Chapter 5

UGANDA

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5.1 Introduction

Recent efforts to address poverty and food security in Uganda have been directed to increasing agricultural productivity through enhancing agricultural research and extension, both of which saw declining investment in the 1980s and 1990s (Beintema and Stads 2006, 2011). A number of countries took bold steps to modernize agriculture through enhancing agricultural extension, a sector that is key to increasing farmer knowledge on new agricultural technologies and practices, among other objectives (see the broader definition in Chapter 1). Uganda is one of the countries in Africa south of the Sahara that invested significantly in improving provision of agricultural extension and other agricultural development programs.

Uganda was among the pioneers of the pluralistic and demand-driven agricultural extension services when it launched the National Agricultural Advisory Services (NAADS) in 2001. Initial impact of NAADS showed the new approach had a strong and robust impact (Benin, Nkonya, Okecho, Randriamamonjy, Kato, Lubade, and Kyotalimye 2012; Benin, Nkonya, Okecho, Randriamamonjy, Kato, Lubadde, Kyotalimye, and Byekwaso 2011). Despite these significant achievements, the NAADS program experienced significant changes starting in 2013 when Operation Wealth Creation was created—and implemented—by the Uganda military.[1] Operation Wealth Creation's mandate was to monitor and provide logistical support in distribution of agricultural farm inputs among beneficiary farmers. The NAADS program has also been used as an instrument for the Ugandan government's agenda of socioeconomic transformation over the years. The program was characterized by significant political interventions (Kwapong and Nkonya 2015). The model of public funding and privately delivered agricultural

1 Operation Wealth Creation was created in 2013 and the Cabinet reformed the NAADS program in 2014, which resulted in establishment of the single spine extension system in 2015.

extension services as promoted by the NAADS program was abandoned. Provision of advisory services by private and nongovernmental providers, however, continued but with limited government support to specialized areas that the government was not addressing.

The objective of this chapter is to contribute to the policy debate on the changing landscape of agricultural extension and advisory services in Uganda. Particularly, we investigate the effectiveness of different modes of advisory services implemented in Uganda. We compare the effectiveness of pluralistic and demand-driven advisory services with the traditional supply-driven advisory services, which operated along the NAADS approach from 2001 to 2014. Government-affiliated advisory services continued to offer supply-driven advisory services in subcounties where the NAADS program was not operating. We explore the effectiveness of the current agricultural advisory services approach used—with emphasis on gender—to reflect the key role women play in both agricultural production and extension services. We discuss the enabling environment and policies, in which we investigate the historical context of extension services in Uganda.

The contribution of this study to the literature is its use of data collected from extension and advisory services to analyze the effectiveness of traditional and new advisory services. Most studies in the past evaluating effectiveness of the traditional and new agricultural extension services use household surveys (for example, Benin et al. 2010; Davis et al. 2012). About 60 percent of the extension providers interviewed in this study worked under the traditional system before the NAADS program. This allowed them to provide an informed perception of both systems. The results will inform policymakers on more effective approaches for providing agricultural extension services.

The rest of the chapter is structured as follows. Section 5.2 discusses the enabling environment and policies and describes the characteristics of the Uganda extension system, including its past and current policies as well as the institutional landscape. Section 5.3 presents the organization and management of extension and advisory methods, and Section 5.4 the advisory methods used. Section 5.5 summarizes the data sources and analytical methods used to investigate the effectiveness of different modes of advisory services implemented in Uganda. Section 5.6 presents the evidence of access to extension services by service provider types. Section 5.7 summarizes the evidence on effectiveness and impact of extension services, and Section 5.8 analyzes the drivers of targeting of extension services. Section 5.9 provides some concluding remarks and policy implications.

5.2 Enabling Environment and Policies

Since the late 1990s, Uganda's agricultural extension services have experienced dramatic changes that have served as a natural experiment (Chapman and Tripp 2003) of agricultural extension systems in Africa south of the Sahara. Uganda's agricultural services have undergone nine phases over the past century, during which remarkable successes and challenges were observed. Our review of these historical changes draws lessons for Uganda and other countries. We talk about the overall policy environment before addressing organization as well as management and advisory methods.

Semana (1998) identifies seven phases (or "epochs") of agricultural extension and research development in Uganda: 1898–1907, 1920–1956, 1956–1963, 1964–1971, 1971–1980, 1981–1991, and 1992–1998. This chapter includes two more phases: 1999–2009 and 2010–2019. Although the discussion by Semana involved mainly changes on extension service delivery approaches, this chapter analyzes the changes in agricultural policies over time. Changes in agricultural development strategies in Uganda can be linked to the evolution in the rest of Africa south of the Sahara. Since 1998, more than ever before, global forces are influencing agricultural policy development processes in the developing countries of Africa south of the Sahara. These global forces include privatization, liberalization, decentralization, and democratization. Uganda is one of the countries that adopted far-reaching policy and institutional reforms to conform to these global policies.

Early colonial period (1898–1907). Uganda was first colonized by the British around 1860. It became a British protectorate in 1894, and the signing of Buganda Agreement in 1900 effectively institutionalized British rule. One of the economic priorities of the British colonial government was the production of export agricultural crops including coffee, cotton, tea, and tobacco. Accordingly, research and extension focused on developing and producing the export crops by mainly using imported technologies with little effort to develop local technologies (Delgado 1995). The belief was that existing Western technology could substantially increase agriculture production. Teaching farmers how to use modern tools and technologies was the main component of this strategy.

Enforcement of colonial policy (1920–1956). Following the introduction of export crops, the mode of agricultural development in Uganda was mainly regulatory. Agricultural regulations and bylaws were established and enforced by local chiefs who wielded powers. The emphasis was on distribution of planting materials of the major crops and simple messages related to

crop production technologies. The bylaws required farmers to produce certain crops in accordance with specified agricultural practices, soil conservation, and storage of famine food reserves. The colonial policy therefore relied heavily on regulations and included use of corporal punishment to attain compliance, which had long-lasting psychological effects on the farmers. Farmers were directed on *what* to do and *how* to do it, with no concrete explanation on *why* they had to do it. For example, coffee—regarded as the major export crop promoted by the colonial rule—was nicknamed *kiboko* (whip or cane), since its production practices were forcibly enforced on farmers. Likewise, farmers growing crops on steep slopes were forced to construct soil and water conservation structures. One of the independence celebrations was destruction of the soil and water conservation structures (NEMA 2007). The use of heavy-handedness may have affected the mind-set of farmers who held negative attitudes toward extension service providers.

Use of progressive farmers (1956–1963). In an effort to promote technology development and transfer, the colonial administration adopted the policy of using progressive farmers to enhance production. Extension was concentrated on progressive farmers with the hope that their improved performance would serve as motivation for the rest of the community to adopt the same techniques. The emphasis was to concentrate technical advice and support in the form of inputs and credit on selected progressive farmers. The expectation was that the improved performance of these farmers would have a demonstration and multiplier effect for increased production and productivity. Although this strategy was desirable given the limited number of extension staff, it failed to achieve the expected results because the community perceived the progressive farmers as a privileged class whom they could not emulate. In some instances, progressive farmers were not willing to share the information and resources with the rest of the community. During this period the colonial policy emphasized an advisory approach to agricultural extension service delivery but also relied heavily on regulatory methods. The agricultural extension staff worked closely with chiefs to enforce bylaws to ensure that the advice given was put into practice. This period saw a surge in agricultural production and productivity, particularly of export crops, although the overall agricultural growth slowed down (World Bank 1993).

Postindependence period (1964–1971). After gaining independence in 1962, the postcolonial government embarked on a radical departure from the colonial policy. The colonial regulation and *kiboko* approach left a negative legacy, which the newly independent government had to address. The new government encouraged an educational and advisory approach to agricultural

extension and technology development. Many agricultural colleges were established and/or upgraded to produce skilled personnel, and courses for practical and communication skills were introduced in the curriculum of agricultural colleges. This was further complemented by in-service trainings within the public service. To ensure technological advancement, existing research stations/institutes were strengthened, and new ones were established. District Farm Institutes were established all over the country to train farmers, and the government encouraged and supported the research–extension–farmers link to attain technological advancement. A number of pilot projects and programs were initiated to establish the most applicable educational methods.

The new government expanded provision of agricultural advisory services to nonexport crop farmers, and smallholder farmers became the target for extension services (Ellis and Biggs 2001). Extension agents were posted to administrative centers to offer advisory services on all major crops, livestock, and forestry. This was due to a conceptualized approach of various line ministries and departments. However, there was weak harmonization of extension messages by the different line ministries. This period registered an annual agricultural growth rate of 10 percent (PMA 2000).

The nondirectional period (1971–1980). This period is also referred to as the dormant phase, characterized by misrule and breakdown of law and order following military takeover of the government in January 1971. The agricultural growth that started after independence was brought to a halt due to civil strife, economic mismanagement, disintegration of public infrastructure and services, lack of private sector investment, scarcity of foreign exchange for agricultural inputs, and the collapse of the emerging commercial agricultural sector. In addition, the research facilities and service delivery systems fell dormant, which weakened the research–extension–farmers linkage. During this period there was no clear agricultural policy to guide agricultural development (Semana 1998), causing the nondirectional period. Consequently, output growth rates fell from an average of 10 percent to –2 percent annually (PMA 2000).

Recovery period (1981–1991). The Idi Amin regime was overthrown in 1979, after which three civilian presidents briefly led Uganda between April 1979 and July 1985.[2] Despite the short-lived presidential regimes, the government launched an economic recovery program, including an agricultural policy with a strong focus on training and better links with research,

2 These were Yusuf Lule (April–June 1979); Godfrey Binaisa (June 1979–May 1980); and Milton Obote (July 1980–December 1985) (Uganda, State House 2019).

farmers, and other related institutions. Most projects/programs designed at the time emphasized smallholder farmers with the main objective of providing agricultural inputs, supporting adaptive research and extension, and strengthening selected institutions. Consequently, from 1981 to 1983 the country experienced a 17 percent growth rate, most of which occurred in the agricultural sector. Renewed political crisis, however, led to negative growth rates of approximately −4 percent in 1984 and −2 percent in 1985 and 1986 (World Bank 1993).

Until 1991, there were parallel extension services in different line ministries or departments and nongovernmental organizations that had mushroomed to fill the gaps left by the public sector during the nondirectional period. This resulted in duplication, conflict, and confusion in the service delivery system. To address this, the government introduced a new policy on agricultural extension services. The Ministries of Agriculture and Animal Industry were merged to form the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)—a ministry that has retained its composition and structure to date. The idea behind the merger was to rationalize, integrate, and harmonize the use of scarce resources as well as to professionalize extension education through learning and teaching (Semana 2002). The new approach emphasized partnerships and dialogue to promote participation. It marked the beginning of the use of participatory methods and techniques in agricultural research and extension. During this period farmers' indigenous knowledge was tapped through participatory methods. There was a revival in agricultural growth with an annual growth rate of approximately 5 percent from 1986 to 1991, although the export crop gross domestic product declined to −0.8 percent annually, reflecting poor incentives for coffee production (World Bank 1993). The World Bank–sponsored structural adjustments in the 1980s, which focused on macroeconomic balance through aggregate demand management with no strong agricultural component and reduced budgetary allocation to agricultural extension, further weakened an already fragile rural service.

Introduction of institutional reforms (1992–1998). This was a period of consolidating participatory methods and techniques in technology development and dissemination. Extension remained largely educational in its approach under its unified extension service delivery with support from the World Bank and other donors. The approach provided a single line of command from frontline extension staff to the district extension coordinator and then to the ministry headquarters. The approach provided strong linkages between extension and research, with increased sharing of information and joint planning

with the farmers as well as preseason workshops. The training-and-visit system was adopted for effective service delivery, and bimonthly training workshops were organized.

However, institutional reforms—including liberalization, decentralization, and privatization and the postconstitutional restructuring of the MAAIF—severely affected these initiatives. The field staff were significantly downsized to the extent that by 1998 the ratio of extension staff to households had declined to only about 1:1,800 (Uganda, MAAIF 1998). Furthermore, the system was complicated by the adoption of the decentralization policy in 1995, where MAAIF extension responsibilities were delegated to the district local governments. The districts lacked capacity to implement MAAIF roles, which severely affected farmers' access to services. The policy reforms introduced during this period had adverse effects on service delivery, which prompted the government of Uganda and its development partners to adopt institutional and administrative changes that culminated in the development of the Plan for Modernization of Agriculture in 2000. This plan was accompanied by radical institutional and administrative reforms within the agricultural sector. In the process, the World Bank reduced support to extension and research in favor of the plan (Semana 2002).

Implementation of institutional reforms (1999–2009). The weakening agricultural extension services gave nongovernmental organizations a bigger role, leading to more diversity of approaches (Friis-Hansen et al. 2003). The concept of popular participation in extension, and in development more broadly, was widely accepted in the 1990s and was incorporated into traditional agricultural extension services approaches (Chipika and Friis-Hansen 2004). It is from this mix of participatory approaches that the idea of demand-driven extension approach became popular. Semana (2002) describes this period as one of uncertainty with a mixture of conflicting views and ideas. In line with the government policies of liberalization, decentralization, and privatization, this period witnessed increased private-sector involvement in the agricultural sector from production through processing to marketing chains. The thrust of reforming agricultural extension during these years can be traced from the development of the Poverty Eradication Action Plan. The Plan for Modernization of Agriculture was used as a platform for implementing the Poverty Eradication Action Plan in the agricultural sector. One of the Poverty Eradication Action Plan's pillars was "enhancing production, competitiveness and incomes," which focused on the transformation of agriculture from subsistence to commercial. To achieve this, the Plan for Modernization of Agriculture prioritized seven policy areas for intervention: research and

technology development; national agricultural advisory services; agricultural education; improving access to rural finance; agro-processing and marketing; sustainable natural resource utilization and management; and physical infrastructure.

The Plan for Modernization of Agriculture assigned priority to boosting agricultural extension services through NAADS, which started in 2001. Emphasis was placed on improving extension and research efforts with increased responsiveness to farmers' needs (Uganda, MAAIF and MFPED 2000). The NAADS approach marked a transition from a public-sector supply-driven approach to a private-sector demand-driven and public-funded and privately delivered extension service delivery system. In addition, NAADS advisory services covered postharvest and marketing topics, which were ignored by the traditional agricultural extension services. NAADS also developed and enhanced farmer groups, thus increasing the capacity of farmer-controlled institutional structures and processes for managing NAADS at all levels. Particularly, the mandate of planning, implementation, monitoring, and evaluation of advisory services was vested to farmers, with the local governments playing a predominantly facilitatory role. The new system was designed to ensure farmer empowerment, poverty targeting, gender mainstreaming, deepening decentralization, commercialization, fostering participation, managing natural resource productivity, increasing institutional efficiency, privatization, and market access (Uganda, MAAIF and MFPED 2000). NAADS received worldwide attention from both scholars and practitioners in agricultural extension (Chapman and Tripp 2003). The program received significant financial and technical support from development partners and the government of Uganda. In other words, NAADS became one of the most far-reaching and promising agricultural extension reform initiatives in Uganda and elsewhere in Africa south of the Sahara.

An impact assessment of NAADS's first phase, which ran from 2001 to 2009, showed that direct participation in the NAADS program increased agricultural income by 37 percent to 95 percent, while indirect participation—in which farmers who did not belong to NAADS farmer groups received advisory services from NAADS-affiliated advisory services—led to an increase of agricultural income by 27 percent to 55 percent. The rate of return from NAADS investment was 8 percent to 49 percent (Benin, Nkonya, Okecho, Randriamamonjy, Kato, Lubade, and Kyotalimye 2012). About 77 percent of NAADS farmer groups also reported to be empowered to make their own decisions on the provider of advisory services and to demand specific agricultural technologies. Participation in NAADS increased the

propensity to demand improved crop varieties, crop management practices, soil conservation, livestock breeds, postharvest practices, and marketing information (Benin et al. 2010).

However, NAADS's relationship with the Plan for Modernization of Agriculture and other upper institutional structures were not well formulated, which posed challenges. NAADS operated outside the framework of the plan and no efforts were made to rationalize, integrate, and harmonize these projects into the new agricultural framework. NAADS was under the MAAIF, while the Plan for Modernization of Agriculture was under the Ministry of Finance, Planning and Economic Development. Overall, MAAIF as an institution was detached from the plan's establishment, which impacted negatively on the overall implementation of the Plan for Modernization of Agriculture and outcomes of the NAADS program. On the research side, the National Agricultural Research System policy was established in 2003. Like NAADS, the NARS policy advocated for a market-responsive, client-oriented, and demand-driven national agricultural research system consisting of public and private institutions working in tandem for sustainable agricultural growth of Uganda (NARS 2003).

The emergence of the pluralistic agricultural extension service delivery system (2010–2019). Toward the end of NAADS phase I, there was negative press coverage of its performance related to mismanagement and corruption; limited access to extension services; declining agricultural productivity; and increased costs of service delivery. Consequently, the president suspended NAADS twice—in September 2007 and July 2010. Rwamigisa (2014) revealed several factors that were both of design and implementation in nature that affected the NAADS program. These included:

1. The program was designed and implemented on the assumption that the reform would be implemented holistically as envisaged under the Plan for Modernization of Agriculture. As it turned out, five of the seven pillars of the plan were never implemented.

2. During implementation, it was expected that all institutions would play their complementary role, but there were no financial provisions made to ensure institutional compliance.

3. The program design assumed that the public extension staff in local governments would be laid off and retooled to form a critical mass of service providers in the private sector. This was never realized as other broad agricultural functions had to be attended to in local governments.

4. It was also assumed that the local governments had sufficient technical capacity to implement the program. Decentralization, however, had not taken root and local governments were grappling with capacity challenges.

5. The reform assumed that the smallholder farmer had reached a level of development to demand, own, and control the service, which was not the case in practice.

6. Expectations of stakeholders beyond the mandate of the NAADS program were partly due to conflicting messages about the program and external influence. This led to the tendency by NAADS to play multiple roles beyond what would ordinarily be expected of an extension program. For example, the procurement and "distribution" of agricultural inputs was introduced under the Prosperity for All program.

7. Failure of the NAADS program to integrate fully with the existing decentralized extension services created a semblance of two parallel extension service delivery systems that were in conflict.

In view of these factors, political interventions in agricultural advisory services intensified, and the government introduced significant changes to the NAADS program in 2014 and 2015. NAADS's new mandate was "to provide support for the management of agricultural input distribution chains, promotion of strategic commodity interventions, agricultural value chain development, and farmer access to agricultural financing" (NAADS 2018).

The strategic objectives of the new NAADS are:

1. To increase access to agricultural inputs to smallholder farmers. Under this objective, vulnerable groups—namely women, youth, older persons, and people with disability—will be targeted;

2. To support development of agriculture value chains by enhancing agribusiness, value addition, and marketing linkage services;

3. To increase access to agricultural financial services by facilitating development of farmer groups/cooperatives; and

4. To strengthen institutional and collaboration frameworks to enhance operational effectiveness and efficiency.

Achieving the first objective involved input distribution—an activity that is implemented through Operation Wealth Creation. The Uganda military

has been given the mandate for Operation Wealth Creation. However, Operation Wealth Creation's mandate is to monitor distribution of agricultural farm inputs among the beneficiary farmers, while provision of technical advisory services is done by public agricultural extension and advisory services by district local governments and coordinated by MAAIF. For objective (2), 12 strategic commodities were selected: tea, cocoa, fruits, maize, beans, rice, cassava, banana, dairy, meat, poultry, and fisheries (NAADS 2018). This is about half of more than 40 enterprises promoted under NAADS phase I (Benin et al. 2012).

The agricultural advisory services have gone beyond NAADS reforms. New policies and strategies for providing technical agricultural services were formulated. The government adopted a new model in 2015 under the name "the Single Spine Agricultural Extension System" (SSES) to provide technical advisory services. MAAIF was restructured and the Directorate of Agricultural Extension Services (DAES) was reestablished. The extension function was transferred from the NAADS secretariat back to DAES. The NAADS secretariat roles were redefined to include input chain management, strategic interventions, and promotion of value-addition technologies. In local governments the extension function was integrated into the production and marketing departments. SSES is a public sector–led extension service delivery system with built-in strong collaborative mechanisms with private-sector involvement in service delivery (Uganda, MAAIF 2016). SSES's objective is commercialization of smallholder farmers and other value-chain actors. Like NAADS, SSES uses farmers' groups and other actors in agriculture value chains across the country. SSES has two main dimensions:

1. Integrated, coordinated, and harmonized pluralistic extension system with multiple providers addressing diverse needs.
2. Extension meets needs along the entire value chain and integrates with other agricultural support services for optimum return on investment.

From the policy perspective, the desired end state is that the public extension system will naturally evolve from direct service delivery to service regulation as commercialization takes root. To provide a clear policy direction, MAAIF spearheaded development of the National Agricultural Extension Policy 2016 and the National Agricultural Extension Strategy 2016/2017–2020/2021. The policy process was highly consultative to ensure domestic ownership of the reform program. The reform builds on lessons learned from previous extension approaches including the NAADS program and

incorporates many of the fundamental ideas and practices required by the extension services to deliver quality and timely information, share knowledge, and build linkages across key commodity value chains. Several policy instruments were developed to guide implementation of the new reform model. These included the Ethical Code of Conduct for agricultural extension and advisory service providers, a process of registration and accreditation of agricultural extension and advisory service providers, guidelines and standards for agricultural extension services, procedures for developing agricultural extension materials, and a detailed manual for farmer institutional development among others.

It is too early to make assessment of the performance of SSES in terms of number and type of farmers reached, changes in productivity and income, and other outcomes. However, involvement of the army to distribute free or highly subsidized inputs poses challenges to development of more efficient private agricultural inputs dealers as well as creating dependence by farmers on government support. Now that we have set the scene, the analysis below will dwell with the different extension systems that existed before SSES.

5.3 Organization and Management of Extension

The National Agricultural Extension Policy 2016 advocated for a pluralistic agricultural extension service delivery system with multiple actors both in public and private sectors playing complementary roles. A large number of agricultural extension providers exist in Uganda. In addition to the public system (where different MAAIF departments and local governments provide services), there are farmer organizations, universities, private agrodealers, farmer leaders, and a host of nongovernmental providers and development partners. Inadequate coordination leads to duplication of services and resource waste as well as conflicting messages (Rwamigisa, Kakuba, and Massawe 2019). One of the main objectives of the policy is to establish a well-coordinated, harmonized pluralistic agricultural extension delivery system for increased efficiency and effectiveness.

With multiple challenges confronting agriculture (including climate change, new pests, and diseases), success in the sector requires up-to-date information, knowledge, and skills that farmers can access through an effective and well-organized agricultural extension delivery system. Farmers can only benefit from productivity-enhancing inputs such as improved seeds, fertilizer, and pesticides when they have the knowledge and skills to apply them.

Therefore, to bridge this gap and contribute to the agricultural sector and socioeconomic transformation, an effective institutional framework and organization and management of the services are needed to implement the policies mentioned previously in this chapter.

A number of good agricultural extension practices are promoted under the new policy that influence the organizational and institutional arrangements. Some of the practices include:

1. Professional ethical values in conduct of delivery of extension services.
2. Organizational learning in service delivery.
3. Satisfaction by all parties in the course of service provision.
4. Participation and involvement of all actors in agricultural extension processes including public-private partnerships.
5. Whole family concept is core in agricultural extension service delivery.
6. Observance of cultural differences shall be key in design and implementation of agricultural extension programs.
7. Service delivery is anchored on interest and need of all parties.
8. Cooperation with clientele.
9. Agricultural extension is predominantly a public good.
10. Public and private sector involvement, separately or in partnership.
11. Market-oriented interventions (market is the primary driver).
12. Value-chain approach.
13. Quality assurance in extension services is mandatory.

Based on these underlying good practices, the Single Spine Extension System is structured and implemented at national, zonal, district, and subcounty levels. At the national level, MAAIF is the main actor responsible for developing policy, regulation, and strategy. The Directorate of Agricultural Extension Services is responsible for the management and coordination of SSES at the national and local government levels. Other MAAIF directorates and agencies support the technical functions of SSES. Key actors include line ministries; nonstate actors (including NGOs and civil society organizations, agro-input dealers, traders, and processors); universities; training institutions; and development partners.

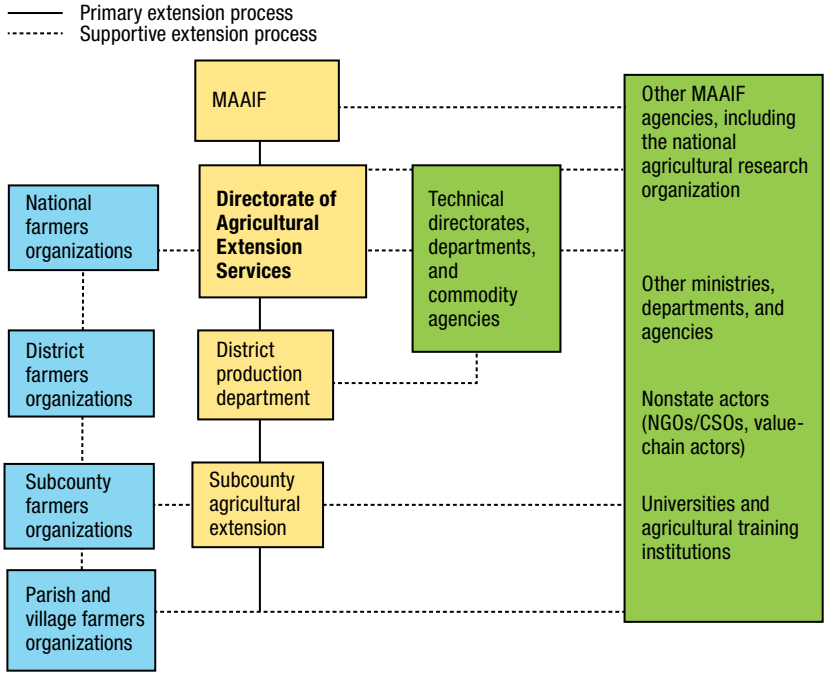
At the zonal level, Zonal Agricultural Research and Development Institutes (ZARDIs) coordinate regional/zonal stakeholder platforms for issues that cut across districts. They coordinate regular zonal meetings with district production and marketing departments and nonstate actors. They coordinate multistakeholder innovations platforms, conduct adaptive trials on new technologies in a collaborative manner, and facilitate flow of technologies from research stations to farmers for adoption.

At district level, the district production and marketing departments are responsible for providing agricultural extension services. They plan and conduct training of farmers and other value-chain actors in application of agricultural technologies, awareness campaigns on technologies, markets and marketing information as well as support planning processes at all levels of the value chains. Other technical departments and district level nonstate actors provide technical support. Political and technical administrators oversee and monitor implementation. At the subcounty level, there are at least three technical extension staff (for crop, livestock, and, where necessary, fisheries) that provide extension services directly to the beneficiaries. Other responsibilities include knowledge sharing, supervising, and quality assurance of services provided by nonstate actors. The policy has enhanced the coordination role of frontline extension staff who have to work collaboratively with nonstate actors for harmonized delivery of agricultural extension services.

At the farmer level, farmers are organized into groups or associations according to agricultural enterprises of common interest to facilitate delivery of agricultural extension services. These groups aggregate into high-level farmer organizations at the subcounty, district, and national levels. An unpublished assessment conducted by MAAIF and the Uganda Cooperative Alliance in 2017 on capacity needs by farmer organizations showed that farmer institutions are weak on management, financial systems, and business management. They are engaged only in primary production and weak in value addition and bulk marketing. The SSES therefore has prioritized farmer institutional development in the transformation agenda. At each level, multi-actor platforms shall be formed to, among other things, improve interactions of the various actors and joint planning, monitoring, evaluation, learning, and review by fostering partnerships and linkages, building networks, assessing challenges and opportunities, and undertaking lobbying and advocacy. Figure 5.1 summarizes the SSES institutional arrangements and linkages.

The DAES is structured into two main departments, the Department of Agricultural Extension and Skills Management and the Department of

FIGURE 5.1 Institutional arrangements and linkages for the Single Spine Agricultural Extension System



Source: Adapted from Uganda, MAAIF (2018).

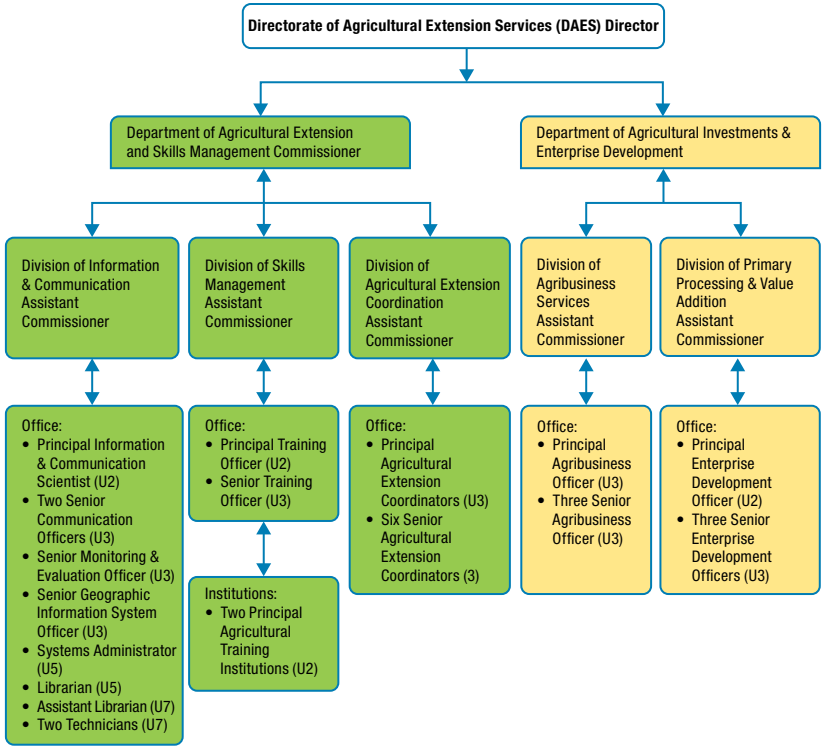
Note: CSO = Civil Society Organization; MAAIF = Uganda's Ministry of Agriculture, Animal Industry and Fisheries.

Agricultural Investments and Enterprise Development (Figure 5.2). Figure 5.3 shows the district production and marketing department structure.

The pluralistic nature of the SSES gives the DAES a complex coordinating role as depicted in Figure 5.4, which illustrates that the public agricultural extension system under SSES is not the traditional public extension service as commonly known, but rather a newly oriented system designed to function in a pluralistic extension service delivery system.

Funding for advisory services is provided mainly by the government of Uganda, although there is some support from bilateral donors, the International Fund for Agricultural Development, and the World Bank. Although budget allocation for agricultural extension and advisory services has been increasing—from about US$10 million in 2015/2016 to about US$36 million in 2018/2019 (MAAIF Agricultural Planning and

FIGURE 5.2 Directorate of Agricultural Extension Services

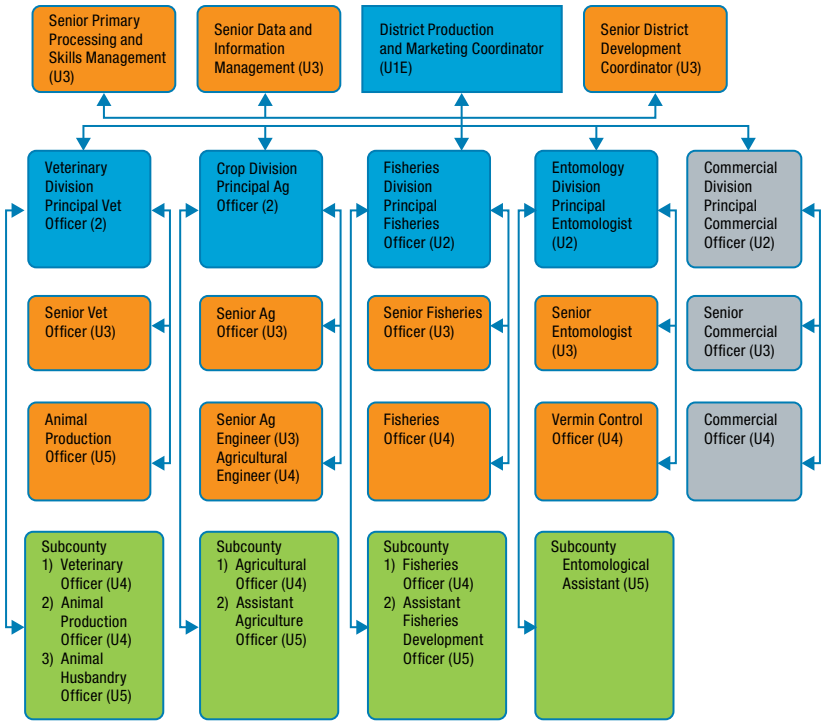


Source: Uganda, MAAIF (2016).

Development Department in Rwamigisa, Kakuba, and Massawe 2019)—public funding is still inadequate to meet the goals of the national extension policy. For instance, the MAAIF budget for 2019/2020 is about US$67 million, but the approved budget is only about US$36 million (Rwamigisa, Kakuba, and Massawe 2019). Thus the funding gap is about 54 percent of MAAIF budget estimates. In addition to being inadequate, funding is often late (Rwamigisa, Kakuba, and Massawe 2019).

Due to this inadequate budget, staff recruitment for extension personnel is not complete. DAES is operating at 38 percent staffing level and local governments at 78 percent. Because the 2019/2020 budget is unchanged from the previous year, there are limited funds to recruit new staff (Rwamigisa, Kakuba, and Massawe 2019). However, government has been slowly recruiting new staff and by December 2018 had recruited 3,872 (or 78 percent) of targeted 5,000 extension workers. This has reduced the ratio of extension worker

FIGURE 5.3 Structure of the District Production and Marketing Department



Source: Uganda, MAAIF (2016).

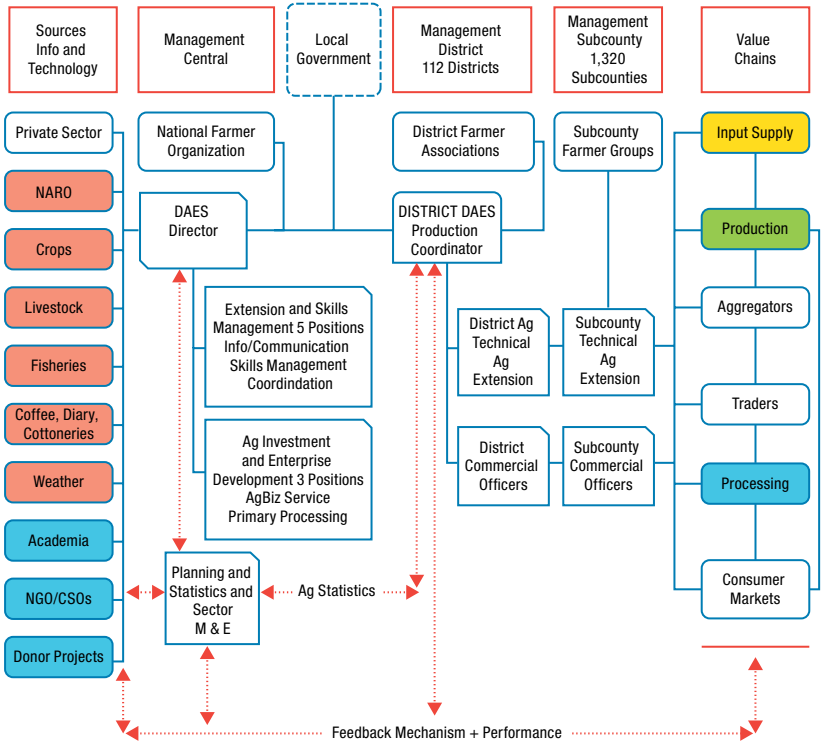
to households from 1:5,000 in 2014 to 1:1,800 (Uganda, MAAIF 2018 in Rwamigisa, Kakuba, and Massawe 2019). The recommended level is 1:500.

Also hindering extension's effectiveness is lack of transport. Although the government provided 137 motor vehicles and 1,061 motorcycles to local governments in March 2019 with support from the International Fund for Agricultural Development, this covered only 20 percent of what was needed (Rwamigisa, Kakuba, and Massawe 2019).

5.4 Advisory Methods

As most countries today, Uganda has a pluralistic set of extension methods to meet diverse goals and serve various types of clientele. Mass media methods include radio, television, leaflets, fliers, and short message services. In addition, demonstrations and shows are also used to reach large audiences.

FIGURE 5.4 Coordination of the system by the Directorate of Agricultural Extension Services (DAES)



Source: Uganda, MAAIF (2016), working papers.

Note: CSO = Civil Society Organization; M&E = monitoring and evaluation; NARO = National Agricultural Research Organisation. Dotted lines represent feedback; solid lines represent coordination.

Information and communications technologies are useful in that they can be reused and can reach large audiences at little cost. More interactive approaches using information and communications technologies include interactive voice response and participatory radio and video. In addition, more sophisticated methods such as the use of drones are also being piloted to support crop research data acquisition and interpretation services (UFAAS 2019). Group approaches are very common. In particular, farmer field schools are popular as a group-based, adult education approach that is participatory and empowering. The field schools are used with young people and pastoralists as well as with more traditional crop farmers.

As a means of reducing costs and extending reach, the use of farmers and local community members as extension providers is becoming predominant in Uganda. The "village agent model" is being quickly scaled up across the country. The model was started by Sasakawa Global 2000 and modified through support from the United States Agency for International Development (USAID). MAAIF is currently in the process of training some 32,000 village agents over the next few years. Apart from delivering advisory services, village agents are to be at the center of an elaborate system whereby farmers make seasonal production contracts with agents and their traders to be verified and enforced by the government agricultural extension service at the district local government level.

Now that we have covered the history of Uganda's extension policies and enabling environment, the organization and management of extension, and methods used, we look at the performance of extension using several analytical methods. Recent research has shed light on the effect of some of these methods. Van Campenhout, Spielman, and Lecoutere (2018) compared a control group, a group that was shown a video about maize practices, a group that was shown a video and also given access to an Interactive Voice Response (IVR) service, and a group that receives all the former in addition to an SMS text campaign that reminds the farmer about the IVR service. As a result of being shown the video, farmers increased knowledge. However, researchers did not find incremental effects for the addition of IVR and SMS reminders. The researchers also examined gender effects and found that (1) there was evidence that showing video only to the female co-head reduced household-level knowledge as opposed to when the information is given to the man only; (2) there was evidence that targeting the couple instead of only the man leads to an increased likelihood of adopting practices; and (3) there was evidence that changing the messenger attribute (for example, videos where males, female, or couples were acting) did not have any effect on household-level outcomes (Van Campenhout, Spielman, and Lecoutere 2018).

5.5 Data Sources and Methods

Two datasets were used in this study as described in Table 5.1—one from farmers and the second from providers of agricultural advisory services.

We use the 2015–2016 Living Standard Measurement Survey (LSMS) data to determine the gender-disaggregated access to agricultural extension services from providers with different institutional affiliation. We also use the same data to determine the type of extension messages given to farmers from

TABLE 5.1 Datasets used in this chapter

Dataset	Description	Year collected	Analytical method
Agricultural extension agents' survey	A survey of agricultural extension agents was done by IFPRI and Makerere University in 2007/2008. The survey covered agents with four different institutional affiliations—including (with percentage of respective institution in brackets) government (63%); National Agricultural Advisory Services (NAADS) (22%); nongovernmental organizations (10%); and others (5%). The others include cooperatives and private providers (for example, input traders, etc.)	2007/2008	• Censored Least Absolute Deviations estimator (CLAD)—to determine share of all farmers served in the area of jurisdiction and female farmers served • Probit model—to determine type of technologies promoted
Living Standard Measurement Survey	Nationally representative data collected by Uganda Bureau of Statistics. The survey devotes a section on agricultural extension services which collects data on agricultural extension agents and their institutional affiliation and the type of extension messages they provide. The survey also collects information on performance of the extension agents on providing supply and demand-driven advisory services	2016/2017	Descriptive analysis—to determine: 1. the gender-disaggregated access to agricultural extension services from providers with different institutional affiliation and 2. the type of extension messages given to farmers from agents with different institutional affiliation

Source: Authors.

extension agents with different institutional affiliations. We use descriptive analysis for the LSMS data. Using data collected from agricultural advisory service providers in 2008, we analyze the effectiveness of agricultural extension approach using four outcomes:

1. Farmers served by an agricultural extension agent as share of farmers in area of jurisdiction;
2. Share of female farmers served by an agricultural extension agent;
3. Type of technologies promoted; and
4. Type of farmers targeted by an agricultural extension agent.

Since the share of all farmers served in the area of jurisdiction and female farmers served are double censored (0 and 1) dependent variables, we use a two-limit tobit model. However, the two-limit tobit model assumes homoscedasticity (which occurs when the error does not change across observations of the independent variables) and normality (Long 1997). To address

TABLE 5.2 Type of econometric models used

Outcome	Type of dependent variable	Model
Farmers served as share of all farmers in area of jurisdiction	Double censored (0–1)	Tobit and CLAD
Female farmers served as share of total female farmers in area of jurisdiction	Double censored (0–1)	Tobit and CLAD
Type of technologies promoted	Dichotomous (0,1)	Probit or logit
Targeting poor or female farmers	Dichotomous (0,1)	Probit or logit

Source: Authors.
Note: CLAD = Censored Least Absolute Deviations.

potential violation of these assumptions, we used the Powell (1984) Censored Least Absolute Deviations (CLAD) estimator, which takes into account the censored nature of the data and addresses violations of the normality and homoscedasticity assumptions (Vijverberg 1987). The Censored Least Absolute Deviations estimator bootstraps the standard error to achieve robust estimations (Vijverberg 1987). The other models are estimated using probit or logit specifications since their dependent variables are dichotomous. Table 5.2 summarizes the type of models used to analyze the drivers of each outcome or rural services.

We also examined the interaction terms of affiliation with sex of agricultural extension agents (AEA) in order to assess the effectiveness of female extension agents under different affiliations (Table 5.3). The drivers of the share of farmers served and share of female farmers served are estimated using the following model:

$$Y = b_0 + \mathbf{b}_i\mathbf{X}_j + e_i$$

Where Y = the farmers served by an agricultural extension agent as share of total number of farmers in the agent's area of jurisdiction. $0 \leq Y \geq 1$; X is a vector of covariates affecting share of farmers served. The vector of the covariates affecting proportion of farmers served by extension, their expected sign, and justification of the expected sign are summarized in Table 5.3.

$$e_j \text{ error term, } e_j \sim N(0,1).$$

The same covariates are used for analyzing the type of technologies promoted and type of farmers targeted. Since there are many types of technologies promoted and several types of farmers targeted, the justification of their expected signs is not given for brevity reasons. Agricultural extension agents serving in areas with better rural services or in high agricultural potential and

TABLE 5.3 Covariates and their expected signs for share of farmers and female farmers served

Covariate	Sign	Justification
Female agent (cf male)	– (prop of farmers) + (prop of female)	Limited resources to serve but greater likelihood to serve female farmers (Lahai, Goldey, and Jones 2000; FAO 2011).
Age of agent	–/+	Older extension agents may have higher administrative position, which reduces the number of farmers served. But they can also have more resources to serve more.
Ethnicity	+	Extension agents with same ethnicity as area of jurisdiction will serve more farmers due to knowledge of language and familiarity with culture.
Level of education	–	Extension agents with higher education tend to serve at district offices and therefore serve fewer farmers.
Affiliation with government	–	Extension agents affiliated with government historically are less effective (Uganda, MAAIF and MFPED 2000).
High agricultural potential	+	Greater density of farmers, better market access.
Better rural services	+	Better services enhance effectiveness of extension agents.
Female agent x NAADS, NGO	+	Female agricultural extension agents will serve better under NAADS and NGOs due to better facilitation.

Source: Authors.
Note: NAADS = National Agricultural Advisory Services of Uganda.

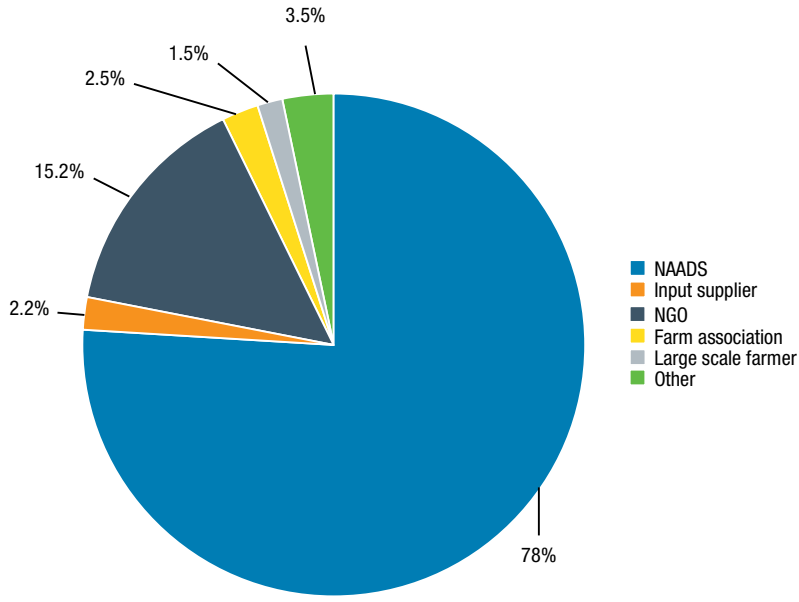
older agents are also expected to have better access to Internet, motorbikes, and training opportunities.

5.6 Access to Extension Services by Type of Service Providers

LSMS 2015–2016 data has one section focused on agricultural extension services. The questions covered are on whether a household received advisory services from agricultural extension agents affiliated with NAADS, input suppliers, NGOs, cooperatives or farmer associations, large-scale farmers, and other providers. Figure 5.5 shows the institutional affiliation of service providers.

To determine the gender-disaggregated access to agricultural extension services from providers with different institutional affiliation, we use the same data to determine the type of extension messages given to farmers from

FIGURE 5.5 Institutional affiliation of providers of agricultural advisory services (% of service providers)



Source: World Bank (n.d.).

Note: NAADS = National Agricultural Advisory Services of Uganda. Because of rounding, numbers might not add up precisely to 100.

agricultural extension agents with different institutional affiliation. To determine the drivers of effectiveness of institutional affiliation in coverage, type of advisory services given, and targeting women and poor farmers, we use data drawn from agricultural extension agents. A total of 208 agricultural extension agents were selected from 16 districts. Since availability of rural services plays a key role in effectiveness of providing rural services, we developed an index of rural services and used the index as a covariate of the outcomes of interest. The rural service index was used to select case study districts.

We used seven rural services and examined their change over time. The seven rural services included in the index were distance to all-weather roads, bank, secondary schools, primary schools, health centers, agricultural input shops, and agricultural extension services. These data were obtained from a household survey conducted by Uganda Bureau of Statistics. We used the varimax rotation methods (Kaiser 1958) to identify major factors that represent the seven rural services included in this analysis. Varimax rotation maximizes the sum of the variances of the squared correlation (loadings) so that

each individual rural service can be linearly represented using a single index. Factors with eigenvalues of greater than 1 were retained (Stata 2007). Only four factors were identified, which explained 77 percent of the variance. We then used the principal component factors generated from factor analysis to identify the districts with comparable level of rural services. An average hierarchical method was used to define the number of clusters (Stata 2007).

Table 5.4 shows the three indexes of rural services: (1) poor rural services; (2) medium rural services; and (3) best rural services. Rural services are best in the central region around Lake Victoria and are generally poor to medium in the northern districts. Western and eastern districts generally have medium to high level rural services. Figure 5.6 shows the results of quality service on a map. The figure shows very poor services in the northeast area of the Karamoja, which was not included in our study due to insecurity concerns during the study period. We then purposively selected districts from three of four rural service indexes. However, we did not sample agricultural extension agents from north and east districts. All districts in the north and east districts have very poor rural services. Purposive selection of districts was made to ensure that districts from each of the four administrative regions (Central, East, North, and West) of Uganda were represented. In addition, agricultural potential of the districts was considered in selecting the districts. Table 5.4 reports the selected districts and the index of rural services under each of the four geopolitical zones.

In each of the districts selected, a sampling frame was developed by listing all agricultural extension agents operating in a given district. A few agents were affiliated with the crop development authority or other institutions but their numbers were too few to form an independent group (Table 5.5). Likewise, there were only a few private agricultural extension agents working independently of NAADS and therefore not included in the analysis. But a number of independent agents worked under NAADS and were thus treated as NAADS-affiliated. NGO-affiliated agents were put into two groups. The first group included NGOs affiliated with NAADS and the other, those unaffiliated with NAADS. The table reports the percentage of agents and their affiliation across the four geopolitical regions.

About 63 percent of the 208 agricultural extension agents interviewed were affiliated with the government, while 22 percent and 10 percent, respectively, were associated with NAADS and NGOs (Table 5.5). The government agricultural extension agent affiliation was larger than expected largely due to the survey being conducted in 2008, during which the government was reemploying extension to prepare NAADS phase II. However, during the

TABLE 5.4 Selected districts and performance of rural services development under the geopolitical zones

Central		East		North		West	
District	Rural service performance	District	Rural service performance	District	Rural service performance	District	Rural service performance
Masaka	Best	Kumi	Medium	Lira	Medium	Bushenyi	Medium
Luweero	Best	Soroti	Poor	Gulu	Medium	Isingiro	Best
Mubende	Best	Mbale	Poor	Yumbe	Poor	Kabale	Medium
Nakasongola	Best	Katakwi	Medium	Pader	Unclassified	Kamwenge	Poor

Source: Authors.
Note: Sampling was done when Uganda had 56 districts. Uganda now has 127 districts.

TABLE 5.5 Type of extension service providers across regions

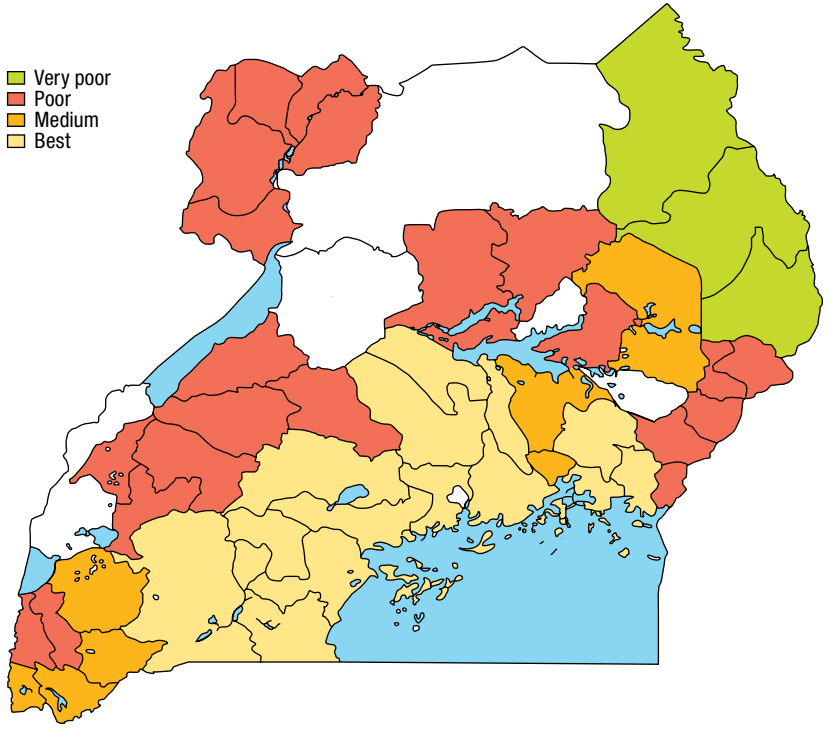
Affiliation	Percentage of total interviewed (n = 208)
Government	63
NAADS	22
Nongovernmental organization	10
Others	5

Source: Agricultural extension agent survey.
Note: NAADS = National Agricultural Advisory Services of Uganda.

time of the survey, government-affiliated agricultural extension agents were not yet working with NAADS. Other types of agents (crop authorities, independent and farmer organizations) only account for 5 percent of the total agent sample. Female agents accounted for only 11 percent of the agricultural extension agents in the country, and their number was significantly smaller than the equivalent of male agents in all types of affiliations (Table 5.6). This is comparable with the national average, which is 12 percent. Consistent with Swanson (2008), who noted that NGOs providing agricultural advisory services are focused on supporting women and other forms of social capital formation, the NGOs reported the largest share of female agents (26 percent), while the government reported the lowest share (10 percent).

The majority of the agricultural extension agents have a diploma (Table 5.7), which is a certificate obtained after high school or after ordinary-level secondary school followed by a college training that gives a certificate. The level of education is not significantly different across types of affiliation, but the share of government agricultural extension agents with first degree

FIGURE 5.6 Index of performance of rural services at district level



Source: Authors collected primary data and created the map.

Note: White space represents missing data: no information was collected from these districts.

TABLE 5.6 Gender of agricultural extension agents

Affiliation	Male (%)	Female (%)	Paired test (P-value)
Government (n = 137)	89.7	10.3	0.000***
NAADS (n = 48)	83.3	16.7	0.000***
Nongovernmental (n = 23)	73.1	26.9	0.015**
All (n = 208)	89.0	11.0	0.000***

Source: Agricultural extension agents survey.

Note: NAADS = National Agricultural Advisory Services of Uganda. Asterisks denote significance levels: *, ** & *** shows significant at P = 0.10, 0.05 & 0.01 respectively.

TABLE 5.7 Age and education level of providers

Affiliation	Age (years)	Education level (% holding)				
		Below college	College diploma	Bachelor's degree	Master's degree	Other
Government	44.0	5.1	37.2	48.7	7.7	1.3
NAADS	42.8	0.0	50.0	42.6	7.4	0.0
Nongovernmental	32.2	7.7	53.9	38.5	0.0	0.0
All	42.0	4.2	42.0	46.2	6.8	0.9

Source: Agricultural extension agents survey.
Note: NAADS = National Agricultural Advisory Services of Uganda.

or postgraduate education is highest. Consistent with Swanson (2008), nongovernmental agricultural extension agents reported the youngest age, suggesting that NGOs tend to hire younger agents. Government-affiliated agents reported the oldest age but highest share of agricultural extension agents with bachelor's degrees (Table 5.7). This reflects the government's long-term investments in educating agricultural extension agents. Agents affiliated with NGOs reported the lowest share of agents with college degrees. The young age of the agricultural extension providers could be the reason for such lower level of education.

Table 5.8 shows that the government agricultural extension agents serve the largest number of farmers but the smallest share of female-headed households (7 percent), while NGOs serve the smallest number of farmers. The share of female and male subsistence farmers met is comparable across all three types of affiliations. The major difference across types of affiliation is the share of farmers met. Agents affiliated with NGOs met about 43 percent of the farmers in their area of jurisdiction, while NAADS and government-affiliated agents met only about 20 percent of the farmers in their area of jurisdiction. The results underscore the smaller coverage of NGOs and their apparent targeting of women (Swanson 2008).

As is the case in Nigeria (Nkonya et al. 2010) and other countries, the major topic promoted across all types of affiliation remains improved varieties, which at least 62 percent of the agricultural extension agents promoted (Table 5.9). Promotion of agrochemicals is the second most important topic. Of interest is that 44 percent of the NAADS-affiliated agents promoted use of herbicide, while only 28 percent of government-affiliated agents and 19 percent of NGO-affiliated agents promoted herbicide use.

TABLE 5.8 Farmers in the area of jurisdiction of agricultural extension agents

Affiliation	Number of farmers served	Percentage of farmers met	Percentage of female-headed households met	Percentage of female subsistence farmers met	Percentage of male subsistence farmers met
Government	29,705	22.2	7.2	74.9	54.9
NAADS	13,529	19.2	9.9	76.7	53.1
Nongovernmental	5,005	43.2	16.1	71.5	59.1

Source: Agricultural extension agents survey.
Note: NAADS = National Agricultural Advisory Services of Uganda.

TABLE 5.9 Major topics promoted

	Percentage reporting		
Topics promoted	Government (n = 137)	NAADS (n = 48)	Nongovernment (n = 23)
Improved seed varieties	85.3	81.5	61.5
Agrochemicals	65.4	62.9	61.5
Herbicides	28.2	44.4	19.2
Plant protection techniques	20.5	16.7	19.2
Organic fertilizer	15.4	20.4	11.5
Chemical fertilizers	10.0	11.1	7.7
Agroforestry	8.3	11.1	0.0
Soil conservation technologies	0.6	1.9	7.7

Source: Agricultural extension agents survey.
Note: NAADS = National Agricultural Advisory Services of Uganda.

Promotion of agroforestry was done by only 8 percent of the government-affiliated agents and 11 percent of NAADS-affiliated agents. Similarly, promotion of soil erosion control was quite low (fewer than 8 percent). This is a cause for concern since advisory services seem focused on improved varieties, plant protection, and, to a limited extent, fertilizer. Promotion of organic soil fertility management practices is limited. The econometric analysis takes a more rigorous analysis of the descriptive statistics discussed previously.

5.7 Evidence of Effectiveness and Impact

About 12 percent of households received agricultural advisory services in 2015–2016 (Table 5.10). NAADS remains the largest provider of agricultural advisory services in Uganda. The program reached 78 percent of farmers who

TABLE 5.10 Institutional affiliation of providers of extension services

Institutional affiliation of provider	Percentage of households reporting							P-value female-headed households = male-headed households
	Central	Eastern	Northern	Western	National	Female-headed household	Male-headed household	
Any provider	7.9	15.5	15.6	7.6	12.0			
NAADS	67.4	88.3	71.4	81.6	78.0	70.2	80.8	0.044**
Input supplier	0.0	0.0	3.3	6.1	2.2	0.0	3.0	0.107*
Nongovernmental	9.3	8.7	23.5	14.2	15.2	20.2	13.4	0.071*
Farm association	9.3	0.0	2.5	2.0	2.5	1.1	3.0	0.358
Large-scale farmer	4.6	0.9	1.6	0.0	1.5	1.1	1.7	0.732
Other	9.3	3.8	2.5	0.0	3.5	7.1	2.1	0.0341**

Source: Computed from LSMS 2015–2016.

Note: NAADS = National Agricultural Advisory Services of Uganda. Responses for access to advisory services for each institution excludes households who didn't have access to advisory from any provider. Asterisks denote significance levels: *, ** & *** shows significant at P = 0.10, 0.05 & 0.01 respectively.

received advisory services in 2015–2016. At the national level, male-headed households had significantly (at p = 0.05) greater access to NAADS than female-headed households—suggesting that NAADS's targeting of women in implementing its strategic objectives has not yet shown favorable results. However, NGOs—which are the second major providers of advisory service—reached significantly higher (at p = 0.10) share of female-headed households than male-headed households—underscoring the nongovernmental organization comparative advantage in targeting women. The eastern region reported the highest access to NAADS advisory services, while the central region reported the lowest access. This is surprising given that the central region has the highest market access.

Given that only NAADS and NGOs are the largest providers of advisory services—and thus with enough observations to conduct statistical tests—the rest of the discussion ignores the other providers. It is striking to observe that participation in NAADS training and farmer groups is below 10 percent at the national level (Table 5.11). In 2007 about 716,000 households—or 20 percent of national farming households—participated in NAADS (Benin, Nkonya, Okecho, Randriamamonjy, Kato, Lubadde, Kyotalimye, and Byekwaso 2011). This means participation in the program has decreased by about 50 percent since 2007. This could reflect reduced budget or declining trust, perception, and effectiveness of NAADS, as recently reported (for example, Turyahikayo and Kamagara 2016; Barungi, Guloba, and Adong

TABLE 5.11 Participation in NAADS training and farmer groups (%)

Region	Participated in NAADS training			Belong to NAADS farmer group		
	Female-headed households	Male-headed households	P-value	Female-headed households	Male-headed households	P-value
Central	4.2	3.8	0.768	4.8	2.4	0.053**
East	8.4	10.7	0.334	4.4	7.1	0.159
North	4.0	10.0	0.003***	4.7	7.5	0.128
West	4.3	10.3	0.009***	2.4	5.8	0.049**
National	5.1	8.7	0.000***	4.2	5.7	0.075*

Source: Computed from LSMS 2015–2016.

Note: NAADS = National Agricultural Advisory Services of Uganda. Asterisks denote significance levels: *, ** & *** shows significance at P = 0.10, 0.05 & 0.01, respectively.

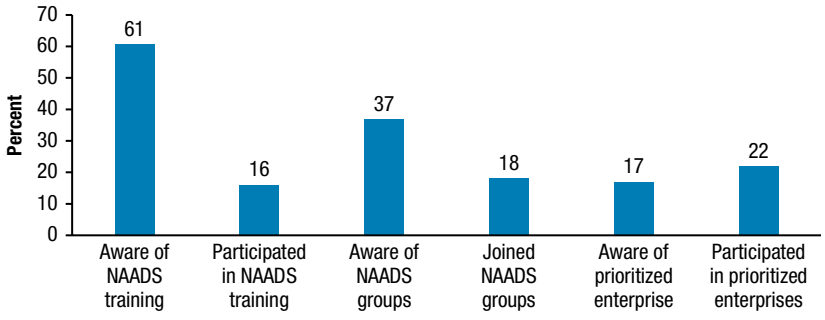
2016). The introduction of the Single Spine Agricultural Extension System (SSES) could have contributed to NAADS's reduced coverage of farmers.[3]

Table 5.11 shows that about 9 percent of male-headed households participated in NAADS training—a level that is significantly higher (at p = 0.01) than female-headed households' participation. Likewise, the share of male-headed households who participated in NAADS training in the north and west regions was significantly higher (at p = 0.01) than the case for female-headed households. There is gender parity in NAADS participation in the central and eastern regions (at p = 10). Compared to male-headed households, a significantly higher (at p = 0.05) share of female-headed households in the central region were members of NAADS groups. This demonstrates that it is possible to achieve gender parity in areas with high market access.

Likewise, even though 61 percent of households reported to be aware of NAADS training, only 16 percent participated in training (Figure 5.7). Only 37 percent of households were aware of NAADS groups and only 18 percent of those aware joined the farmer groups. This is consistent with the results reported in Figure 5.7, which shows limited participation in NAADS training. Awareness of the 12 strategic enterprises is even lower, as only 17 percent of households reported being aware and only 22 percent of those aware participated in their production. Despite the broad consultation done to select the

3 Although farmer group training under NAADS has decreased, giving way to SSES, farmers seem not to have realized the institutional changes and apparently think SSES is NAADS. This could have contributed to the high percent of farmers reporting that they received advisory services from NAADS in Table 5.10, but the very low participation in NAADS farmer groups in Table 5.11, as NAADS farmer groups no longer provide training in its former structure.

FIGURE 5.7 Awareness of NAADS training, groups, and priority enterprises



Source: Computed from World Bank (n.d.).
Note: NAADS = National Agricultural Advisory Services of Uganda.

TABLE 5.12 Demand-driven and supply-driven provision of advisory services

	Total number of visits per year	
Service provider	Solicited	Unsolicited
NAADS	99	81
Input supplier	2	0
Nongovernmental organization	57	55
Cooperative/farmer group	8	3
Large-scale Farm	2	6
Other extension	8	14

Source: Computed from LSMS 2015–2016.
Note: NAADS = National Agricultural Advisory Services of Uganda.

strategic enterprises, the low share of farmers producing them calls for strategies to determine relevance and enhance greater uptake.

The key approach of NAADS phase I was demand-driven agricultural extension services. Accordingly, training of farmers was done to increase their capacity to demand advisory services (Benin, Nkonya, Okecho, Randriamamonjy, Kato, Lubadde, Kyotalimye, and Byekwaso 2011). Respondents reported higher frequency of solicited visits by NAADS and NGOs than unsolicited visits—underscoring higher capacity to demand and seek advisory services (Table 5.12).

Of interest is the type of extension messages given. Consistent with its strategic objective of developing agriculture value chains and facilitating market linkages, NAADS delivered advisory services covering the entire value chain

TABLE 5.13 Type of extension messages given by providers, by their affiliation (%)

Extension topics	NAADS (n = 254)	Input supplier (n = 7)	NGOs (n = 49)	Cooperative/ farmers association (n = 8)	Large-scale farmer (n = 5)	Others (n = 11)
Agricultural production	95.6	71.4	91.8	100	80.0	63.6
Agricultural prices	41.7	28.5	57.1	75.0	80.0	45.4
Agro-processing	32.6	28.5	51.0	37.5	40.0	54.5
Crop marketing	37.4	28.5	65.3	62.5	20.0	72.7
Livestock marketing	31.8	28.5	38.7	25.0	0.0	54.5
Fishing production	10.2	0.0	18.3	12.5	0.0	9.0
Meat production	36.2	0.0	26.5	12.5	0.0	18.1
Milk production	23.6	14.2	26.5	25.0	0.0	36.3
Livestock diseases	47.2	57.1	42.8	25.0	20.0	63.6

Source: Computed from LSMS 2015–2016.

Note: NAADS = National Agricultural Advisory Services of Uganda. Analysis restricted to those who received extension services from a given provider.

and all 12 strategic enterprises (Table 5.13).[4] Agricultural production was the most popular topic promoted by all providers. The share of NAADS message recipients was lowest for fish advisory services. This is expected given the low importance of fishing enterprise compared to crops and livestock. It is interesting to note that nongovernmental organizations provided higher advisory services on agricultural prices and processing and crop marketing than NAADS. This further illustrates the comparative advantage of NGOs providing specialized advisory services.

In summary, the household-level results show the impact and effectiveness of NAADS in providing advisory service reforms in Uganda has been reduced. The LSMS 2015–2016 data show the negative short-term effect of the reforms on NAADS effectiveness. Particularly, the coverage of farmers by NAADS has been reduced by about 50 percent, while the role of private extension agents has been reduced. Similarly, farmer groups formed under NAADS phase I have been reduced significantly. These results cast concerns on the ongoing extension reforms and direction of the NAADS program. This chapter takes a deeper analysis of data drawn from agricultural extension agents. We examine the drivers of share of farmers served, targeting of women and poor households, and type of technologies provided. The analysis is done across institutional affiliation of agricultural extension agents.

4 However, the table aggregates all crops into one group.

Drivers of Share of Farmers and Female Farmers Served by Agricultural Extension Agents

For brevity, we focus the discussion on policy-relevant covariates, which include gender, level of education, institutional affiliation of agricultural extension agents, and their access to rural services. Given the key role women play in agricultural production and provision of advisory services, the discussion emphasizes the gender role and its impact. Consistent with other studies (for example, Lahai, Goldey, and Jones 2000; World Bank 2010), female agents were more likely to provide advisory services to female farmers than male agents (Table 5.14). Consistent with a priori expectation, agricultural extension agents with bachelor or postgraduate degrees provided less advisory services than those with a diploma or lower education. This is due to placement, where agents with a degree or a master's degree (46 percent of the total agents interviewed) are given supervisory roles at the district or subcounty level. The agricultural extension agents with master's level education accounted for only 7 percent and therefore are given strategic supervisory roles. The diploma and certificate holders have less specialized professions and are meant to do most of the legwork to advise farmers.

NAADS- and NGO-affiliated agricultural extension agents are more likely to provide advisory services to women than government-affiliated agents. This is consistent with Swanson (2008), who noted the NGO bias toward women and other vulnerable groups. This result is consistent with what farmers reported (Table 5.10). Benin, Nkonya, Okecho, Randriamamonjy, Kato, Lubadde, Kyotalimye, and Byekwaso (2011) observed that female-headed households benefited more indirectly from NAADS than male-headed households. The results underscore the weak capacity of government-affiliated agricultural extension agents to provide advisory services to women farmers and highlight the need to increase their capacity given that the changes in the advisory services are reinstating provision of advisory services to government-affiliated agents. NGO-affiliated agents were more likely to offer advisory services to a larger share of farmers than was the case for the government-affiliated agents. This could be due to better incentives provided by NGOs, small number of farmers served, better working facilities (for example, all of them reported having a motorbike and cell phone), and their young age, all of which lead to more efficient delivery of rural services.

Surprisingly, agricultural extension agents in areas with poor rural services were more likely to provide advisory services to higher proportions of farmers than those in moderate or best rural services. These unexpected results are

TABLE 5.14 Determinants of proportion of farmers served by extension providers in the community

	Proportion of farmers served		Proportion of female farmers served	
Variable	Two-limit tobit	CLAD	Two-limit tobit	CLAD
Female agent	7.958	–4.781	1.768	5.498**
Age of agent	–0.233	–0.066	0.054	0.047
Ethnic group (cf. Luganda)				
Nyakitara	3.267	0.056	–0.165	–0.781
Northern	–13.706	–8.147***	–0.963	–3.120*
West Nile	–2.483	–7.159***	–2.96	–3.753*
Eastern bantu	–5.015	3.714*	–0.557	–0.451
Eastern non-bantu	23.754***	13.998***	9.151***	5.230***
Level of education (cf. certificate)				
Diploma	–11.187	–4.776	1.838	–0.208
Bachelor degree	–15.332	–8.115***	1.259	–1.017
Postgraduate degree	–24.988*	–9.751**	2.978	1.98
Other education	–45.702	–0.413	–4.605	–6.459*
Institutional affiliation (cf. Government)				
NAADS	–0.264	1.737	6.404***	1.341
NGO	7.082	4.328*	6.228*	2.919
High agricultural potential	2.086	2.197	–3.054	–0.785
Performance of rural services (cf. Poor)				
Medium performance	–5.515	–4.931**	2.272	–0.875
Best performance	–10.154	–5.898**	0.389	–2.096
NAADS x female agent	–14.114	–2.631	–8.017	–6.287*
NGO x female agent	1.408	21.977***	–1.772	7.633*
Constant		17.391***		1.627

Source: Agricultural extension agents survey.

Note: cf. = control or reference group. NAADS = National Agricultural Advisory Services of Uganda. CLAD = Censored Least Absolute Deviations estimator. Asterisks denote significance levels: *, ** & *** shows significant at P = 0.10, 0.05 & 0.01 respectively.

supported by descriptive statistics, due to the large number of farmers in areas with good rural services (Table 5.15). It is likely that agricultural extension agents in areas with medium or best market access are engaged in other activities and do not devote enough time to provide services. However, there is need to examine these puzzling results.

TABLE 5.15 Farmers across levels of rural service development groups

Rural services	Number of farmers in area of jurisdiction	Share served (%)
Poor	38,445	20.7
Moderate	14,143	18.1
Best	13,452	14.5

Source: Agricultural extension agents survey.

Female agricultural extension agents working under nongovernmental organizations provide advisory services to a larger share of all farmers and to women farmers than is the case of female agents affiliated with government. This is additional evidence of the orientation of NGOs to provide advisory services to women farmers.

5.8 Drivers of Targeting of Advisory Services to Different Groups of Farmers

Disregarding institutional affiliation, female agricultural extension agents were less likely to target any group—including women. However, when affiliated with NGOs or NAADS, female agents were more likely to target poor farmers, large-scale farmers, women, export farmers, and young farmers (Table 5.16). Consistent with its objectives of targeting poor farmers, NAADS-affiliated agricultural extension agents were more likely to target poor farmers than government-affiliated agents. NGO-affiliated agents were more likely to target export crop farmers but less likely to target large farmers, female farmers, and livestock farmers. The results conflict with those observed previously. Probable reason for these results could be the inclusion of the interaction terms discussed above. Accordingly, the NGO times female agent and NAADS times female agent interaction terms show positive impact on targeting poor farmers, female farmers, and young farmers.

Drivers of the Type of Technology Provided by Agricultural Extension Agents

While female agricultural extension agents generally were less likely to provide advisory services on fertilizer, agroforestry, and soil erosion control,

TABLE 5.16 Determinants of type of farmer targeted by provider (marginal effects)

Variable	Poor farmer	Large-scale farmer	Export farmer	Female farmer	Young farmer	Livestock farmer
Female agent	−0.250***	−0.095***	−0.053***	−0.164***	−0.133***	−0.035
Age of agent	0.002	−0.002	−0.001	−0.002	0.003	−0.001
Ethnicity of agent (cf. Ganda)						
Nyakitara	−0.013	−0.018	−0.051***	−0.106***	−0.062	−0.125**
Northern	−0.108*	−0.081***	−0.096***	−0.042	−0.049	0.011
West Nile	−0.038	−0.002	−0.050***	0.06	0.046	−0.05
Eastern bantu	−0.138***	−0.03	−0.074***	−0.045	−0.052	−0.002
Eastern non-bantu	−0.065	−0.014	0.011	0.053	0.055	−0.003
Highest level of education (cf. Certificate)						
Diploma	0.014	0.305***	−0.015***	0.028	0.458***	−0.142*
Bachelor degree	0.056	0.346***	0.025	0.016	0.459***	−0.089
Postgraduate degree	−0.002	0.538***	−0.022***	0.048	0.746***	0.045
Other education	−0.184***	−0.026***	0.012***	−0.100***	0.087***	−0.160***
Affiliation of AEA (cf. Government)						
NAADS	0.174**	0.078	0.037	0.066	0.074	0.129
NGO	0.065	−0.055***	0.020***	−0.134***	−0.002	−0.177***
High agricultural potential	0.03	0.006	−0.024**	0.015	−0.011	0.035
Performance of rural services (cf. Poor)						
Medium performance	−0.057	−0.060**	−0.013***	0.037	−0.015	0.101
Best performance	−0.148**	−0.059*	−0.052***	−0.033	−0.004	0.009
NAADS x female agent	0.715***	0.530***	0.068***	0.710***	0.731***	−0.083
NGO x female agent	0.730***	0.534***	0.280***	0.873***	0.066***	−0.033***
Number of observations	202	202	202	202	202	202

Source: Agricultural extension agents survey.

Note: cf. = control or reference group. NAADS = National Agricultural Advisory Services of Uganda. AEA = agricultural extension agents. Asterisks denote significance levels: *, ** & *** shows significant at P = 0.10, 0.05 & 0.01 respectively.

they were more likely to provide advisory services on agroforestry, soil erosion control, and fertilizer if they work under NAADS or nongovernmental organizations (Table 5.17). This gives further evidence of the likelihood of NGOs to provide advisory services on sustainable land management technologies observed by Nkonya et al. (2005). Contrary to Nkonya et al. (2004), however, NGO-affiliated agricultural extension agents were less likely to provide advisory services on agroforestry. Results show that better educated agents were more likely to provide advisory services on

TABLE 5.17 Determinants of technology provided by extension provider (marginal effects)

Variable	Improved seeds	Agrochemical	Plant protection	Herbicide	Fertilizer	Organic fertilizer	Agroforestry	Soil erosion control
Female AEA	–0.034	0.026	–0.039	–0.036	–0.154***	0.135	–0.082***	–0.031***
Age of AEA	–0.002	0.001	–0.003	0.003	0.006***	0.002	0.003*	–0.004***
Ethnicity of AEA (cf. Luganda)								
Nyakitara	–0.138	–0.061	0.113	0.195*	–0.027	–0.067	0.112	0.007
Northern	0.138*	–0.291**	–0.032	–0.07	–0.043	–0.147***	–0.044	–0.142***
West Nile	0.049	0.111	0.155	–0.032	–0.024	–0.001	–0.081***	–0.099***
Eastern bantu	0.059	–0.121	–0.055	0.07	–0.072**	–0.093**	–0.014	–0.063***
Eastern non-bantu	0.098*	0.059	–0.069	0.019	0.096	–0.121***	0.022	–0.038***
Level of education (cf. Certificate)								
Diploma	0.257***	0.011	0.065	0.097	0.478***	0.113	0.013	–0.092***
Bachelor's degree	0.183***	0.053	0.014	0.185	0.474***	0.115	–0.007	–0.148***
Postgraduate degree	0.065	–0.106	–0.013	–0.081	0.755***	0.292	–0.028	–0.033***
Other education	0.190***	–0.23	0.11	0.373	0.245***	–0.145***	0.067***	–0.025***
Affiliation of AEA (cf. Government)								
NAADS	–0.042	0.017	–0.103	0.164*	–0.017	0.094	0.012	0.018
NGO	–0.339***	0.084	–0.037	0.059	–0.024	0.089	–0.077***	–0.016
High agricultural. potential	–0.082	–0.078	–0.018	–0.043	–0.088***	–0.042	–0.01	0.012

(continued)

TABLE 5.17 Continued

Variable	Improved seeds	Agrochemical	Plant protection	Herbicide	Fertilizer	Organic fertilizer	Agroforestry	Soil erosion control
Rural service performance (cf. Poor)								
Medium	0.156***	0.04	0.009	−0.012	0.03	−0.072	−0.059*	−0.129***
Best	0.267***	0.162*	−0.003	−0.089	−0.014	−0.137***	0.001	−0.182***
NAADS x female AEA	0.082	−0.209	0.039	−0.07	0.760***	−0.093	0.016***	0.019***
NGO x female AEA	0.034	−0.174	−0.096	−0.12	0.788***	−0.092	0.677***	−0.025***
Number of observations	202	202	202	202	202	202	202	202

Source: Agricultural extension agents survey.

Note: cf. = control or reference group; AEA = agricultural extension agents; NAADS = National Agricultural Advisory Services of Uganda. Asterisks denote significance levels: *, ** & *** shows significance at P = 0.10, 0.05 & 0.01 respectively.

improved crop seeds and chemical fertilizer but less likely to provide advisory services on soil erosion control.

This suggests that better educated agents seem more oriented toward providing advisory services on short-term benefits, which could lead to land degradation. Since the agricultural extension agents with higher education were the supervisors of the agents with a certificate in agriculture, their low propensity to provide advisory services on technologies that lead to long-term benefits—namely agroforestry and soil and water conservation practices—is a concern and calls for reevaluation of their capacity to provide such technologies. One of the solutions to addressing the low propensity to provide sustainable land management practices is to provide on-the-job training.

NAADS was more likely to give advisory services on herbicide than government-affiliated agricultural extension agents (Table 5.17). This reflects NAADS's commercial orientation. Best rural services were positively associated with provision of improved seeds but negatively associated with propensity to provide soil erosion control. The high propensity to provide improved seeds in areas with best rural services is likely due to the higher access of improved seeds in areas with high market access. This further raises concerns on the capacity of advisory services to provide sustainable land management advisory services.

5.9 Conclusions and Policy Implications

This study comes at a time when Uganda is implementing reforms in provision of its agricultural extension services. Even though the data used are dated, the results show the negative short-term effect of the reforms on NAADS effectiveness. The results are corroborated by most recent studies that reach the same conclusion. Particularly, the coverage of farmers by NAADS was reduced by about 50 percent, while the role of private extension agents also reduced. Similarly, farmer groups formed under NAADS phase I reduced significantly. This calls for the need to improve the institutional landscape of agricultural advisory services in Uganda—a country that trailblazed the advisory service approach. On the positive side, the higher share of farmers who received advisory services from NAADS phase II on topics other than production has increased significantly.

Results drawn from the agricultural extension agents survey as well as the household survey reaffirm the important role played by pluralistic extension services, since each type of institutional affiliation seemed to have a comparative advantage. This requires reconsideration of some of the new strategies

of giving a greater role to advisory services by NGOs and private agricultural extension agents. As seen in the results, for example, female agents affiliated with NGOs and NAADS (under phase I) had greater propensity to provide advisory services to the poor and to female farmers and to offer advisory services on sustainable land management than males. Female extension agents hold the key to provision of agricultural advisory services to female farmers and the poor and to providing more sustainable land management extension messages.

Female agents serving under NAADS or NGOs were more likely to target their advisory services to women and poor farmers than their male counterparts. These favorable outcomes suggest the need to increase the number of female agents to exploit their great potential to reach women and the poor. Currently, only about 11 percent of the agricultural extension agents in Uganda are women. Most of them are located in the southern and western regions, underscoring the need to create incentives to reach the poorest region in the north. Female agents working under NAADS and nongovernmental organizations were more likely to provide advisory services on soil erosion control and agroforestry than their male counterparts. Our study shows that the share of agricultural extension agents providing messages on control of soil erosion and agroforestry was among the lowest but among those most demanded by farmers. This shows a big gap of provision of advisory services on organic soil fertility management practices. This is a common problem in other countries in Africa south of the Sahara. For example, Nkonya and Koo (2017) and Nkonya, Koo, and Kato (2017) showed that such practices—used in combination with chemical fertilizer—are more profitable and more sustainable than use of fertilizer alone, but their adoption rate in Kenya, Niger, Nigeria, and Uganda was lower than adoption of fertilizer only. Hence recruitment of more female agents will address this gap and contribute to achieving the Development Strategy Investment Program objective of ensuring sustainable land management.

Training of agricultural extension agents serving under the Single Spine Agricultural Extension System is required to increase their knowledge on sustainable land management and marketing and postharvest knowledge. Our results showed that agricultural extension agents with higher levels of education and those affiliated with government had a lower propensity to provide advisory services on organic soil fertility management practices than those with a certificate or those affiliated with NAADS or NGOs. In addition, the focus of agricultural extension agents affiliated with government is on

production technologies. This suggests their weak capacity to provide advisory services on marketing and postharvest technologies. Such advisory services are key to achieving objectives of several policies and strategies seeking to transform subsistence farming to commercial farming (for example, the National Agricultural Extension Policy 2016 and the National Agricultural Extension Strategy 2016/2017–2020/2021). Another new aspect that calls for retraining is the provision of demand-driven advisory services and provision of gender-sensitive advisory services, both of which show weaknesses.

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