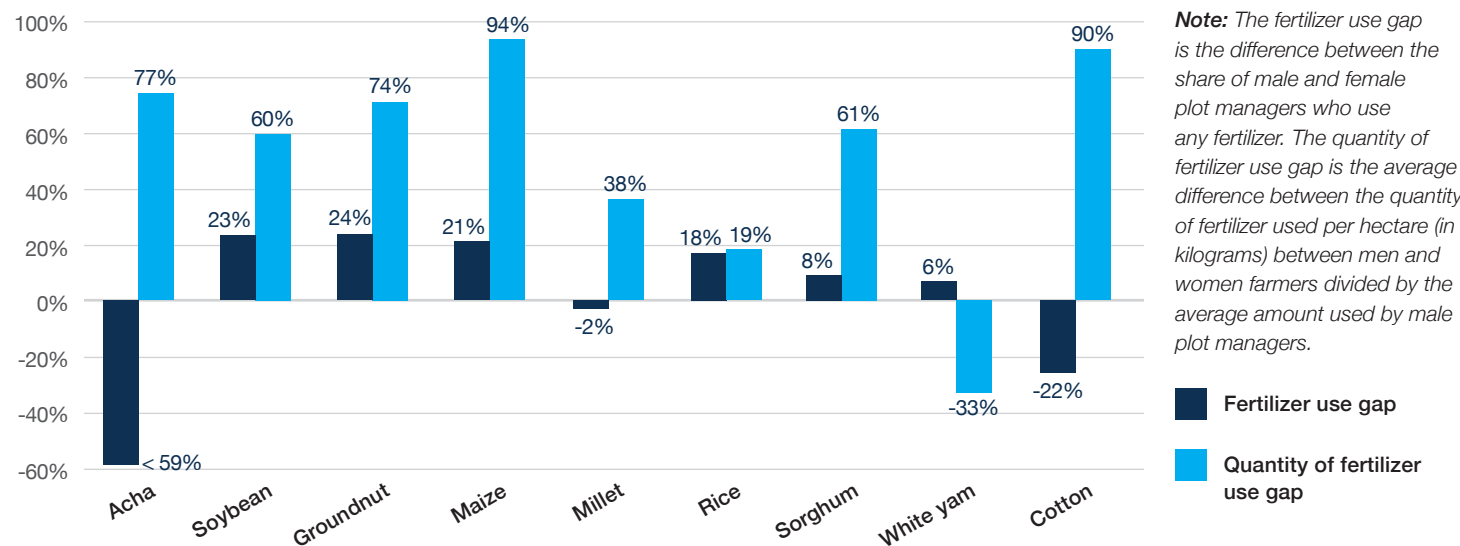


Figure 2.2 - Gender gaps in the use of fertilizer



Pesticides

Nationally, 5 percent of female plot managers and 15 percent of male plot managers report using pesticides on their plots, yielding a gender gap of 10 percentage points. Like fertilizer use, the gendered use of pesticides varies significantly between the Northern and Southern regions of the country (figure 2.3). Gender gaps are significantly wider regarding the quantity of pesticide used per hectare (in kilograms). On average, men use over eight times as much pesticide per hectare as women plot managers.

As depicted in figure 2.4, despite smaller gender gaps in pesticide use (1–10 percentage points for most value chains), the quantity of pesticide used by female farmers is substantially lower than that used by their male counterparts (in the range of 20 percent to 100 percent). The maize value chain is a good example of this trend, with a pesticide use gap of 9 percentage points and women using 95 percent less pesticide per hectare than men. Similarly, 7 percent of women plot managers use pesticides in the groundnut value chain, and the average quantity used is 0.2 kg/ha. In comparison, 16 percent of male plot managers use pesticides, and the average amount men use is 0.56 kg/ha. Cocoa is the only crop in which more women plot managers (83 percent) than men (65 percent) use pesticides, resulting in a -18 percentage point gender gap.

Figure 2.3 - Regional gender gaps in pesticide use

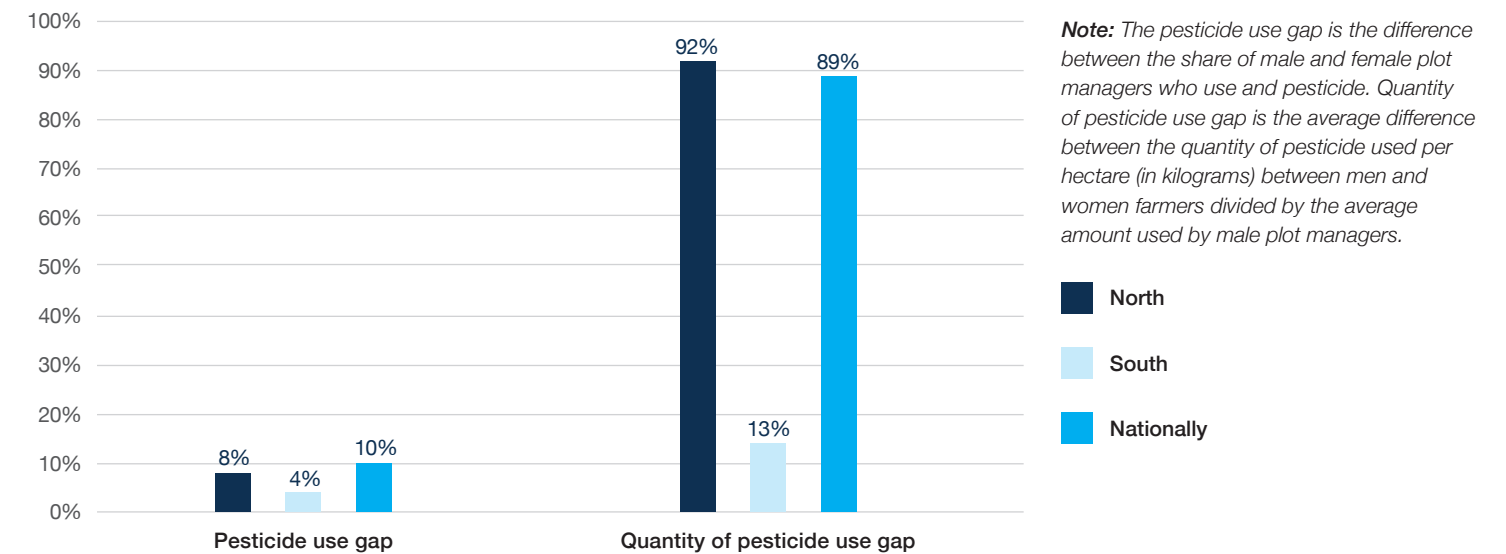
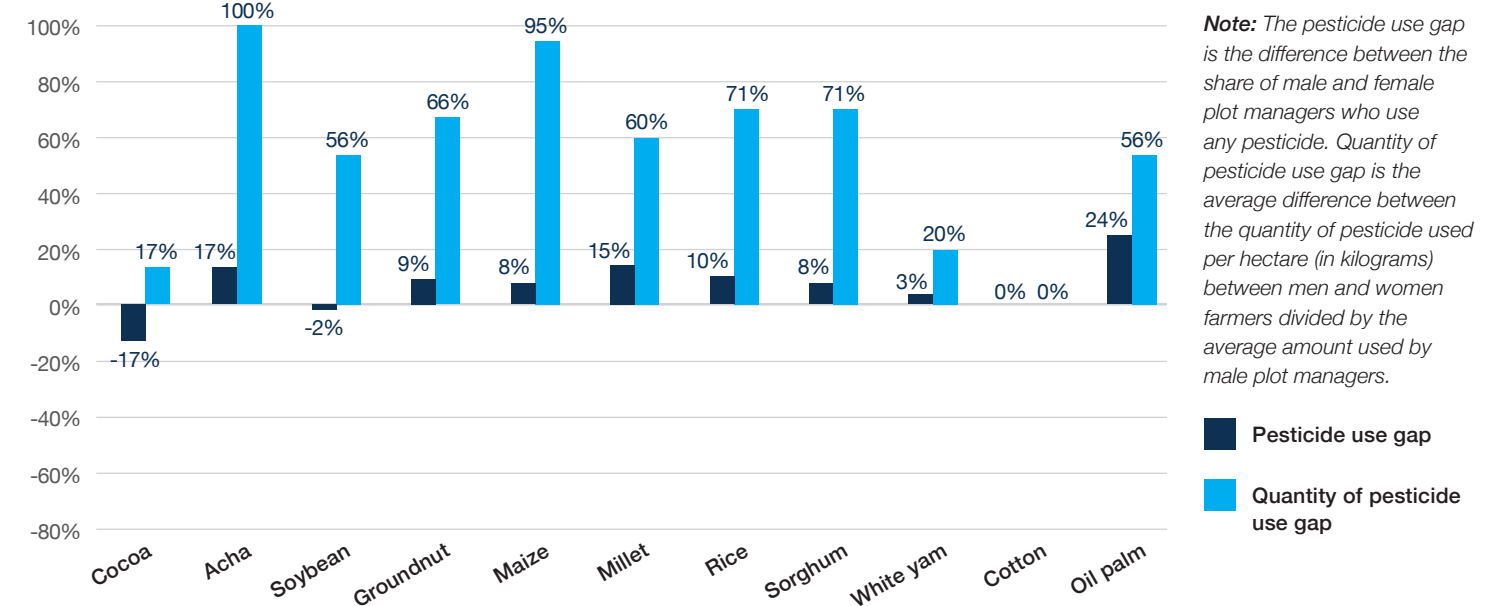


Figure 2.4 - Pesticide use gaps

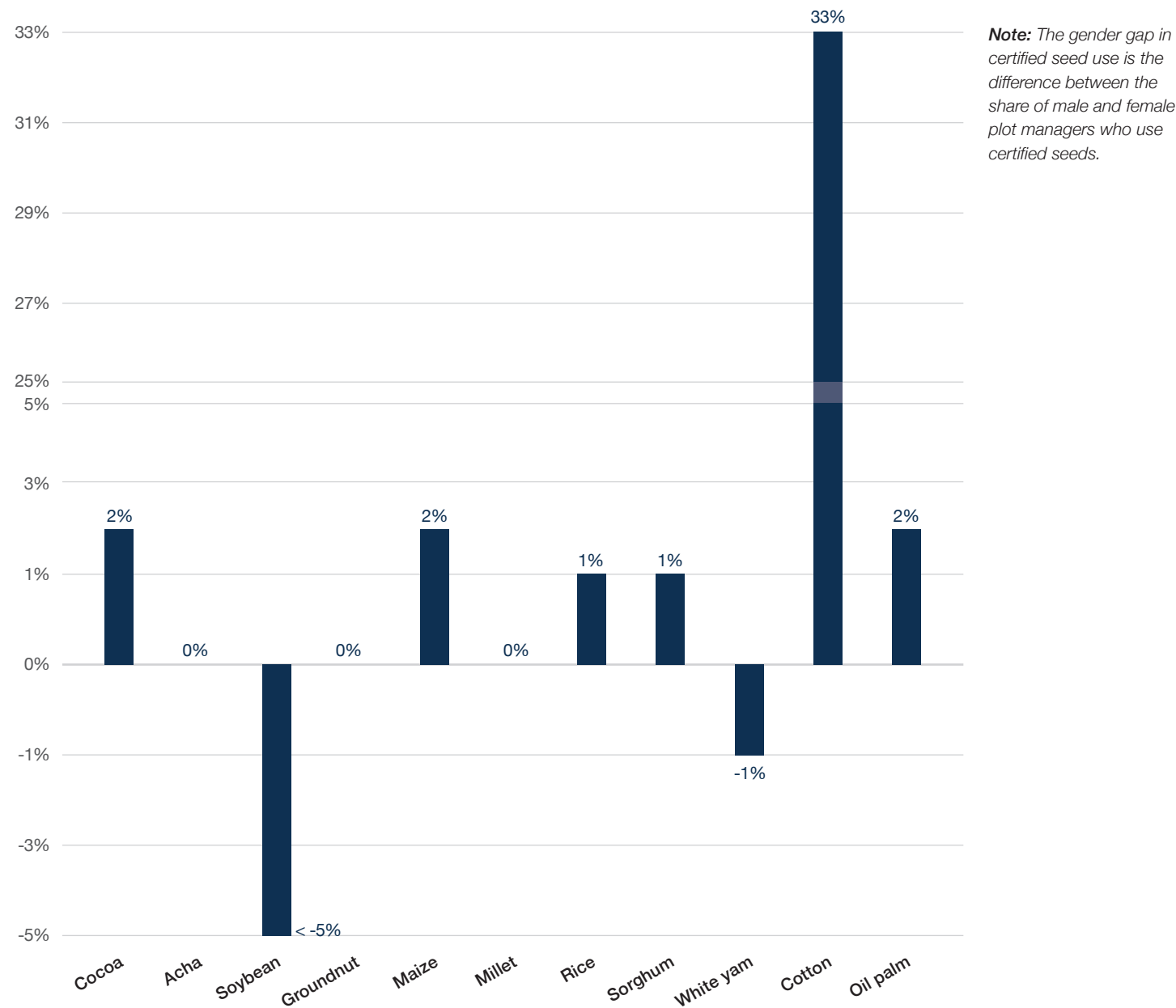


Certified Seeds

Nationally, 10 percent of female plot managers and 7.5 percent of male plot managers report using certified seeds on their plots, yielding a gender gap of -2.5 percentage points.³ The small reverse gender gap in certified seed use reflects how few men and women plot managers use certified seeds rather than depicting a significant uptake among women farmers compared to fertilizer or pesticides. Unlike other physical inputs, the gender gaps in the use of certified seeds generally do not vary much by the value of crops (see figure 2.5). Cotton is a noteworthy exception to the trend of low uptake and small gender gaps. Thirty-three percent of male plot managers who farm cotton used certified seeds, while none of the women plot managers in the sample reported doing so, creating a gender gap of 33 percentage points. Notably, the negative gender gap in the soybean value chain results from more women plot managers using certified seeds than men. Ten percent of women plot managers who cultivate soybeans used certified seeds, while just under 5 percent of male plot managers did so.

³ The tree crops, cocoa, and oil palm are excluded from this certified seed use analysis as seeds are only used at the time of planting for these tree crops, while seeds are used on an annual basis for arable crops.

Figure 2.5 - Gender gaps in certified seed use



Mechanization Use

Like certified seeds, the use of mechanization on agricultural plots in Nigeria is low regardless of gender. Only 9 percent of plot managers report using machines and tools, of which fewer women plot managers (3.3 percent) use mechanization than men (10.4 percent). As with other inputs, the gender gap is smaller in the South, where 6 percent of men and 2 percent of women use mechanization, than in the North, where 12 percent of men and 5 percent of women plot managers use mechanization on their plots. As a result of such low usage rates, the gender gaps appear relatively small, even though nationally, three times as many male plot managers as female plot managers use machines (figure 2.6).

The variation of gender gaps in mechanization across value chains is likely influenced by how labor-intensive crop production is. For example, acha has no gender gap because no men or women cultivating acha reported using any mechanization on their plot. The gender gap for groundnuts is the lowest after acha, as just over 9 percent of women plot managers and 11 percent of men plot managers used any mechanization. The largest gender gaps are found in cotton and rice, as 44 percent of male plot managers cultivating cotton and 19 percent of male plot managers cultivating rice used mechanization on their plots, while no women plot managers who produced either crop used mechanization (figure 2.7). The gender gap in technology may be linked to women having less access to capital to buy or hire equipment and machinery, less control over household agricultural assets, being less likely to purchase mechanization thought to be inappropriate for women in areas with restrictive gender norms, and the fact that mechanization technologies are frequently designed with the physical build of a man in mind, requiring significant additional physical effort to maneuver by women (FAO and AUC 2019; Njuki et al. 2014; UN Women, UNDP, UNEP, and the World Bank Group 2015).

Figure 2.6 - Gender gaps in the use of mechanization

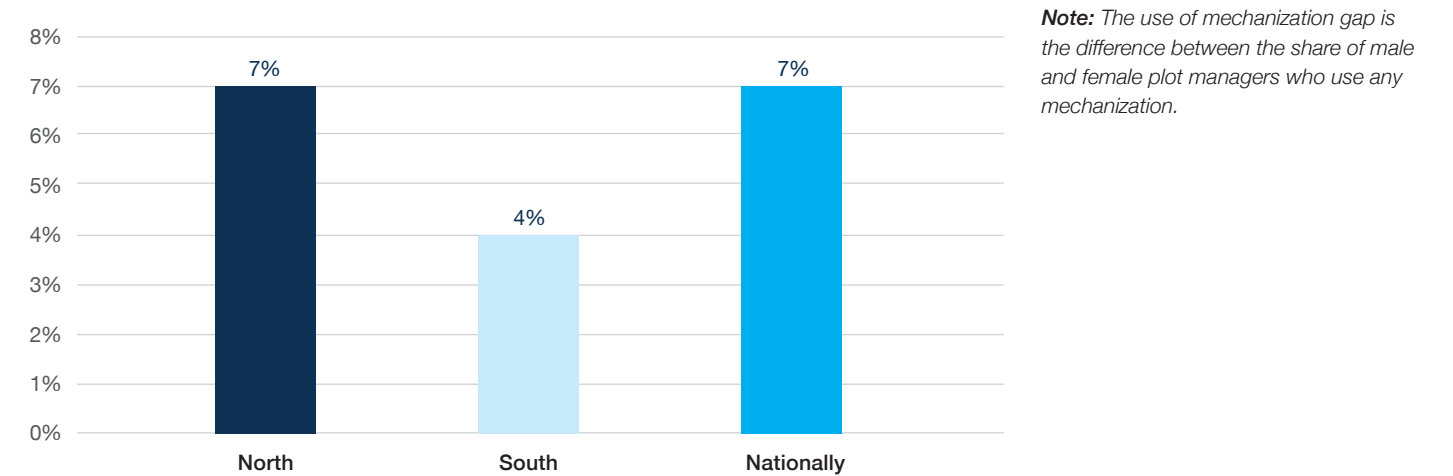
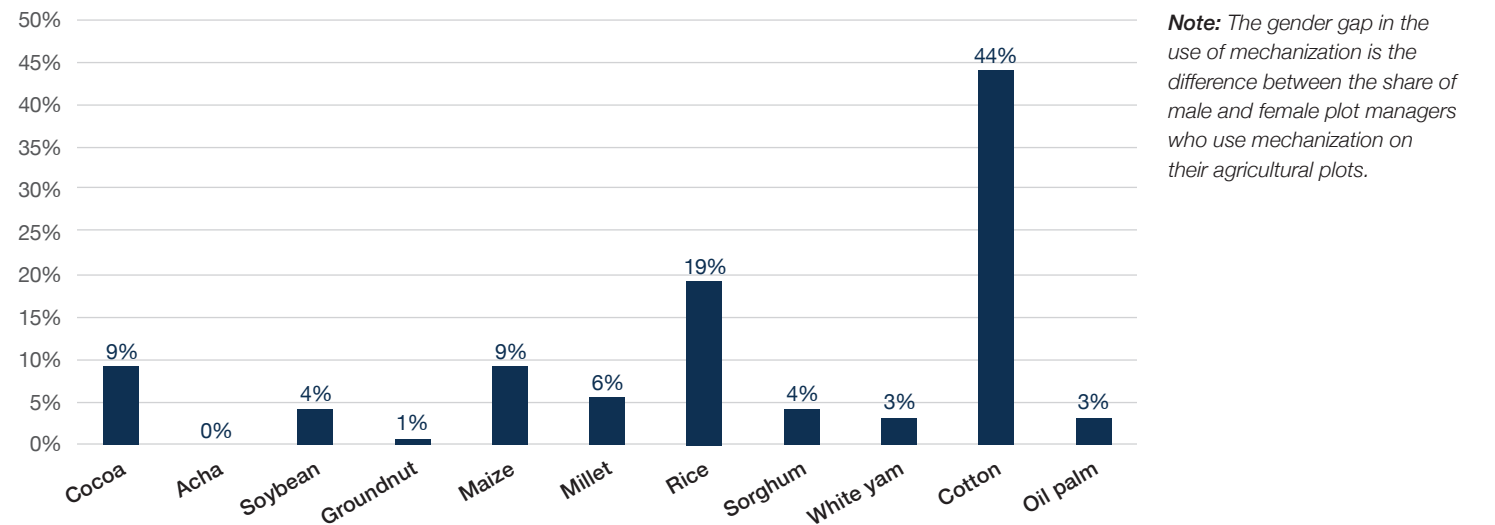


Figure 2.7 - Gender gaps in the use of mechanization



2.2 Gender Gaps in Extension Services

Extension services are a powerful mechanism for introducing farmers to and training them in new techniques, sharing market information, and providing access to agricultural inputs, such as fertilizer, pesticides, and certified and improved seeds. Information sharing is especially critical for the uptake and efficient use of agricultural inputs, which can, in turn, improve agricultural yields and impact crop choice.

We analyze participation in extension services of plot managers and their households. The distinction between plot managers and households is pertinent as evidence shows women's direct involvement in extension services increases their knowledge, decision-making, and agricultural outcomes compared with women who depend on receiving information from a male household member (Lecoutere, Spielman, and Van Campenhout 2020). Additionally, inequitable intra-household resource allocation between male- and female-managed plots is a potential constraint to women's use of inputs and could be compounded by women not receiving the inputs or information directly (Doss 2001).

The analysis focuses on extension services during the planting season when they most impact decision-making and input use. Nationally, there is a 9 percentage point gender gap in direct participation in extension services, driven by women's low participation rates in the North. Seventeen percent of male plot managers' households received extension training during the planting season, nearly all of whom were direct recipients. In contrast, only 11 percent of women plot managers' households received extension services, of whom only 8 percent were direct recipients, yielding a gap of 6 percentage points (figure 2.8). It is also worth acknowledging that only 1.5 percent of female and 5 percent of male plot managers' households received extension training during the harvest season. The unequal participation in extension services is especially critical in Northern Nigeria, where fewer than 6 percent of women plot managers participated directly in extension services during the planting season, compared to 20 percent of men (World Bank 2022). The participation gap in extension services is a driver of the gender productivity gap in the North. Plot managers who participated in extension services in the North within the last year experienced 18 percent higher productivity than those who did not (World Bank 2022). Across crops analyzed in this report (and supported by FMARD), most plot managers, irrespective of gender, did not receive extension services.⁴ While overall participation is low among plot managers receiving extension services, significant gender gaps exist. The gender gap for direct participation in extension services is greater than or equal to that of household participation, indicating that women are disadvantaged in their ability to benefit from extension services directly or indirectly (figure 2.9). Such low participation among women plot managers may be due to (i) current extension services focusing on crops predominantly cultivated by men; (ii) social norms preventing women from interacting with men outside their communities or families, while most extension workers are men, precluding women from participating; or (iii) current outreach activities skewed in favor of male social networks (World Bank 2022).

⁴ Analysis of extension services was not limited to those offered by FMARD but rather focused on whether the plot manager received any services, regardless of funding or organization.

Figure 2.8 - Gender gaps in participation in extension services

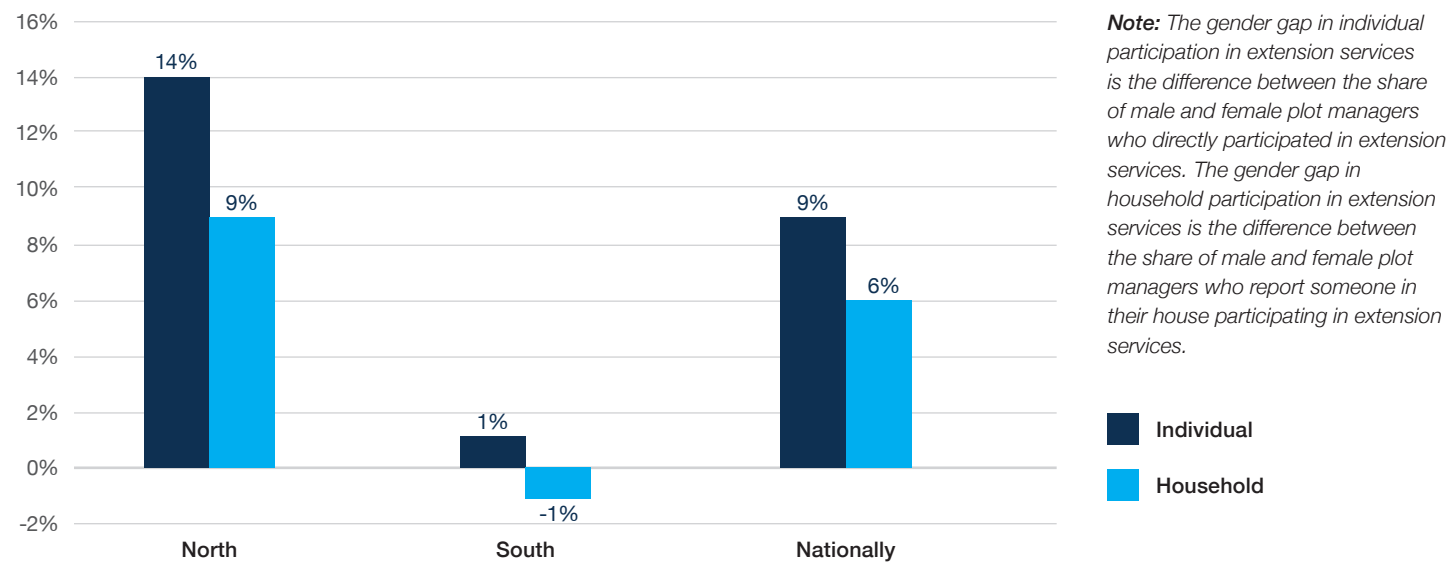
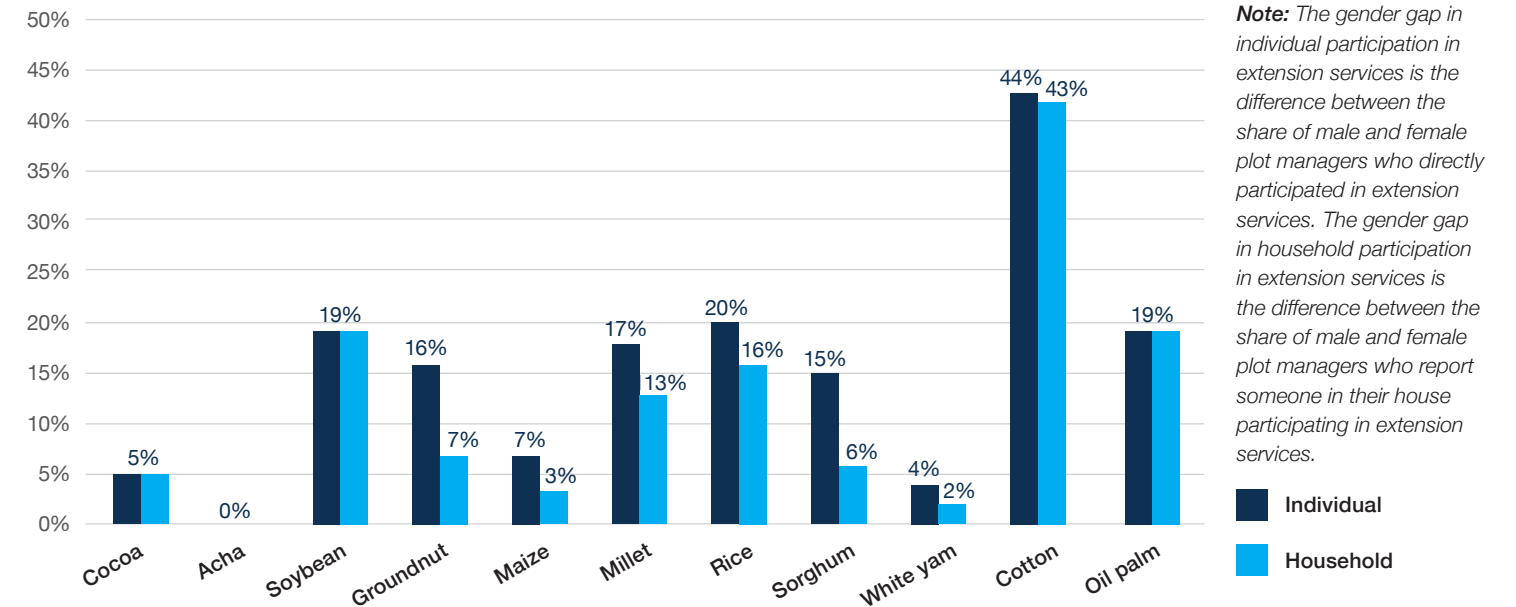


Figure 2.9 - Gender gaps in participation in extension services



2.3 Gender Gaps in Labor Productivity

Despite a comparable portion of male and female plot managers hiring labor, women's profits are lower due to the lower productivity of labor employed by women. Of plot managers who hire labor, slightly fewer women plot managers hire male labor than male plot managers (90 percent vs. 92 percent), and 44 percent of women plot managers employ female labor versus 29 percent of their male counterparts (figure 2.10). Of plot managers who hire labor, male plot managers hire larger numbers of laborers: on average, 26% more male laborers and 19% more female laborers than female plot managers nationally (figure 2.11).

Figure 2.10 - Use of male and female labor by plot managers

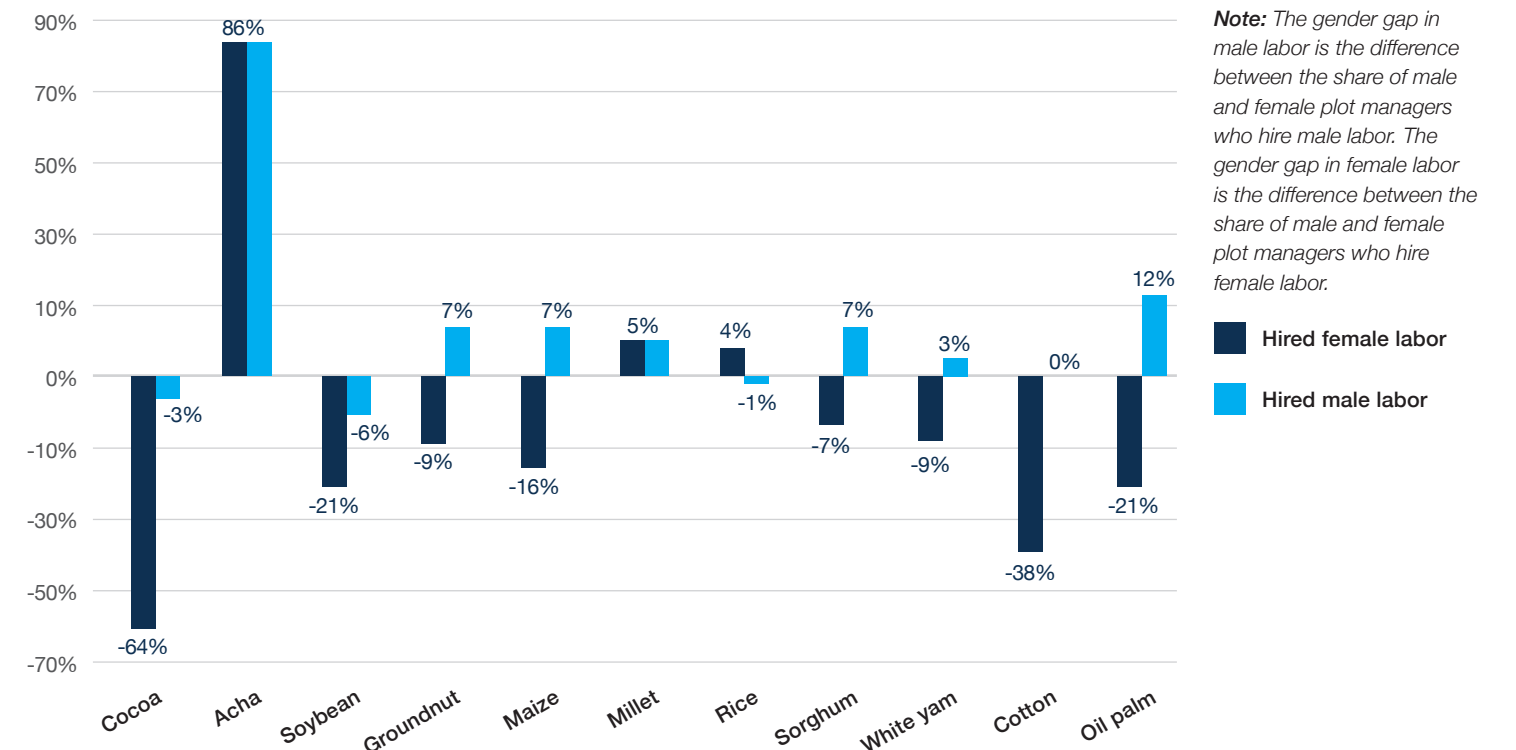
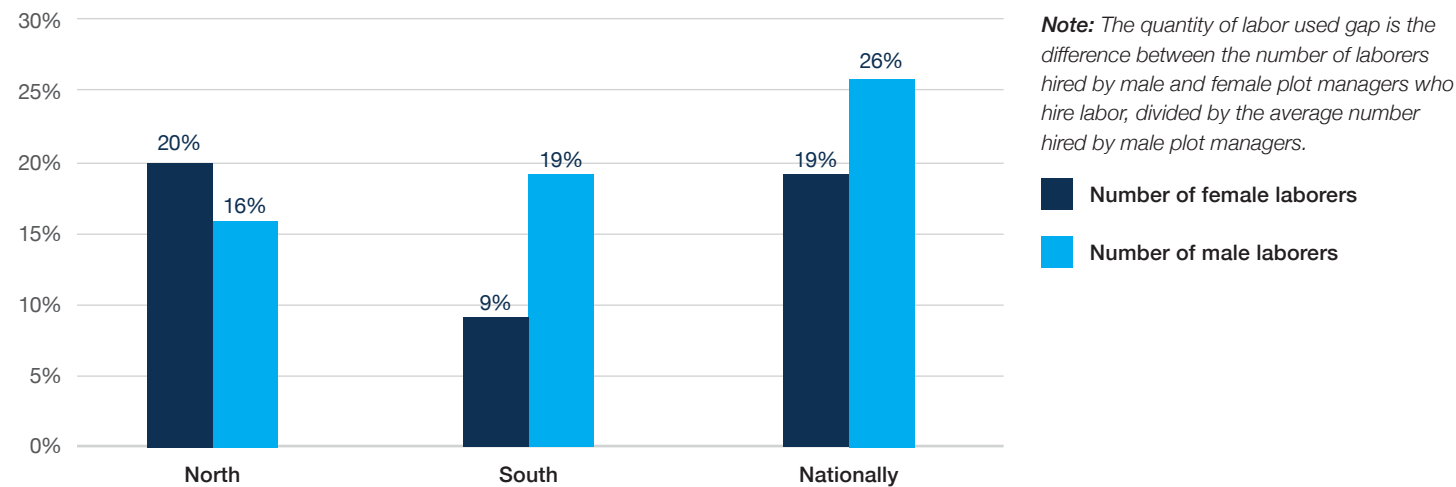


Figure 2.11 - Quantity of labor used gap



The data show that male labor used by female plot managers is significantly less productive than male labor used by male plot managers (World Bank and ONE Campaign 2014). Interestingly, this trend is driven by hired male labor in the North and household male labor in the South being less productive for women plot managers. In the North, hired male labor produces less per hour for female plot managers than it does for male plot managers, while in the South, household labor produces less per hour for female plot managers than for males (World Bank 2022). Several reasons could explain why male labor is less productive for female plot managers: female plot managers may not have time to supervise workers effectively; male laborers working for a woman supervisor may exert lower effort; women may have less funds to pay sufficient labor; and women may lack resources to hire a sufficient number of more productive workers (World Bank 2022). This analysis shows that male labor is more expensive than female labor and that nationally, women plot managers pay higher daily rates for labor than their male counterparts (table 2.1). This trend is driven by the North, where women plot managers pay an average of 140 naira per day more for male hired labor and an additional 190 naira per day for hired female labor than their male counterparts. In the South, women, on average, pay 280 naira per day less for males and 126 naira per day less for female hired labor than their male counterparts. The higher rates paid in the North may result from several contributing factors, such as restrictive social norms women must overcome to attract male labor, financial competition women face in accessing productive labor, or women having lower bargaining power, to name a few. The higher daily rate for male labor in the northern and southern regions may reflect women's inability to hire more productive labor and their increased likelihood of hiring female labor.

A further explanation, supported by existing evidence, suggests that women plot managers may be constrained in employing male labor during the optimal harvest season due to capital constraints and labor shortages as male plot managers engage hired labor during preferred times of the harvest season (Anderson and Donald 2022). This analysis found that among FMARD-supported crops, the time spent harvesting was comparable between men and women and was completed in under a month (not including cocoa or oil palm, which are, on average, harvested over three months and four-plus months, respectively). However, the timing of the harvest is variable. On average, women plot managers began harvesting acha, maize, and cotton two to five weeks earlier than male plot managers. White rice, sorghum, white yam, and oil palm were harvested by women plot managers on average one to two weeks later than by male plot managers. The timing of harvest among women plot managers may be due to competition in hiring labor at optimal harvest times. If the timing of harvest negatively impacts the value of crops, the lack of availability or access to more productive labor during optimal harvest times may contribute to their lower productivity (Pierotti, Friedson-Ridenour, and Olayiwola 2022).

Table 2.1. Average hired labor daily rates

	Average paid to hired male labor (naira/day)	Average paid to hired female labor (naira/day)
Men plot managers	₦1,391	₦1,223
Women plot managers	₦1,598	₦1,342



"Farmer operates his tractor outside Abuja" by Milo Mitchell/IFPRI

3 - Budget Allocation to Boost Gender Equity among Nigerian Farmers

It is imperative to make concerted efforts to narrow the above-described gender gaps in agricultural participation, productivity, and input use through targeted policies and programs. The government of Nigeria has demonstrated its commitment to fostering a more gender-equitable agricultural sector. Toward that goal, FMARD has adopted the National Gender Policy in Agriculture (NGPiA), which aims to equalize access to land and publicize existing credit services, facilitate access to mechanization, make input distribution more gender sensitive, promote the production of small livestock and agribusiness, develop women farmers' business skills, and disseminate information on market access and extension services through farmer field schools. Still, more investment is needed. Expanding ongoing FMARD priorities, such as improved and certified seed distribution and increased fertilizer use, coupled with improved targeting of input recipients, are critical opportunities for FMARD to close gender gaps.

To examine existing budgetary support to women farmers, the Nigeria Gender Innovation Lab has overlaid budget data provided by FMARD and the Office of Budget Federation with plot-level agriculture data from the GHS. The findings from this analysis are presented in subsections below.

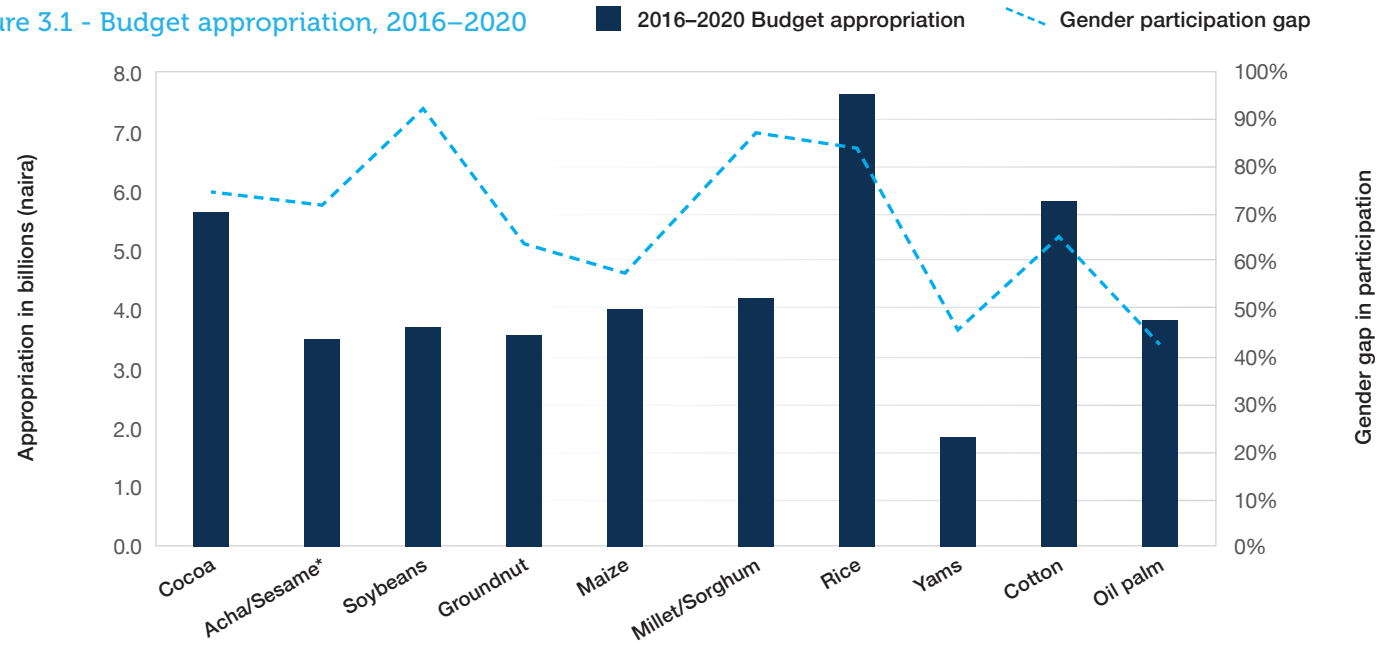
3.1 Budget Appropriation

Using macro-level budget appropriation data provided by the Office of Budget Federation in partnership with FMARD in Nigeria for five years (between 2016 and 2020), this analysis examines budget allocation trends through a gender equity lens. To ensure adequate comparability, this analysis only includes those value chains for which data were available in the budget data set as well as the agriculture data set (GHS). This analysis was not conducted at the program level due to a lack of programmatic budget data.

We first find that the top four value chains that received the highest investment, i.e., cotton, rice, sorghum, and cocoa, are among those with the lowest female farmer participation, with gender gaps in participation ranging from 64 percentage points to 88 percentage points. Figures 3.1 and 3.2 depict the budget appropriations by value chain during 2016–2020 and in 2019 and 2020 individually. In 2020, three of the four value chains with the largest budget allocations (400–600 million

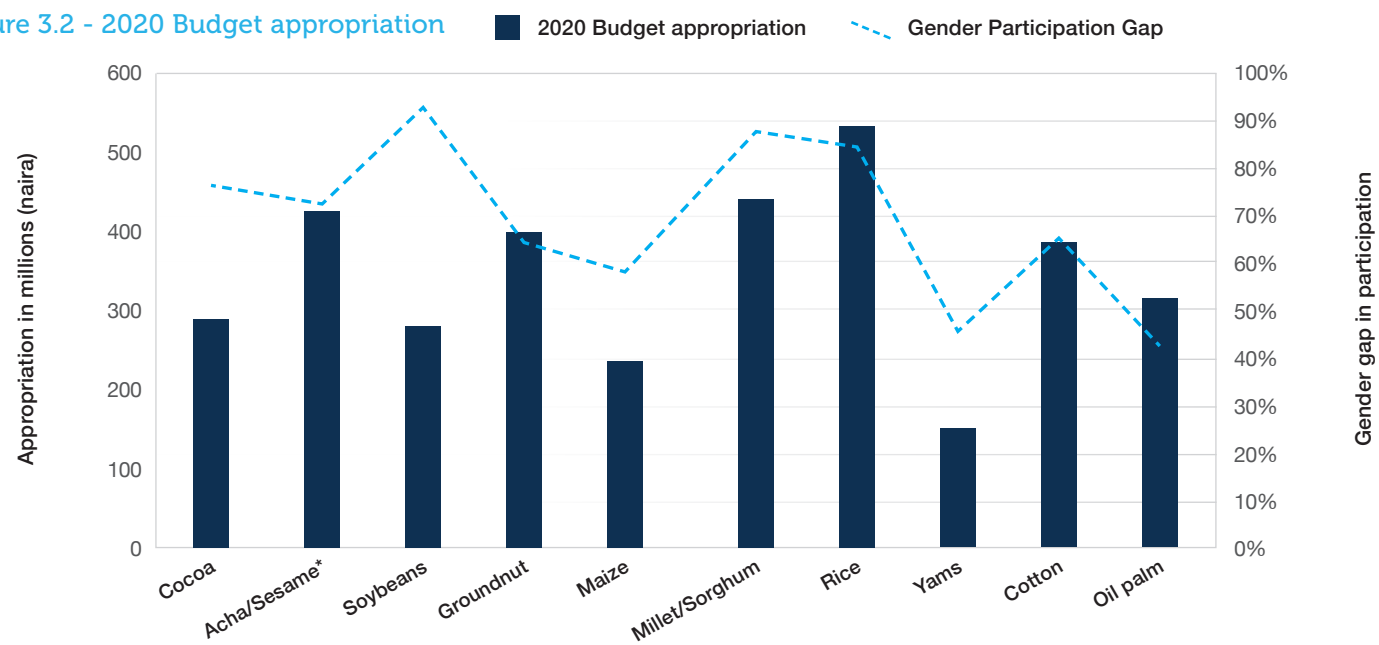
naira) were the value chains with the largest gender gaps in participation and yield: rice, acha, and millet/sorghum (figure 3.2). From a policy perspective, these allocations were in line with priorities to increase food security (millet/sorghum), boost export for foreign exchange earnings (acha), and substitute imports (rice). However, other crops, which received less funding and have higher female participation, also align with these policy goals. For example, maize was highlighted along with rice and soybeans for increased food security, while oil palm was prioritized along with cocoa and acha for increased foreign exchange earnings through exports. From a gender perspective, such investments into more male-dominated crops risk the perpetuation or expansion of existing gender gaps if they are not designed to encourage women to adopt priority crops and target female as well as male farmers. In 2020, maize and yams, two of the value chains with the highest female participation, were among those receiving the smallest budget allocations (100–200 million naira). These correlations suggest a concerning investment trend in value chains with lower female participation. Exceptions to this trend include both the groundnut and oil palm value chains, which have relatively high value after processing, smaller gender gaps in participation and yield, and both of which received mid-range budget allocations (200–400 million naira), likely highlighting the value FMARD has placed on these export crops.

Figure 3.1 - Budget appropriation, 2016–2020



* = The indicated crop was included in the budget analysis, but not the earlier GHS analysis.

Figure 3.2 - 2020 Budget appropriation



* = The indicated crop was included in the budget analysis, but not the earlier GHS analysis.

3.2 Input Provision

Input use and adoption of crops are heavily influenced by access to and participation in extension services. Unfortunately, as the provided budget lacked detailed gender-disaggregated data on extension services, it was not included in this budget analysis. The provision of inputs to farmers is generally associated with one of two goals: (i) to increase agricultural productivity or (ii) to encourage farmers to adopt new crops. Due to the numerous barriers women face in acquiring and using inputs, it is pertinent to target and provide physical inputs to women farmers to increase their productivity and encourage them to adopt more valuable crops. The micro-level budget appropriation data indicates that the most common inputs provided by FMARD are certified and improved seeds, followed by fertilizer, pesticides, and mechanization (figures 3.3, 3.4, 3.5, and 3.6). FMARD has made an effort to target women with input provisions in certain value chains, such as cashew, coconut, acha, and soybeans which have postharvest activities that are both labor-intensive and generally performed by women. Currently, 48 percent of seeds provided in the acha value chain were allocated to women; 35 percent of seeds, 33 percent of pesticides/herbicides, and 50 percent of fertilizer were distributed to women in the rice value chain. Additionally, 36 percent of rice processing machinery and 34 percent of rice harvesting and planting machinery were distributed to women.

Evidence suggests that FMARD allocates inputs to farmers at rates comparable to gender participation in most value chains. As such, it is unsurprising to find that the majority of inputs in most value chains is allocated to male farmers, as they constitute the majority of farmers. Such proportionality suggests that inputs are provided to farmers to increase productivity rather than incentivize crop adoption. This approach may be insufficient to encourage women farmers to adopt more lucrative crops or those crops which have been identified as a priority by the government of Nigeria. Cocoa, for example, is a high-value crop with among the largest gender gaps in participation (76 percentage points) and yield (47 percentage points), indicating that most plots harvesting cocoa are managed by men and that women plot managers obtain smaller yields than their male counterparts. Within the cocoa value chain, women received 33 percent of seeds distributed by FMARD, a proportion likely sufficient to support existing cocoa farmers, yet unlikely sufficient to encourage adoption beyond that. Similarly, maize, a relatively less valuable crop with smaller participation (57 percentage points) and productivity gaps (27 percentage points), received 34 percent of FMARD-distributed seeds and pesticides/herbicides and 35 percent of distributed processing machinery. Conversely, oil palm is a low-value crop with the smallest participation and productivity gender gaps (41 percentage points and -88 percentage points, respectively) among crops included in this analysis, indicating that women are more engaged in this value chain and produce higher yields. Oil palm is one of the value chains in which FMARD targets women with the highest distribution of inputs, allocating 65 percent of seeds and fertilizer to women farmers, as well as 33 percent of harvesting and planting machines, 33 percent of processing machines, and 35 percent of materials and tools.

Figure 3.3 - Gender-disaggregated mechanization distribution

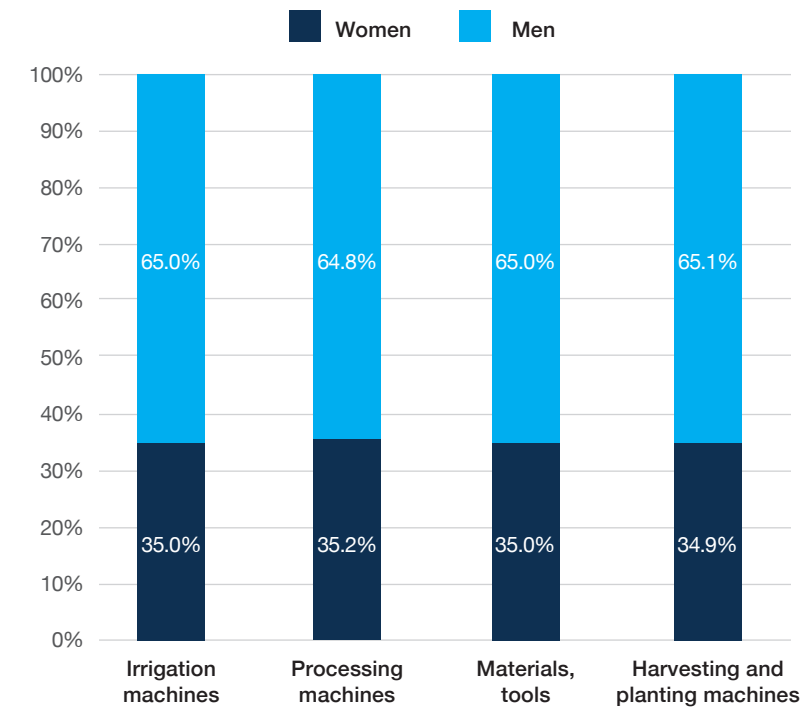
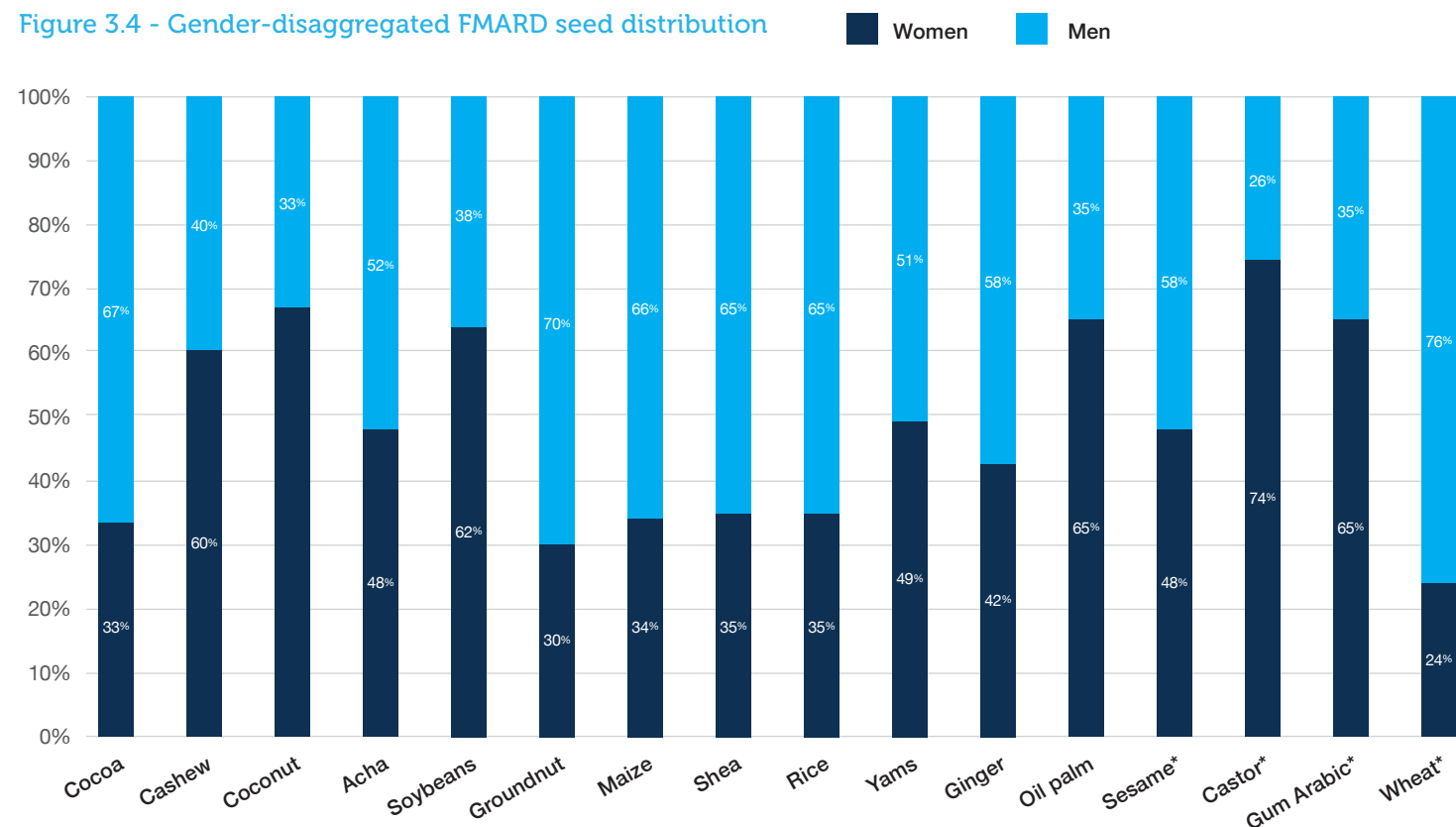


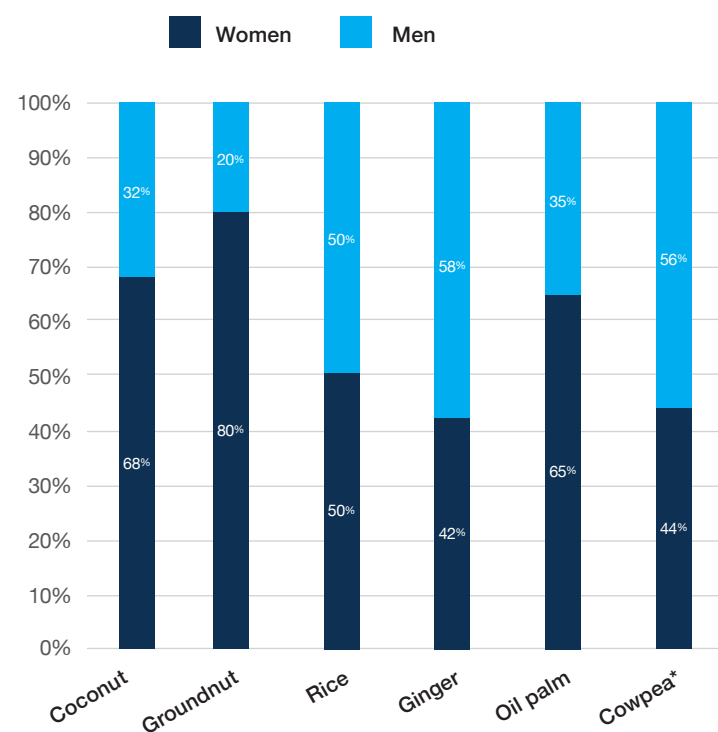
photo credit: Olubukola Olayiwola / World Bank

Figure 3.4 - Gender-disaggregated FMARD seed distribution



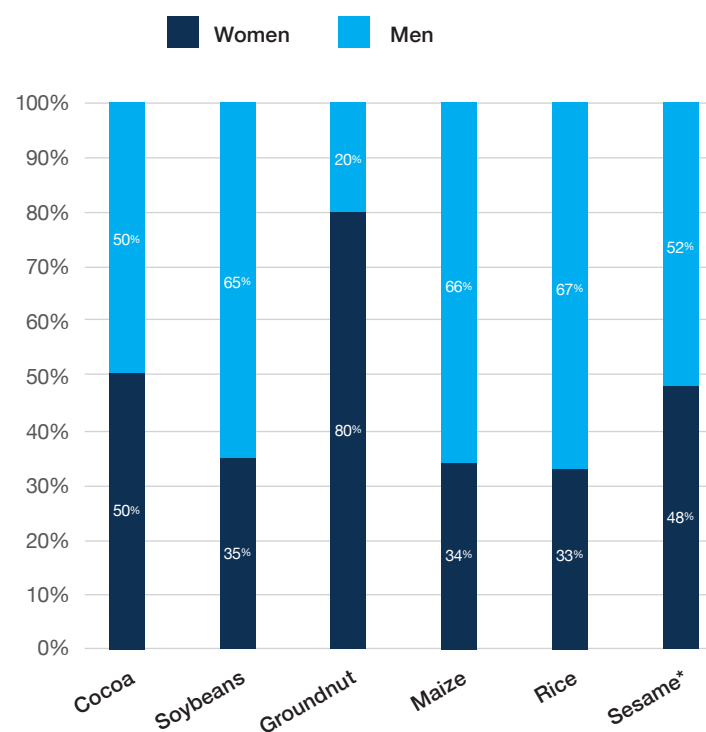
* = The indicated crop was included in the budget analysis, but not the earlier GHS analysis.

Figure 3.5 - Gender-disaggregated FMARD fertilizer distribution



* = The indicated crop was included in the budget analysis, but not the earlier GHS analysis.

Figure 3.6 - Gender-disaggregated FMARD pesticide/herbicide distribution



Note: Figures 3.3, 3.4, 3.5, and 3.6 depict the proportion of FMARD's input allocations to men and women by value chain. Due to a lack of budgetary data, a more sophisticated crop-level input distribution analysis was impossible.



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4 - Policy Recommendations

Based on the National Agriculture Promotion Policy (2016–2020), Nigeria has set goals to become self-sufficient and less dependent on imported crops, create more jobs, and promote economic diversification. Increasing women's productivity and the number of women farmers engaged in priority crops is essential to improving the productivity of priority value chains at the macro level. The overall low uptake of inputs and low participation in extension services, regardless of gender, indicates a need to increase access to all farmers. However, to close the gender gaps discussed in this technical note, it is essential that women be targeted within input distribution and extension service programming. To do so, sufficient funding must be reallocated from less efficient areas of the budget toward increasing agricultural productivity with an emphasis on female farmers. Not all these subsidies are accounted for in the budget, which makes them difficult to track and scrutinize. However, available data suggest that they benefit primarily wealthy households while distorting incentives and discouraging investment (Hernandez et al. 2022). Reallocation of such subsidies is critical to (i) increase women's access to and use of physical inputs, (ii) increase women's access to and use of extension services, (iii) enhance women farmers' access to markets, (iv) encourage women farmers to transition to higher-value crops, and (v) increase the collection and availability of gender-disaggregated data.

4.1. Increase Women's Access to and Use of Physical Inputs

- **Increase budget allocation—through the reallocation of inefficient spending—toward the distribution of fertilizer and pesticides coupled with training on their use.** Due to the significant barriers women face in acquiring and using inputs, sufficient investment must be directed toward providing inputs directly to women farmers. Direct provision of inputs or subsidized inputs to women plot managers has shown to increase use of inputs and reduce financial strains, enabling them to hire more productive labor (Ogunniyi et al. 2017; Beaman et al. 2013). The current budget allocation to crop value chains in which women are engaged is lower than that allocated to male-dominated value chains, compounding women's constraints in accessing inputs. Closing gender productivity gaps can also yield significant economic gains, as discussed above, and thereby aid the process of creating more fiscal space for the Government of Nigeria.
- **Increase budget allocation through the reallocation of inefficient spending for labor-saving and processing mechanization for women farmers.** Mechanization is a significant barrier to entry into market-based crop production. Women carry additional time constraints due to childcare and domestic responsibilities. Such constraints contribute to and compound upon women plot managers' limited access to productive labor, hurting their efficiency, production capacity, and profits. Increasing access to technological inputs such as machinery can increase agricultural labor productivity and reduce the negative impact of less productive labor on women's agricultural profits (JC and FN 2021). Across all FMARD-supported crops included in the provided budget information, the allocation of irrigation, mechanization, and tools to women is roughly 35 percent, regardless of women's level of participation in value chains. Directly providing and subsidizing mechanization and the use of mechanization is critical to closing gender gaps in agricultural productivity.

- **Bolster production and distribution of improved seeds to women farmers.** While Nigeria's seed sector remains in an early growth stage, FMARD has highlighted it as a priority sector moving forward. Currently, seeds are the input that FMARD supplies within the most value chains and to both men and women farmers. Yet, certified seeds remain the input least utilized by both men and women farmers in this analysis. Improved seeds and starter vines can increase women's adoption of higher-value crops and more nutritious crop varieties. In Uganda, biofortified orange flesh sweet potatoes were adopted by women farmers through the provision of subsidized input packages along with extension services (Buehren et al., forthcoming). In Benin, adopting Nerica, an improved rice variety, increased yields and profits for women farmers (Agboh-Noameshie, Kinkinginhoun-Medagbe, and Diagne 2007). Currently, the crops with the most varieties released in the country remain crop value chains with less female farmer participation, such as sorghum and soybeans. Increasing the production of improved seed varieties across value chains is essential to increasing the yields of both male and female farmers. To increase the production of new varieties of improved seeds and increase the volume of seeds produced, the government must continue to collaborate with research institutions and utilize public-private partnerships to increase seeds produced and distributed by seed companies. It is equally essential that the seed companies and the government reach and provide improved seeds to smallholder farmers. Low general access to extension services (see section 4.2) could exacerbate constraints to increasing the uptake of improved seeds and other agricultural inputs among all farmers, especially among women farmers who generally have less access to extension services. The Nigerian groundnut value chain is an excellent example (box 4.1).

BOX 4.1. THE GROUNDNUT VALUE CHAIN

The world's third-largest producer of groundnuts, Nigeria, has been negatively impacted by the European Union's recent ban on groundnuts from Nigeria due to aflatoxin levels (Vabi et al. 2018). In response, the government is engaged in initiatives to provide training and inputs to groundnut farmers to make the crop safer for human consumption (The Guardian 2021). To that end, certified and improved seed distribution has been identified as key to reducing the aflatoxin level in the crop (Vabi et al. 2018). Despite 80 percent of pesticide and fertilizer inputs and 35 percent of processing machinery being distributed to women farmers, only 30 percent of seeds were allocated to women—proportionally less than the share of women cultivating groundnuts. This is a missed opportunity. The unequal distribution of certified and improved seeds may (i) prevent existing women groundnut farmers from producing 'safe' crops and selling to an international market once the ban is lifted and (ii) be too small an amount to encourage the adoption of the crop by women farmers.

4.2 Increase Women's Access to and Use of Extension Services

Nigeria lags other Sub-Saharan African countries in the number of farmers serviced through an individual extension officer. Estimates from the Department of Agriculture and Extension in 2020 were that one extension officer was estimated to be working with more than 5,000 farmers. This ratio indicates that it is more challenging for Nigerian farmers to access extension services than for farmers in other Sub-Saharan countries, many of which have ratios of one extension officer to fewer than 1,000 farmers (Mabaya et al. 2021). Such low access to extension services likely exacerbates gender gaps in benefiting from extension services (section 2.2). Additional funding should be allocated to increase extension services throughout the country and tailor extension services to meet women's needs and overcome gendered constraints faced by women farmers. Effective extension services must be both localized and gender targeted.

Women's direct participation in and benefit from extension services could be improved through increased and targeted funding for the following priorities: (i) increased funding for crop value chains in which women are engaged (as opposed to the current general budgetary prioritization of predominately male value chains); (ii) funding outreach activities designed to target female social networks to increase the transfer of agricultural practices, technology, and entrance into predominately male value chains; (iii) increasing the extension service budget allocation to hire more female agents as a way to reduce women farmers' exclusion based on cultural gender roles and practices (Kondylis, Mueller, and Zhu 2017); (iv) allocating a portion of the extension service budget toward reducing both implicit and explicit bias on the part of extension agents through

regular sensitization to make extension delivery more gender responsive (Policy Objective 2 under NGPIA); (v) incentivizing the development and uptake of innovative extension service provision through digital technology and public-private partnerships with input distributors (Ngige 2021); and (vi) providing additional funding to increase women farmers' risk tolerance by including personal initiative and socioemotional skills training in extension services (Montalvao et al. 2017).



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4.3 Enhance Women Farmers' Access to Markets

Improving women's access to markets is essential to increasing women's agricultural productivity and closing gender gaps in Nigeria. A key barrier women face is limited access to financial services, constraining their ability to reach markets at various stages of the agricultural cycle. Funding can be targeted toward supporting or subsidizing innovative mechanisms to help women access markets and overcome barriers to entry into more profitable value chains. In Nigeria, fintech companies are filling this gap by creating innovative business models to help women overcome obstacles in accessing markets, inputs, training, and financial services. Fintech has improved women farmers' access to markets by securing up-front contracts with large produce buyers and then identifying a network of small-scale participating female farmers to fulfill the agreement.⁵ The business model identifies which crops are in demand and provides training and inputs to their network of women farmers. The model enables large-scale collective bargaining power on behalf of women farmers while facilitating their access to inputs, training, financial education, and savings and credit mechanisms (Ngige 2021; HerVest 2022). Targeted investments in such programs could include subsidized access to inputs and mechanization, targeted extension services for participants, and promoting the provision of credit to women farmers. Such investments can help bolster women's access to markets, increase entrance into male-dominated value chains, and close productivity gender gaps.

⁵ CoAmana and HerVest are two examples of such fintech companies.

BOX 4.2. THE RICE VALUE CHAIN

The demand for rice in Nigeria far surpasses local production, resulting in large quantities of imported rice. There is a significant opportunity for increased engagement of women farmers in the rice value chain. Female plot managers manage only about 8 percent of plots on which rice is cultivated. Of FMARD-supported crops, input provision in the rice value chain is among the most unequal, allocating 35 percent or less of distributed pesticides, herbicides, and seeds to women. Contributing to the issue, rice is among the crops with the largest gender gaps in extension service participation. Women farmers, currently undervalued in the rice value chain, represent a significant opportunity to increase Nigeria's local rice production and reduce reliance on rice imports.

BOX 4.3. THE MAIZE VALUE CHAIN

Maize, a staple crop in Nigeria, is used for household consumption and food manufacturing and is a critical ingredient in animal feed, especially poultry animal feed. As the poultry value chain has grown, the demand for maize has risen and is expected to continue to grow, while high domestic maize prices put the poultry sector at risk. Despite efforts by the Central Bank of Nigeria to bring down the cost of maize and reduce food inflation by releasing 300,000 metric tons of maize (which it had accepted in place of cash as repayment from farmers), the demand for maize continued to surpass the national supply (Boluwade 2021). Female primary managers manage only about 21 percent of plots that cultivate maize, and maize harvested by female plot managers accounts for only 5.6 percent of the total harvest. Increasing the number of women farmers growing maize could significantly improve the supply of maize and help secure the growing poultry sector.

4.4 Encourage Women Farmers to Transition to Higher-Value Crops

Women farmers' entry into more profitable value chains is essential to increase women's productivity and improve the country's ability to be self-sufficient and less dependent on food imports. The maize value chain is a good example of this opportunity (box 4.3). Targeted funding can minimize the barriers to entry faced by women farmers. Such barriers include (i) access to financial services and capital constraints, which can prevent women from making the necessary up-front investments when entering a new value chain; (ii) higher risk aversion among women farmers, which can prevent willingness to transition into more lucrative value chains; and (iii) insufficient production volume to supply larger contractual agreements. Incentives and subsidized support to women farmer cooperatives, innovation platforms, and mechanisms, such as the fintech solutions described above, can help women farmers overcome the capital and production volume constraints that prevent women from entering more lucrative value chains (Mumbeya et al. 2020; HerVest 2022). Targeted financing for training modules on personal initiative and socioemotional skills for women can be added to extension training and has been shown to increase their likelihood of adopting more valuable crops (Montalvao et al. 2017). Increasing targeted funding within extension services to hire more women agents and reach more women farmers can increase women's adoption of higher-value crops and address restrictive gender norms (Kondylis, Mueller, and Zhu 2017). Finally, given FMARD's relatively proportional gender distribution of inputs, seemingly to encourage productivity, the government of Nigeria may invest in a separate funding mechanism to supply agricultural inputs to women farmers with the explicit aim of encouraging their adoption of priority and higher-value crops.

4.5 Improve Monitoring and Documentation of Budget Performance and Availability of Gender-Disaggregated Data

While the conducted analysis yields meaningful insights on the gender-incidence of public spending, the analytical process was constrained by limited and incomplete gender-disaggregated data. To undertake a more complete analysis and facilitate evidence-based policy making, existing data could be improved in a few specific ways. First, on a micro level, input provision data should include key inputs provided within each value chain to both men and women farmers. Second, data on extension service programming should consist of all extension services provided by FMARD rather than only those explicitly targeting women and youth. It is not possible to identify gender gaps in overall extension service programming when the only budget data provided are from programming that targets women. Further, extension service programming can generate, collect, and report gender-disaggregated data on participation in training and receipt of inputs. Finally, the micro-level input data and the extension services data should include the monetary values of training and inputs provided to enable connections to be drawn between the macro-level value chain appropriations to the inputs and services provided by gender.

Moving forward, such data can help depict how funds are allocated and utilized, who the beneficiaries are, and how policy makers can prioritize spending. Critically, the continued collection and monitoring of such data can provide evidence on how FMARD spending impacts agricultural productivity, specifically that of women plot managers, and can guide future budget and spending decisions to close key gender gaps in agriculture in Nigeria.



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Appendix: Measures and Descriptions

Measure	Description
Plot Manager	The person identified in the GHS Survey as being primarily responsible for decision-making regarding the agricultural plot
Value of Crop	Naira per kg (after harvest, not processing)
Gender Gap in Value Chain Participation	Difference between the percent of plots managed by men and women that harvest a particular crop
Gender Gap in Proportion of Total Harvest	Difference between the percent of the recorded harvest produced by men and women
Gender Gap in Yield	Difference between men's and women's harvest value/hectare
Fertilizer Use Gap (Percent)	Difference between the percent of men and women plot managers who use any fertilizer
Fertilizer Use Gap (Quantity)	Difference between men and women plot managers of how many kilograms of fertilizer were used per hectare
Pesticide Use Gap (Percent)	Difference between the percent of men and women plot managers who use any pesticide
Pesticide Use Gap (Quantity)	Difference between men and women plot managers of how many kilograms of pesticide were used per hectare
Gender Gap in Certified Seed Use	Difference between the percent of male and female plot managers who use certified seeds
Gender Gap in Individual Participation in Extension Services	Difference between the percent of men and women plot managers who directly participated in extension services
Gender Gap in Household Participation in Extension Services	Difference between the percent of men and women plot managers who report someone in their house participating in extension services
Gender Gap in Male Labor	Difference between the percent of men and women plot managers who hire male labor
Gender Gap in Female Labor	Difference between the percent of men and women plot managers who hire female labor
Use of Male and Female Labor	The percentage of women and men plot managers used male or female hired labor
Seed, Pesticide/Herbicide/Fertilizer FMARD Distribution	The percent of inputs distributed by FMARD to men and women

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