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Context, Challenges, and Prospects for Agricultural Extension in Nigeria

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Abstract

Agricultural extension programs have been implemented in Nigeria by governmental and non-governmental agencies from the colonial era to the present day as a means toward bolstering economic development, rural livelihoods, food security, and trade relations. Nevertheless, funding and staffing levels in agricultural extension remain low compared to Nigeria's farming population. With a brief review of past initiatives, current challenges, and potential opportunities, this article gives recommendations in three focus areas for maximizing the effectiveness of Nigerian agricultural extension: (1) prioritize human education over input provisioning in the definition of agricultural extension's primary purpose; (2) aim for household food security, not solely business expansion, to ensure the inclusion of the most vulnerable farmers; and (3) foster multidirectional communication among academic researchers, extension agents, and farmers. Overall, this article argues that taking a farmer-centric educational approach to agricultural extension, rather than a farm-centric business approach, will have the most profound and sustained impact on Nigerian agricultural development.

Keywords: Nigeria; agricultural extension; rural development; fertilizer subsidies; farmer education; household food security; agribusiness; research-farmer linkage

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Introduction

In the crook of Africa's west coast, Nigeria is the most populous nation in Africa and the seventh-most populous in the world, with a 2019 population of 201 million (UNdata, 2019). Of the country's 911,000 square kilometers of land area, 78% is dedicated to agriculture (including 33% permanent pasture), and 36% of the labor force is engaged in agriculture (Food and Agriculture Organization of the United Nations [FAO], 2019). Nigeria's export economy is mainly based on petroleum (95%), while cocoa and rubber have the next largest shares (Central Intelligence Agency [CIA], 2019). Despite its export dominance, petroleum accounted for under 9% of national GDP in 2018, compared to agriculture's 21% (National Bureau of Statistics [NBS], 2019). However, domestic agriculture is currently unable to support the growing population's food needs; three to five billion dollars of food is imported per year, largely comprising staples such as wheat and rice (Federal Ministry of Agriculture and Rural Development [FMARD], 2016). Effective agricultural extension is a key component of agricultural development and thus critical to Nigerian prosperity. Yet, it faces many challenges.

Initiatives to expand agricultural extension in Nigeria must bridge diverse needs and perspectives due to the many demographic distinctions across the country (Sehu, 2018). Home to over 250 ethnic groups speaking more than 500 languages, Nigeria retained English as its official language after gaining independence from Great Britain in 1960 (CIA, 2019). The Nigerian population is split nearly in half in several ways: around 50% live in urban areas (FAO, 2019); 51.6% are Muslim and 46.9% Christian (CIA, 2019); and 59.6% are literate - 69.2% among males and 49.7% among females (CIA, 2019). Islam is the majority religion in the arid northern plains bordering the Sahel, with *sharia* (Islamic law) officially integrated in twelve states (Kendhammer, 2013; CIA, 2019). Inhabitants of the southern lowlands near the coast, by contrast, predominantly adhere to Christianity (Kendhammer, 2013; CIA, 2019). In between, hills and plateaus form a religiously mixed middle region (Kendhammer, 2013; CIA, 2019).

Besides facing unique challenges, agricultural development in Nigeria has minimal governmental financing compared to other African countries (Olomola et al., 2015). Despite the substantial portion of Nigeria's land, labor force, and GDP associated with this sector, agriculture was allotted 5.5% of the national budget on average from 2008 to 2012 (Olomola et al., 2015). This fell to 2% in 2018 (Onyibe, 2019), although the Comprehensive Africa Agriculture Development Program recommends a 10% allocation (NEPAD Planning and Coordinating Agency et al., 2012). Furthermore, as a nation of lower-middle income, Nigeria regularly experiences low budget execution, where actual spending falls short of planned spending (Morgues et al., 2008; Olomola et al., 2015). Low availability of monetary resources increases the urgency that they be used to the highest efficiency.

In this article, the authors draw upon historical and current examples of agricultural extension in Nigeria to argue that its full potential to facilitate the country's agricultural and national development has yet to be realized. Specifically, we focus on three areas where an agricultural extension system (and the Nigerian system especially) must advance to achieve long-term effectiveness for human development: (1) defining agricultural extension's primary purpose, (2) reaching marginalized populations, and (3) mediating multidirectional communication among academic researchers, extension agents, and farmers. For each of these three areas, we describe relevant context, challenges, and future prospects for strengthening the agricultural extension system in Nigeria. This review article aims to stimulate local and international stakeholders in Nigerian agriculture toward reflection, dialogue, and constructive reprioritization, with implications for other countries' agricultural extension systems as well.

Defining the Purpose of Agricultural Extension

The foundation of an effective and cohesive extension system lies in a dynamic response to the following question: what is the purpose of agricultural extension? Developmental progress is often measured by material indicators, e.g., productivity (Phillip et al., 2009), fertilizer use (Banful et al., 2010; Olomola et al., 2015), equipment acquisition (“Fadama III,” 2010), or adoption of recommended crop varieties (Phillip et al., 2009). However, these need not be considered the chief end of an agricultural extension system. For example, Liberty Hyde Bailey, a pioneer in founding agricultural extension programs in the U.S., most strongly emphasized its role in knowledge dissemination and human education, writing in 1898, “Its purpose is to improve the farmer, not the farm” (as cited in Peters, 2006, p. 192). He and his peers sought to promote practical learning throughout the farming population, rather than advanced classroom instruction for a scholarly few (Peters, 2006). From this standpoint, agricultural extension programs must not induce a dependency of farmers on expert instruction. Rather, they must increase farmers’ independent capacity to analyze and adapt to ever-changing environmental, market, and technological conditions. This article will refer to this emphasis on farmer education as a *farmer-centric* approach to agricultural extension.

In Nigeria, governmental bodies and international agencies often tend towards the contrasting *farm-centric* perspective. Their publications largely treat extension services as one means among many toward the end of economic development, defined by improvements in household income, imports and exports, agricultural productivity, and other quantitative farm indicators (FMARD, 2016). The transmission of intellectual and cultural capital is rarely recognized even as an intermediate success. Economic outcomes certainly hold meaning where agricultural extension aims to contribute to financial and food security. At the same time, however, these outcomes are also affected by civil strife, natural disasters, and other factors that agricultural extension can prepare for and respond to but not control (Davis, 2008; FMARD, 2016). A farm-centric agricultural extension system concerned primarily with technology adoption is inherently limited in relevance to where the technology it promotes is the best option (Davis, 2008). In contrast, a farmer-centric extension program can transcend changing and diverse conditions by building foundational knowledge and skills, promoting localized evaluation and adaptation, and facilitating farmer experimentation and decision making (Rhoades, 1989). Increased farmer resilience is an intangible benefit, even if circumstances prevent its immediate manifestation as monetary profit. For these reasons, a farmer-centric approach could serve well in an African context (David & Samuel, 2014). The remainder of this section discusses the context, challenges, and future prospects for strengthening a farmer-centric agricultural extension system in Nigeria.

Context: Linkage of Agricultural Extension and Input Provisioning

The first decades of Nigeria’s independence coincided with the global “Green Revolution” of explosive agricultural technology development. As a newly independent country, Nigeria emphasized modern agricultural objectives in its first national development plan (implemented 1962-1968), including expansion of cash crop production, technology, infrastructure, and extension services (Iwuagwu, 2008). In 1966, today’s Federal Ministry of Agriculture and Rural Development (FMARD) was established (under the name Federal Ministry of Agriculture) to oversee agricultural policy in Nigeria at the federal level (World Bank, 2008). State-level Agricultural Development Programs (ADPs) funded by the World Bank became the major implementers of agricultural extension in the seventies and eighties (Omoregbee & Ajayi, 2009), with the first pilot ADPs in 1975 (Phillip et al., 2009). Besides

delivering agricultural training, ADP extension agents became the primary distributors of fertilizers (Banful et al., 2010; Morgues et al., 2008). Private fertilizer businesses were not even permissible at the time, because the federal government of Nigeria enforced a monopoly on fertilizer procurement and distribution until 1996 (Morgues et al., 2008). This system distributed subsidized fertilizers to each state (Morgues et al., 2008), where additional subsidies were often applied (Banful et al., 2010). In released national budget expenditures, 43% of agricultural funds went towards procuring and distributing fertilizer from 2001 to 2005 (Morgues et al., 2008). Applied research, extension programs, and farmer capacity building remain low budget priorities (Omotayo, 2010).

In 2011, FMARD initiated the Agricultural Transformation Agenda (ATA), a five-year strategy to revitalize Nigerian agriculture (FMARD, 2016). The ATA's goals included bolstering production, reducing food import dependency, and fully liberalizing the government-administered input supply ("ATA-Nigeria," n.d.; Olomola et al., 2015). Federal fertilizer subsidies continued under the Growth Enhancement Support Scheme (Olomola et al., 2015; Ejiogu, 2017). Restructuring the fertilizer procurement system, with private companies selling subsidized inputs directly to farmers since September 2011 ("ATA-Nigeria," n.d.), resulted in an estimated 12 to 14 million farmers benefiting from fertilizer subsidies over five years (FMARD, 2016). This coincided with increases in average fertilizer use rates and farm revenue (Onyekuru et al., 2019). Thus, for much of Nigeria's history, input provisioning has been tightly linked with agricultural extension in terms of government funding and staffing.

Challenges: Limitations of Farm-Centric Agricultural Extension

Despite the emphasis on fertilizers, Nigeria's usage rates remain among the lowest in the world, with limited quality and quantity available in many areas (Banful et al., 2010; Onyekuru et al., 2019). Less than 50% of agricultural households were found to use any fertilizer whatsoever by a 2015/2016 survey (NBS, 2016). The government-dominated procurement system was criticized as narrowly targeting large-scale farming (Phillip et al., 2009) and being inefficient in quantity and timeliness of materials reaching farmers (Banful et al., 2010; FMARD, 2016; Morgues et al., 2008; Onyekuru et al., 2019). Thus, while Nigeria's small agricultural budget has heavily leaned toward input provisioning and promotion (Morgues et al., 2008; Olomola et al., 2015; Onyibe, 2019), challenges in implementation have impeded its ability to benefit farmers.

Perhaps the more serious challenge is that if extension agents see their primary purpose as ensuring access to subsidies or inputs, the core educational component of extension is minimized. Further, a prioritization of farm technology over farmers' communication, leadership, and organizational skills may leave program participants with limited capacity to pass on learned information to others, as observed under the World Bank's "Training and Visit" approach used by the ADPs (Musa et al., 2016). In fact, agrochemical use tends to surpass organic fertilizers, irrigation, and soil erosion control as extension agents' main emphasis across Nigeria (Banful et al., 2010). In Edo State in South-South Nigeria, a study found that over 98% of women cassava farmers were informed on fertilizer use, while under 32% knew about the recommended planting time, 35% about plant spacing, and under 30% about the recommended harvest time (Onemolease, 2002). In 2009, 40% of extension agents in Edo state supplied farm inputs, while less than 8% provided technical advice, and less than 2% offered training on agrochemical use (Omoregbee & Ajayi, 2009). A 2010 survey reported that 90% of extension agents across Nigeria had promoted fertilizer use in the past year, while their own knowledge

regarding fertilizers and usage recommendations was found to be shallow and inconsistent (Banful et al., 2010). Any newly circulating technology, including synthetic fertilizers and crop storage and others, requires sufficient accompanying instruction to be properly used and to actually benefit farmers (Faborode & Ajayi, 2015). Increasing fertilizer use has been a key goal of Nigeria's development strategies for decades. However, any emphasis on technological adaptation would be complementary, not fundamental, to the core purpose of a farmer-centric agricultural extension system seeking to expand farmers' knowledge and skills.

Prospects: Towards a Farmer-Centric Agricultural Extension System

The priorities of an extension system will be reflected in what it uses as indicators of success. If technology adoptions and productivity increases are the only outcomes measured, the intangible benefits of deepening farmer knowledge and analytical thinking remain unsung or unachieved. Farmer-centric evaluation of agricultural extension must include farmer-centric metrics, such as awareness of recommended agricultural practices, finance management, and marketing opportunities (Onemolease, 2002). For example, the Sasakawa Africa Association headquartered in Japan, which has partnered with FMARD and state ADPs in Nigeria since 1992, shifted its emphasis in 2009 from crop productivity to human education (Sasakawa Africa Association, n.d.). This international organization assesses and fulfills the training needs of Nigerian extension staff and farmers regarding current and advanced knowledge on agriculture, technology, and entrepreneurship (Donye et al., 2013). Future research on the impact of agricultural extension should not allow farm-centric indicators to overshadow the fulfilment of farmer-centric needs. The following section moves from the purpose of an agricultural extension system to the targeting of its content.

Reaching Marginalized Populations

Whether farm-centric or farmer-centric, agricultural extension programs face a variety of needs and preferences for educational content in a country as climactically and economically diverse as Nigeria. The issues faced by small-scale subsistence farmers growing staple foods will often differ from those on large plantations growing cash crops, and the environmental risks to and from agriculture will differ across climates. With agricultural extension staff low in numbers compared to the farming population (Banful et al., 2010; Omotayo, 2010), not all farmers' concerns can be addressed concurrently. This section argues that the capacity of an agricultural extension system to benefit the economically poorest farmers is impacted by its instructional focus, largely based on whether agriculture is prevailingly viewed as a business sector or as a means toward household food security.

Context: Historical Targeting of Agricultural Extension

A business-oriented focus within agricultural extension in Nigeria can be traced back to the colonial era (1861-1960). Initially, agricultural extension was devised to expand export commodity production, rather than to improve food security (Forest, 1981; Omotayo, 2010). For example, the British Cotton Growing Association founded the Moor Plantation in Ibadan around the turn of the twentieth century to serve as an experimental station and distribute cotton seeds to farmers (Ekundare, 1973). Agricultural development efforts similarly promoted crops desirable for export in the latter twentieth century, while staple production for local consumption struggled to compete with low-priced imports (Forest, 1981). Under the structural adjustment policies of the

1980s, demand for tropical exports influenced cropping patterns in many developing countries like Nigeria away from staple grains and other necessities, undermining food security (Patnaik, 1996).

In the 1980s, some agricultural extension programs in Nigeria also began to focus on the production of domestic foods, especially maize, through capacity building and fertilizer promotion (Phillip et al., 2009). These included the ADPs, funded by the World Bank, which marked a localization of agricultural extension with state-level rather than national implementation (Omogbee & Ajayi, 2009). Agricultural extension work further contributed to building domestic food security in the twenty-first century under the presidential initiatives on cassava, rice, and other food crops, which aimed to reduce dependency on imports and enable export of surplus (Phillip et al., 2009).

Beginning in 2011, FMARD's ATA addressed both small- and large-scale agriculture through a focus on economics (FMARD, 2016). Motivated by the concept that "agriculture is a business," the ATA's explicit objectives emphasized financial gains, namely increased income for smallholder farmers and growth of private industry through integration in value chains and establishment of staple crop processing zones (FMARD, 2016). At the same time, the ATA's Strategic Environmental and Social Assessment seemed lacking in ecological considerations, with neither soil health nor biodiversity concerns being mentioned in the summary (FMARD, 2013). Another environmental issue unaddressed by the ATA is the remediation of agricultural lands impacted by oil spills throughout the Niger Delta region (Ahmandu & Egbodion, 2013).

Challenges: Barriers to Agricultural Extension Access

In attempting to reach the most marginalized farmers, agricultural extension services in rural Nigeria face the compounding challenges of decaying infrastructure (FMARD, 2016), lack of transportation (FMARD, 2016), low farmer education levels (Phillip et al., 2009), retiring staff needing replacement (Banful et al., 2010), and limited staff numbers (Banful et al., 2010). Perhaps the major obstacles can be summarized under the interrelated themes of geographic access and socioeconomic status.

Geographic access was especially a challenge under FMARD's "Training and Demonstration" strategy of the sixties, where large demonstration plots were established to showcase a farming practice or system (Omotayo, 2010). The finite numbers of demonstration plots inherently limited geographic accessibility for farmers farther from the plots' locations (Omotayo, 2010). Regardless of strategy, a short-staffed office has limited interaction capacity within its intended target area. Using Edo State to illustrate, 80 ADP extension agents were reported in the state by a 2009 paper (Omogbee & Ajayi, 2009), serving a predominantly agricultural population of over three million. Even interacting with 650 farmers per year (Banful et al., 2010), the Edo ADP extension staff numbers fall short, which may contribute to uneven distribution of the beneficial impacts of ADP services (Inegbedion et al., 2018). In 2014, only one of 457 women farmers surveyed in Edo State had ever accessed extension-organized training (Ibharhokanrhowa, 2016). The average extensionist-to-farmer ratio has been estimated to be as low as 1:3000 across Nigeria (Omotayo, 2010). Most Nigerian agricultural extension staff are spread too thinly to adequately serve their intended geographic areas using current strategies.

Besides low extension staff numbers, socioeconomic status can also be a barrier to farmers accessing relevant extension. With insufficient state funding, extension programs are proposing to charge service fees, which can exclude the poorest farmers (Banful et al., 2010). Farmers can also be marginalized or targeted by the selection of crops emphasized in agricultural extension programming. High-value crops tend to be opportunistically grown on small parcels of

land by richer households as an income supplement, whereas subsistence crops of low market value tend to be grown by households that remain poor, even with large family landholdings (World Bank, 2014). Thus, an extension program promoting high-value, marketable crops (such as pumpkins and yams) could disproportionately benefit non-poor households with greater market integration, although further research is needed in this area. The risk of excluding vulnerable populations was realized by public fertilizer subsidies from 2003 to 2008, which disproportionately benefited middle- and high-income households over the poorest ones (Olomola et al., 2014). In light of the challenges of geographic access and socioeconomic status, the following subsection discusses prospects rooted in successful past initiatives for agricultural extension to effectively reach the most easily marginalized farmers.

Prospects: Toward Ensuring Inclusion

To address the most pressing needs among the farming population, the Nigerian agricultural extension system must not allow income to bias its focus toward large-scale commercial farmers to the detriment of serving small-scale subsistence farmers. An example of specifically targeting smallholders, the third phase of the National Fadama Development Project (Fadama III) was implemented in 2008 in all 36 states with funding from the Nigerian government and the World Bank (Omobowale & Akinola, 2017). The Fadama projects promoted irrigation to decrease dependency on unreliable rains as a strategy to support crop productivity and increase smallholder farmers' incomes ("Fadama III," 2010). In Delta State, an evaluation of Fadama III found participant households to experience a larger increase in income compared to non-participants (Ike, 2012), with similar results in other states (Omobowale & Akinola, 2017). Rather than only considering states or the country in aggregate, future agricultural extension and research initiatives may similarly implement household-based evaluation strategies to ensure inclusion of marginalized farmers. Further, the distribution of observed benefits across farmer income level should also be analyzed.

More recently, an increasing prioritization of food security in agriculture is evident in government planning in Nigeria. In 2016, the ATA was succeeded by another five-year plan called Agricultural Promotion Policy (APP), also called the Green Alternative ("The Green Alternative," n.d.). In some ways, the APP continued in the vein of the ATA by emphasizing agribusiness's role in economic stability through reducing imports and increasing quality and profitability of exports (FMARD, 2016). Additionally, however, the APP adopts the language of food as a human right and names environmental sustainability as a priority (FMARD, 2016; "The Green Alternative," n.d.). Overall, agriculture in Nigeria is still cast as a business enterprise in which the government can invest to build national economic stability and foreign exchange. Nevertheless, through programs targeting subsistence crop production and low-income households, agricultural extension can be more directly serve the needs of the most vulnerable segment of the population. The next section of this paper discusses multidirectional communication as the third and final key area of potential growth for the Nigerian agricultural extension system.

Fostering Open Communication

A successful farmer-centric agricultural extension system must not only inform farmers of the advances of scientific research but also inform researchers of the needs and insights of farmers. Farmer involvement in problem identification and project evaluation is critical to ensuring that agricultural research and extension remain applicable to practical issues in the field

(Cernea et al., 1985; Davis, 2008). To date, agricultural extension programs in Nigeria have tended towards a top-down flow of technical information (Alao, 1982; Musa et al., 2013), with dissemination of current research findings remaining low (Faborode & Ajayi, 2015). Further, women farmers face unique barriers to integration in agricultural extension systems staffed predominantly by men (Banful et al., 2010; Osaze, 2015). Here, we argue that fostering farmer involvement in agricultural research through multi-way communication and listening is critical to matching agricultural extension initiatives to farmers' needs.

Context: Research, Agricultural Extension, and Farmers

Agricultural experimental stations were founded in Nigeria during the colonial era, such as the Moor Plantation in Ibadan, which focused on cotton for export (Ekundare, 1973). Through independence in the 1960s, federal research institutions continued to focus on commodity crops (Omotayo, 2010). The 2011-2015 ATA period saw the establishment of the Federal Department of Agricultural Extension and reform measures within the Agricultural Research Council of Nigeria (ARCN), which oversees Nigeria's state-supported agricultural research institutions (FMARD, 2016). The Council supervises fifteen commodity-based research institutes, eleven Federal Colleges of Agriculture (one at Ibadan, established in 1921 in the location of the former Moor Plantation), the National Agricultural Extension Institute, three universities of agriculture, and more (FMARD, 2016).

Historically, the linkage between agricultural research and field extension services in Nigeria has remained tenuous (FMARD, 2016). The main purpose of agricultural extension in Nigeria has been characterized as unidirectional, conveying technical information from research agencies to farmers (Alao, 1982), without emphasis on communicating farmers' knowledge to researchers (Rhoades, 1989). In the late twentieth century, the Research-Extension-Farmer-Input Linkage System (REFILS) model was developed to facilitate communication among diverse stakeholders in agriculture (Faborode & Ajayi, 2015; Koyenikan & Omoregbee, 2015), adapted from the Training and Visit approach introduced to Nigerian ADPs in 1986 (Omotayo, 2010; Musa et al., 2013). More recently, the ARCN began collaborating with the International Food Policy Research Institute to seek greater integration of the Federal Colleges of Agriculture in extension activities and village-level outreach to improve the translation of knowledge to practice (Babu, 2016). Further, the APP proposes strengthening coordination among federal and state agricultural institutions while adding up to 15,000 extension agents (FMARD, 2016). Despite these realized and proposed efforts, clear gaps persist between researchers and farmers in terms of technology transfer and communication of needs (Faborode & Ajayi, 2015).

Communication among agricultural extension agents and farmers has evolved over time as well. Under the FMARD's Training and Demonstration approach before REFILS, farmers tended to doubt their ability to replicate results from demonstration plots in their own fields (Omotayo, 2010). With the expansion of ADPs in each Nigerian state in the 1980s, interactions between extension agents and farmers were positive, although inefficient communication across national and state offices resulted in redundancy and rivalry among programs rather than a coordinated effort (Phillip et al., 2009). In the 1990s, dedicated Women in Agriculture programs were funded under every state's ADP to particularly address women's limited agricultural extension access and participation (Ibharhokanrhowa, 2016; Osaze, 2015). The following subsection discusses such challenges to mutual communication between farmers and researchers through agricultural extension.

Challenges: The Most Difficult Connections

There are countless opportunities for communication breakdown between researchers' experiment-based knowledge and farmers' practical decision making. For example, official fertilizer rates are listed in planting manuals as elemental nutrient weights, while farmers and extension agents prefer the practical unit of 50 kg bags of standard NPK fertilizer (Banful et al., 2010). Many Nigerian farmers will recognize different crop and livestock varieties based on physical characteristics without knowing formal names used in scientific research and communication (Phillip et al., 2009). Extension agents work to bridge the gap by explaining farmers' perspectives to researchers, and in turn contextualizing recommendations (Cernea et al., 1985). The best recommendations must be both relevant and understandable.

In terms of gender, women tend to have less access than men to agricultural extension services, land rights, and credit, despite bearing core responsibilities for agricultural production (Ibharhokanrhowa, 2016; Osaze, 2015; Phillip et al., 2009). In 2010, extension staff from eight Nigerian states comprised less than 15% women (Banful et al., 2010). With few women among them, the homosocial tendency to interact with others of the same gender results in a dearth of agricultural extension reaching women farmers (Banful et al., 2010; Osaze, 2015). Gender roles also impact extension's targeting capacity if training programs prioritize work carried out by men rather than women, or if women-targeted training programs are misaligned with women's actual roles (Odebode, 2012). A homogeneity of gender (or another demographic variable) among extension agents, especially when their efforts are already spread thin, can be a barrier to participation for farmers who find themselves underrepresented—in this case, women. An extension system striving to integrate the perspectives of diverse farmers must address this.

Prospects: Toward Expanding Interconnected Agricultural Networks

Where the conventional agricultural extension pattern remains distinct from research institutions and finds difficulty transcending social barriers to reach marginalized farmers, more traditional avenues of communication may prove valuable. For example, while less than 9% of women cassava farmers in Igueben and Esan Northeast Local Government Areas of Edo State had received information through interaction with extension agents, 89% did through family and friends (Onemolease, 2002). Despite the limited numbers of extension agents, information naturally disseminates to farmers through other formal and informal channels. If educational programs target farmers with a high number and diversity of social connections and encourage participants to pass on what they learn, a larger segment of society can benefit beyond direct contact with extension agents. Opportunities for farmers to grow as communicators and innovators can be created through personal relationships with extension agents, partnerships with researchers to conduct on-farm research (Cernea et al., 1985), and building connections among farmers through local organization (Davis, 2008).

Modern technologies can also prove useful to facilitating networks among agricultural stakeholders (Faborode & Ajayi, 2015). Opportunities for enhancing communication and local connectivity include leveraging mobile phones as an accessible platform and increased coordination among federal, state, and local levels of government (Omotayo, 2010). Mobile phones have already been successfully integrated into fertilizer subsidy programs in Nigeria under the Growth Enhancement Support Scheme (Olomola et al., 2014); perhaps parallel advances can be made in applications of this technology in agricultural extension. Further research can illuminate how agricultural extension can best integrate traditional and modern modes of interaction to connect farmers, extension agents, and agricultural researchers more

strongly. A successful agricultural extension system requires not simply passive information dispensing but rather active multidirectional communication and navigation of social barriers.

Conclusions, Implications and Recommendations

In summary, three potential areas for increased efficiency and growth for agricultural extension in Nigeria include defining extension's purpose, matching programs to the target population's needs, and mediating linkages among researchers, extension agents, and farmers. Current and past initiatives have made advances in these regards; yet, financial support from the government remains insufficient to sustain and institutionalize successful activities nationwide. In some cases, private sector agencies and international NGOs have filled gaps where government funding was not available. Still, the full potential for agricultural extension services to enhance agricultural development remains unrealized in Nigeria.

This article has presented three core recommendations for an increasingly farmer-centric focus in Nigerian agricultural extension: (1) prioritize human education over resource provisioning, (2) aim for household food security and not solely business expansion, and (3) engage farmers' practical concerns through listening and on-farm research. Moving in these directions could revitalize the role of agricultural extension in broader agricultural development and human flourishing in Nigeria, while setting an example for other countries in Africa and around the world with parallel challenges.

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