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Informing Policy with Agricultural R&D Evidence

An ASTI Pilot Project in Ethiopia, Nigeria, and Tanzania

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ABSTRACT

Despite Agricultural Science and Technology Indicators' (ASTI) global and regional visibility—and the use of its data for institutional decision-making by various national agricultural research institutes—the incorporation of ASTI evidence into national policymaking remains mostly ad hoc and is often indirect. Moreover, interventions to influence the uptake of ASTI data for this purpose have been limited. Given agricultural research's important role in increasing agricultural productivity, economic growth, and poverty reduction, ASTI initiated a pilot study in three African countries (Ethiopia, Nigeria, and Tanzania) to develop a clearer understanding of how to promote the uptake of agricultural research evidence. The study focused on how evidence in general, and ASTI evidence in particular, could be more effectively integrated at the national level, particularly to promote the allocation of sustainable resources to agricultural research.

The study was conducted in two stages: (1) the mapping of each country's agricultural research interests and issues; and (2) identifying initial activities through which those interests offered opportunities both to fill research gaps and enhance the utility of agricultural research. Findings from the pilot studies point to opportunities for improving the availability, accessibility, appropriateness, and ownership of ASTI evidence to ensure that it contributes more effectively as a valuable resource for decision-making. Strong relationships and networks are needed to increase awareness of ASTI evidence and to institute linkages with official national data systems. Outcomes indicated both interest in the evidence and recognition of its merit. Greater outreach and connectivity with local institutions may be useful next steps.

These findings lead to some general recommendations for improving the use of evidence, along with specific recommendations for the ASTI network approach moving forward. Shifting ownership of the data and systems to the regional and national levels—a key objective of the network approach—is a long-term undertaking. A transition period is needed, accompanied by a strategic plan to shift responsibility and action, first to the regional level and then to the national level where feasible.

Keywords: agricultural research, evidence use, Ethiopia, Nigeria, Tanzania, policy influence

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ACRONYMS

AgGDP	agricultural gross domestic product
ARCN	Agricultural Research Council of Nigeria
ASTI	Agricultural Science and Technology Indicators
COSTECH	Commission for Science, Technology and Innovation [Tanzania
CSA	Central Statistical Agency [Ethiopia]
CSO(s)	civil society organization(s)
EIAR	Ethiopian Agricultural Research Institute
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
IDRC	International Development Research Centre
IFPRI	International Food Policy Research Institute
MALF	Ministry of Agriculture, Livestock, and Fisheries [Tanzania]
NARI(s)	national agricultural research institute(s)
NARS	national agricultural research systems
NBS	National Bureau of Statistics [Nigeria and Tanzania]
PIM	CGIAR Research Program on Policies, Institutions, and Markets
PPP(s)	purchasing power parity [exchange rates]
R&D	research and experimental development
REDFS	Rural Economic Development and Food Security [Ethiopia]
TARI	Tanzanian Agricultural Research Institute

1. INTRODUCTION

For nearly two decades Agricultural Science and Technology Indicators (ASTI) has filled the unique role of providing relevant, high-quality data and analyses on investments, human resource capacity, and institutional developments in national agricultural research systems (NARS) in low- and middle-income countries. Working with a large network of country-level collaborators, ASTI conducts institutional surveys to collect primary data from government, higher education, nonprofit, and private for-profit agencies involved in agricultural research and experimental development (R&D) across 4 regions encompassing nearly 90 countries. ASTI's evidence is widely respected and extensively used by international organizations such as the World Bank, United Nations, Food and Agriculture Organization of the United Nations (FAO), African Union, donor organizations, regional bodies, and the international research community. Despite its global and regional visibility—and the use of data for institutional decision-making by various national agricultural research institutes (NARIs) (Lowder 2018)—the incorporation of ASTI evidence into national policymaking is mostly ad hoc and often indirect. Moreover, interventions to influence the uptake of ASTI data for this purpose have been limited.

Given the important role of agricultural R&D in increasing agricultural productivity, economic growth, and poverty reduction (Beintema and Stads 2017), ASTI initiated a pilot study in three African countries—Ethiopia, Nigeria, and Tanzania—with the intention of developing a clearer understanding of how ASTI evidence could be used more effectively at the national level. In particular, the study focused on how ASTI evidence might be more effectively and consistently used by national governments and other stakeholders to promote the allocation of sustainable resources to agricultural research.

This study has broader implications than the boundaries of using agricultural research evidence. The rise of big data and the growing awareness of both the importance of data and the gaps in even basic data, such as civil registry and vital statistics in many countries, brings to the fore the challenges and importance of reliable data, not only for producing, but also for using the evidence needed for long-term progress. The next section of this discussion paper describes the broader context for "evidence-informed" policymaking. Section 3 outlines the framework employed for the study. Sections 4 and 5 present the

approach to the pilot case studies. Section 6 discusses the findings of the pilot studies and their implications. Section 7 presents conclusions, along with broad recommendations for increasing the use of evidence, and specific recommendations for promoting the use of ASTI evidence.

2. TRENDS IN "EVIDENCE-INFORMED" POLICYMAKING

What has become the preoccupation of many researchers and evaluators over the past 25 years is not so much *use* of research itself, but a better understanding of the *mechanisms* of its use. Two of the founders of the field of evaluation, Carol Weiss (1967, 1977) and Michael Patton (1982, 2008), prioritized the use of "evaluative evidence" (that is, evidence emerging from the evaluation of an intervention or program). Over the past two decades, interest in how evidence informs public policy has grown significantly, evolving from a focus on "evidence-based" policy—which implies a direct, but illusory relationship—to the idea of "evidence-informed" policy—which assigns evidence a more modest role. This subtle shift recognizes that, to play a role in public policy, evidence must dance with the prevailing political climate, values, and priorities. Evidence-informed policymaking has also come to the fore in the development programming of a number of donor agencies, evolving from the perspective that evidence should directly influence public policy to a recognition that—while evidence can inform policy processes—a direct and measurable causal influence seldom exists.

In major innovations, such as treatments for polio or vaccines for various diseases, the relationship between evidence and policy appears to be more straightforward because of the clear and direct benefits to public health and the economy (which does not mean the transition is easy, but rather that it is well understood and supported both politically and socially). But when impacts are more abstract and longer term, support becomes much harder to muster. Policy change resulting from disruptive technologies—for example, the car, the Internet, or the polio vaccine—tend to be self-organizing, whereas change resulting from nondisruptive technologies requires much more attention and energy to institute.[1]

Extending the case to agricultural research, development timelines are long: it can take decades for the benefits of building capacities and committing time and resources to research to pay off in improved agricultural productivity (Pardey and Alston 2010). So, while agricultural research has been

[1] Disruptive technologies significantly alter the way people and organizations operate; they create new opportunities, new markets, and new ways of interacting. Nondisruptive technologies focus on improvements within the existing system by attempting to change existing patterns; this leads to tensions and potential changes in power structures, with all the resistance that such changes imply.

shown to improve agricultural productivity, it is a hard sell to governments that are stretched for resources and focused on short-term impacts. Consequently, evidence of the state of agricultural research in a country receives insufficient attention and spending on improving the foundations for agricultural research remains limited.

It is in this challenging context that ASTI set out to investigate how national-level use of its agricultural research evidence could be increased. As a basis for launching the three pilot case studies, a framework for influence was first defined following the findings of research conducted by the International Development Research Centre (IDRC) and reported in Carden (2009).

3. STUDY FRAMEWORK

In 2009, IDRC published the results of a major study looking at how the research it supported influenced public policy in the countries in which it was carried out (Carden 2009). IDRC supports development research by researchers in the global south, with a view to addressing significant development problems in those countries. What the Centre had not previously looked at was how the link was made—how the data and analyses moved from evidence to useful policy guidance or information. It was intended that the study would identify the mechanisms that led to success, with a view to learning for future interventions. The framework that emerged is briefly outlined below to set the stage for presenting and discussing the findings of the pilot studies in Ethiopia, Nigeria, and Tanzania (Figure 1).

In the IDRC study, 23 in-depth case studies were developed from projects where program officers identified that the research had influenced policy. These projects were conducted in Africa, Asia, Latin America, and Eastern Europe. They covered a wide range of topics, including finance and trade, poverty monitoring, education and health reform, and natural resources and water management. They were nondisruptive in nature, but nevertheless represented important development issues. Rather than assessing a random sample to determine whether or not policy influence was occurring, the intent was to assess a sample of research projects where influence was thought to be occurring in order to identify what mechanisms had made the policy influence possible.

In identifying the mechanisms of influence, it became clear that the setting in which the research was carried out made a big difference and hence needed to be understood prior to accurately defining how the mechanisms themselves operated. The studies highlighted three crucial factors that are beyond the control of researchers and are key to the success or failure of efforts to influence policy: intent, time, and context.

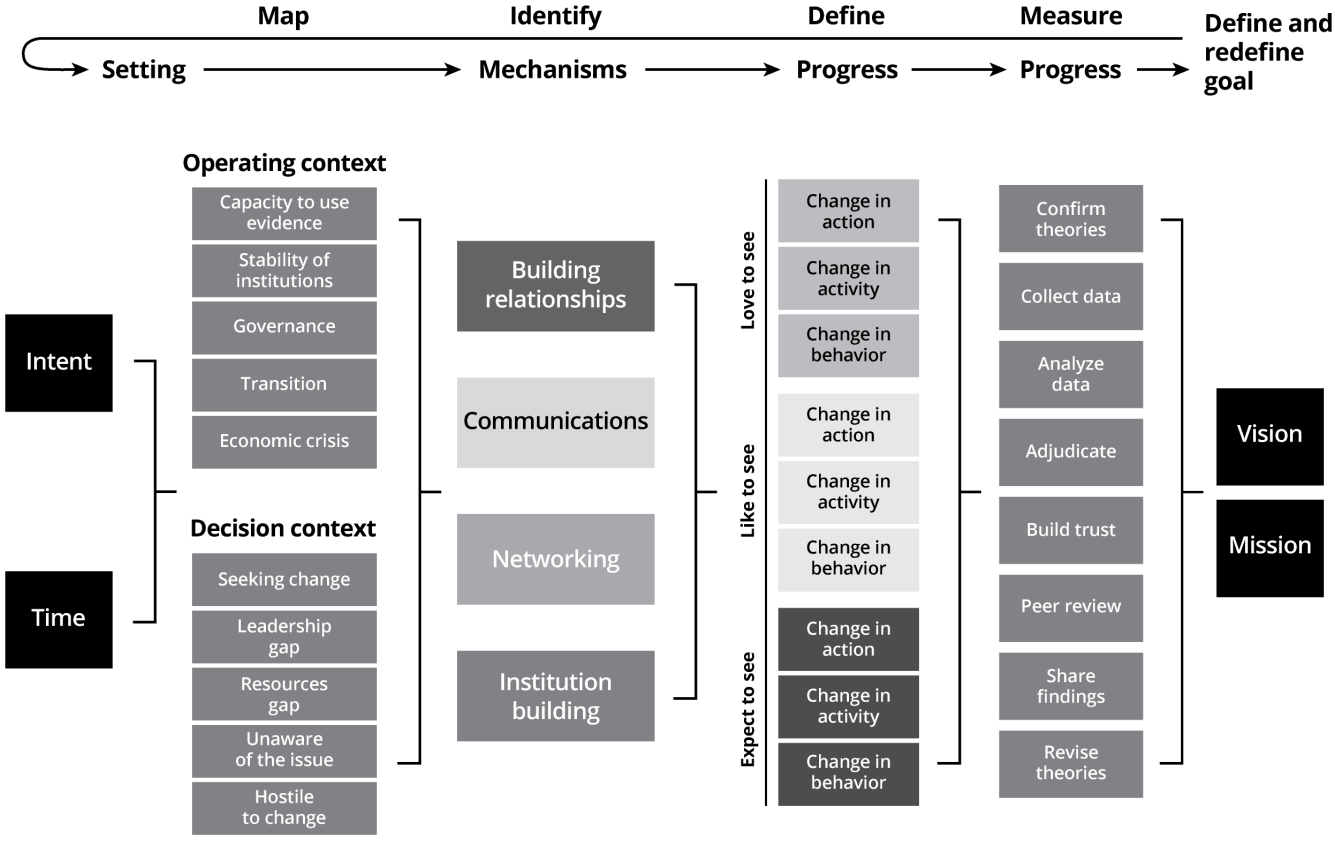
First, ***intent*** matters for the obvious reason that if you do not set out to do something, it is much less likely to happen; further, identifying the need to adapt strategies or tactics is much less likely because a clear end goal is not in sight. Obvious as this may seem, it was not present in all cases. Projects were often founded more on good intentions than on a strategic focus: the first reaction of many researchers

interviewed was that they "do the research" and it was up to others to "use the results." In these cases, policy influence was lessened, did not actually occur, or took much longer to occur. This is particularly an issue in the context of development research, which is about both *generating* and *using* knowledge. With clear intent comes the ability to adapt as the conditions and context change, dropping some activities that are not successful and taking advantage of new opportunities as they emerge.

Second, ***time*** matters because there is seldom a straight line from research to results to policy influence (exceptions exist, but there was only one in the IDRC sample). It is rather more common for research to percolate into the thinking of policymakers and mix with other evidence and factors before it is brought to bear on a policy issue (Weiss 1993). Unless the results align with something a policymaker not only believes but is also in a position to act on politically, it is more likely to require time before the findings affect policy.

Third, ***context*** matters in two ways. First, the ***operating context*** is critically important. This includes a clear understanding of the governance system (for example, institutional stability and locus of decision-making), capacities of decision-makers, and economic and sociopolitical conditions. All these factors play positively and negatively into opportunities to present evidence for change—and understanding them is crucial. The second aspect of context is the ***decision context***, that is, how open decision-makers are to evidence. Understanding their level of interest, as well as the factors that shape their interest, are important for identifying tactics to promote policy adaptation. In some cases, decision-makers are seeking evidence; in others they are limited by a lack of leadership or resources; in some cases they are unaware something needs to be addressed (the study found that researchers are often ahead of the policy regime in anticipating potential issues); and in still other cases, policymakers are opposed to change for political, knowledge, socioeconomic, or values reasons.

Figure 1. A framework for policy influence



Source: Adapted from Carden (2017).

These were the main two contextual factors that appeared to make a difference in how well research influenced public policy. Without this clarity and understanding, it is difficult to take the next step and identify (1) appropriate strategies to promote evidence; (2) how, when, and why to change approaches; and (3) how best to apply such approaches. This is where the intervenor has control over the mechanisms of interaction—that is, what intervention to choose in efforts to bring the evidence to bear. Four critical factors were identified, each operating within—and crucially dependent on adaptation to—the context.

First, ***relationships*** are critical. Determining what relationships to build is key. Relationships with decision-makers are certainly important, but often it is relationships with lower levels of the bureaucracy that play a key role, and sometimes the community matters in exerting external pressure on decision-

makers. The media, including social media, also plays an increasingly important role in some issues. A clear understanding of context helps in identifying which relationships matter.

Second, ***networks*** often play an important role, whether with other researchers to strengthen the findings or with those who can advocate using the evidence. Few things can be achieved by a single organization because issues are increasingly complex in nature.

Third, ***communications*** are essential. Researchers are often poor communicators of their work and find it difficult to put ideas into the language of policymakers or into a style the media or communities can use. Thinking about who can help with communications, who to communicate with, what style of communication would be effective, and how to persist is crucial to successful influence.

Finally, ***institutional knowledge*** plays a vital role. Understanding where in the system a change can be made is crucial. Communicating evidence to affect policies is not only about presenting ideas but about identifying where in the system an idea can have influence and lead to improved policies and practices. Understanding institutions is often neglected by researchers who strive to influence policy; but institutions matter deeply to policymakers who have to implement change. This gap in understanding can result in researchers and policymakers talking at cross purposes, revealing no clear way forward.

Together these four mechanisms facilitate the identification of an ***impact pathway*** for evidence and suggest domains for measurement (the "Measure Progress" column in Figure 1.) Being clear about both the destination and the mechanisms to use to get there seems obvious. But too often, heroic assumptions are made about what an activity can achieve because the pathway to influence has not been mapped. Being explicit about how change will happen—the theory of change—forces an articulation of how an intervention will occur. At the same time, as Weiss (1995) argues, alternative theories should be considered, along with whether or not the main issues have been identified; this includes looking at both factors for change *and* why change might not happen.

The next step is framing an approach to evaluating change (the "Defining Progress" column in Figure 1), which is based on outcome mapping (Earl, Carden, and Smutylo 2001). The pilot project did not proceed with defining and measuring progress in its short time frame. In outcome mapping, change is

measured through changes in behavior, action, and activity that signal movement toward the desired new condition. Measuring progress then permits confirmation or falsification of the theory of change. The data collected and analyzed allow a judgement on progress (an adjudication) to be made. Building trust is essential to move beyond adjudication to open the findings to peer review. This legitimizes sharing the findings more broadly so that learning and exchange of ideas can result in revisions and improvements to the theory of change. This reflective process culminates in confirmation or adaptation of the long-term vision, as well as the shorter-term mission of the organization or project.

4. THE APPROACH ADOPTED FOR THE PILOT CASE STUDIES

In order to identify ways to increase the use and utility of agricultural research evidence for national policies that support and fund agricultural research, ASTI sought to test some strategies for bringing agricultural research support front and center in responding to the agricultural development agendas of ASTI target countries in Africa. The aim of the study was to adapt the framework for policy influencing (as described in Section 3) for use at the country level, supporting enhanced uptake and use of ASTI's data, analyses, and policy options by key policy influencers, stakeholders, and decision-makers to promote increased funding for agricultural research. The study team included staff from the International Food Policy Research Institute (IFPRI), experts in national policy processes, and ASTI's key collaborators (country focal points). The ASTI evidence covers a broad set of indicators related to agricultural research, such as financial resources and human resource capacity; however, the focus of the three pilot studies in Ethiopia, Nigeria, and Tanzania was narrower, and targeted national agricultural R&D investments.

The pilot studies were defined in two stages. Phase I involved mapping each country's agricultural research interests and issues. Phase II involved identifying initial activities to focus those interests on opportunities to fill gaps in and enhance agricultural research. The pilot studies were short (eight months), with the intention of opening up the discussion, identifying opportunities, and clarifying further potential.

In Phase I, country focal points were asked to map the interests at the national level on how investment in agricultural research can positively affect agricultural productivity, economic growth, and poverty reduction. More specifically the mapping studies aimed to identify the demand for agricultural research evidence—not just ASTI evidence specifically—along with existing and potential pathways of influence among decision-makers and other actors in the policy process. The intention was also to obtain feedback on institutional and political opportunities and constraints to using evidence.

During this phase, national experts on policy influencing, supported by an international expert and the ASTI national focal points, interviewed major stakeholders in agricultural research in each of the

pilot study countries. The team targeted representatives from government, the research community, civil society organizations (CSOs), development partners, and the media to assess the demand for agricultural research data and analyses in both the government and nongovernment sectors, including the private sector. Where possible, this phase comprised an assessment of how ASTI data and analyses have been used, who has used them, and what the impacts/outcomes have been to date. The studies also addressed gaps in data provision compared with the needs and interests of key users.

Drawing from the key findings of Phase I, Phase II was initiated based on the proposition that agricultural research data have not been used effectively to promote support for agricultural research due to (1) lack of awareness of the data; (2) lack of resources to develop effective communication strategies for its use; and (3) lack of connection to national systems of data management, which are the primary sources of data and evidence for national governments.

Therefore, the overall objective of Phase II was to develop a set of activities in the three pilot countries that would result in increased awareness of the financial issues facing NARIs, in particular, and agricultural research more broadly. The second objective was to promote greater interest in funding and support for agricultural research, taking into account that these activities should

- be specific, testable, and feasible to implement;
- be sustainable without significant external input over the long term;
- take account of the key needs of the agricultural system;
- take account of the key needs of decision-makers for agricultural research data;
- build on existing systems (preferably at the national level, but where necessary at the international level); and
- offer lessons for cross comparison among the three pilot countries and, eventually, for other countries.

In addition to individual meetings, workshops were used to enumerate the issues, explore the findings, and identify champions who could move the agenda forward in each country. Workshop

participants included representatives of the major agencies implicated in any effort to improve the relevance utility and place of the ASTI evidence in national agricultural research policy—such as ministries of agriculture and finance, national statistical agencies, other relevant government ministries, other agricultural institutions, universities, and CSOs.

The findings of Phase I indicated that, to promote agricultural research findings at the national level, it would be crucial to have national leadership and ownership of the country pilot studies; that they should not be led by an outside organization (such as IFPRI) but should be led by an organization with a strong stake in improving each country's agricultural research funding. During consultations in each country, the NARIs expressed their clear interest in playing this leadership role and owning the implementation process with other study partners playing a supporting role. It was also decided that the pilot activities would contribute toward achieving two main objectives. First, it was determined that they should aim to strengthen outreach by NARIs (which was observed to be weak due to resource constraints) to those who could support enhanced funding for agricultural research. Making a compelling case based on evidence, and the ability to highlight gaps in the evidence, are important tools in raising awareness about the strengths and weaknesses of NARS. Second, it was decided that the activities should assist in institutionalizing an ongoing discussion of agricultural research funding. Improving agricultural research funding is not a simple task nor something that can be achieved through one or two events. It needs an ongoing dialogue and a space where progress and gaps in agricultural research can be raised regularly, and where the benefits of funding agricultural research can be highlighted. In some cases, a forum for this may be found in existing agriculture-related platforms, within which research could have higher prominence.

5. THE THREE PILOT STUDIES

Ethiopia

Ethiopia is the second-largest country in Africa by population, with over 105 million people.[2] The country's agricultural sector is critical in delivering food, employment, and industrial goods, and will continue to be the main source of economic growth in the near term. Despite strong economic growth in recent years, Ethiopia's dependence on food imports continues to grow. Furthermore, agricultural productivity remains low due to the many serious challenges the sector faces. Recognizing its strategic role, agriculture has taken high priority in the various development programs, plans, and strategies instituted in recent years. Nevertheless, for the country to address its many challenges and achieve sustainable increases in agricultural production, generation and adaptation of appropriate technologies and innovations are vital.

Investments in agricultural research increased substantially during 2001–2016 due to strong government support combined with donor contributions. However, the country still underinvests in agricultural research. Ethiopia invested only 0.29 percent of its agricultural gross domestic product (AgGDP) in agricultural R&D in 2016 (Table 1)—a fraction of the 1 percent target recommended by the African Union and United Nations. Furthermore, the Ethiopian NARS faces numerous challenges, including inadequate coordination, insufficient institutional capacity, weak human resource quality, and low generation of technologies required for the agricultural sector.

Table 1. Agricultural indicators for Ethiopia, 2016

Agriculture's role in the economy		Agricultural R&D spending trends	
Agriculture's share in total GDP	35%	Total (in million 2011 PPP dollars) [a]	162
Rural population's share in total population	79%	As a share of AgGDP	0.29%
Agricultural labor in total workforce	68%	Yearly growth rate, 2010–2016	7.9%

Sources: Beintema and Haregewoin (2018), FAO (2019), and World Bank (2019).

Note Total agricultural R&D spending excludes the private sector.

[a] Purchasing power parities (PPPs) measure the relative purchasing power of currencies across countries by eliminating national differences in pricing levels for a wide range of goods.

[2]This section is based on the mapping and final reports prepared as part of the Ethiopia pilot study (Admassie 2017, 2018) and ASTI 's most recent country factsheet (Beintema and Haregewoin 2018).

Phase I: Mapping Interest in Agricultural Research Evidence in Ethiopia

After a systematic review of relevant published and unpublished information, major stakeholders who could potentially have access to and use the ASTI evidence were identified and interviewed. These included key government ministries, agricultural research institutes, universities, international organizations, and private-sector agents. These interviews also identified the major current and potential users of ASTI evidence in Ethiopia. In addition to the country's agricultural research organizations, the Ethiopian Institute of Agricultural Research (EIAR) and the regional agricultural research institutes, several other government institutions were identified to have interest in agricultural research issues. The federal Ministry of Agriculture and Natural Resources and the Ministry of Livestock and Fish Resources, with their mandates to promote the development of crop and livestock resources in an environmentally sustainable manner, are the main sector ministries responsible for agricultural development in Ethiopia. Regional bureaus of agriculture are responsible for agricultural development in their respective regions. Other key government institutions are the Ministry of Finance and Economic Cooperation, the Agricultural Transformation Agency, and the National Planning Commission. Several development partners are active in Ethiopia—including the World Bank, FAO, Bill & Melinda Gates Foundation, CGIAR, and various bilateral donors—and many of those are involved in agricultural issues.

The interviews revealed that researchers and experts from international organizations, donors, and universities have been using the ASTI evidence produced to date, but the use of research evidence for policy formulation, both generally and specifically in terms of ASTI, has been weak. Although the ASTI data and analyses could be important evidence to advocate for increased investment in agricultural research, use of this information—and knowledge of its existence by key policymakers who have a high stake in agricultural development—has been disappointing. This was determined through the interviews with stakeholders in the government sector (who would be expected know about agricultural research data but did not), as well as other key ASTI partners (such as in the private sector, the media, and CSOs).

The accessibility and presentation format of the ASTI data and analyses were found to be adequate and were not seen as an impediment to use in informing policymaking.

A rigorous effort is needed to create awareness among policymakers to integrate ASTI evidence into the evidence base they use to promote agricultural research funding. It was clear from the findings of the mapping study that this requires increased national leadership and ownership of the activities proposed in Phase II of the pilot study in Ethiopia.

Phase II. Promoting the Use of Agricultural Research Evidence in Ethiopia

The pilot implementation plan comprised a series of meetings to address the lack of awareness of ASTI evidence among key policymakers and, ultimately, to improve agricultural research funding and human resource capacity. These included a national stakeholders' consultative workshop, a round table discussion with the Agricultural Research and Technology Taskforce of the Rural Economic Development and Food Security (REDFS) Working Group—comprising representatives of the NARS; the donor community; and other development partners, such as the CGIAR—and various individual meetings with key policymakers, such as the Planning Commissioner, Minister of Agriculture and Livestock Resources, member of the Parliamentary Standing Committee on Agriculture, and Minister of Finance. ASTI's national focal point, with the support of the national expert, made considerable efforts to build relationships with these key stakeholders. EIAR's management team expressed strong interest in leading the process; however, due to political developments that led to changes in government structures and EIAR leadership, the implementation of the planned activities was slowed considerably. Despite these setbacks, the level of commitment from EIAR management remained high.

The national stakeholders' workshop was organized with some delay. The REDFS Taskforce did not convene during the eight-month span of the pilot study, so representatives of key donor organizations and other development partners were invited to attend the workshop as well. The discussion focused on the funding landscape of agricultural research, identifying the main actors and their roles, current bottlenecks, and solutions to overcome these. Participants recommended the organization of high-level forums for decision-makers and the development of strategies to communicate research results to enhance the awareness of ASTI evidence. To demonstrate to policymakers that agricultural research requires increased investment, it was deemed important to show the positive impact of these investments, which

means the inclusion of additional data and analyses in agricultural research evidence (including that of ASTI) in the future.

Phase II also aimed to enhance the visibility of and ease of access to ASTI evidence by linking ASTI's website with the data portals of national stakeholders. Individual meetings with some of the key policy actors and ministers were also planned. These two activities could not be implemented within the timeframe of the pilot study because the government administrative structure was in the process of being reorganized. As of July 2019, EIAR is expected to take this concept forward and negotiate with other data portals, such as the Central Statistical Agency (CSA) on mechanisms for linking the ASTI data portal with their portal.

Nigeria

With a population of over 180 million, Nigeria is the largest country in Africa.[3] Its economy has undergone structural transformation from the agricultural sector to the services sector. The substantial drop in global oil prices in 2014 plunged the economy into a recession resulting in increased rates of inflation. The agricultural sector was less affected, with production growing marginally and the sector's contribution to job creation growing significantly during this period. Nigeria is continuing its attempts to industrialize its economy, and agribusiness and agriculture-related industries have been identified as priority areas.

In pursuit of these goals, increased agricultural investments are needed, particularly in research to drive improved productivity, economic growth, and poverty reduction. Nevertheless, Nigeria's agricultural R&D spending—in inflation adjusted-terms—declined in recent years (Table 2). The country's investment as a share of AgGDP fell from an already low 0.39 percent in 2008 to 0.22 percent in 2014. With low levels of capital investment, Nigeria's agricultural research infrastructure remains underequipped, understandably having negative impacts on the quality and quantity of research outputs.

[3]This section is based on the mapping and final reports prepared as part of the Nigeria pilot study (Onyekwena 2017, 2018) and ASTI's most recent country factsheet (Beintema, Nasir, and Gao 2017).

Table 2. Agricultural indicators for Nigeria, 2014

Agriculture's role in the economy		Agricultural R&D spending trends	
Agriculture's share in total GDP	20%	Total (in million 2011 PPP dollars) [a]	432
Rural population's share in total population	54%	As a share of AgGDP	0.22%
Agricultural labor in total workforce	38%	Yearly growth rate, 2010–2016	–3.5%

Sources: Beintema, Nasir, and Gao, 2017; FAO (2019); and World Bank (2019).

Note Total agricultural R&D spending excludes the private sector.

[a] Purchasing power parities (PPPs) measure the relative purchasing power of currencies across countries by eliminating national differences in pricing levels for a wide range of goods.

Phase I. Mapping Interest in Agricultural Research Evidence in Nigeria

Nigeria has a vast number of stakeholders involved or interested in agriculture and agricultural research. At the government level, these include various federal line ministries—the Ministry of Agriculture and Rural Development, the Ministry of Budget and National Planning, the Ministry of Science and Technology, and Ministry of Finance—and other government institutions, such as the Agricultural Research Council of Nigeria (ARCN), which is mandated to coordinate the country's agricultural research. Other key stakeholders are the major agricultural higher education agencies and CSOs (for example, All Farmers Association of Nigeria), and various donors and development partners actively working on Nigeria's agriculture-related development issues. A mixed information-gathering approach was taken in order to cover the country's large number of key stakeholders, some located far from Abuja. For logistical and time considerations, face-to-face interviews were organized in cluster states,[4] and other stakeholders were asked to provide feedback via telephone interviews and email.

The mapping study found that awareness of ASTI evidence was moderate, but usage was low. Awareness was particularly lacking among those in the government sector. A number of research organizations were aware of ASTI evidence, and about half of them had used the data in preparing publications and presentations, and in developing research projects. ASTI evidence was deemed useful, easy to access, and informative. The participants also provided suggestions for including more detailed data and analyses, such as disaggregated soil and crop information and measurements on the impact of

[4] The states covered were Federal Capital Territory, Kaduna, Lagos, Niger, Ondo, Oyo, and Plateau.

research investments on development and the environment. Awareness of ASTI evidence was highest among CSOs and professional bodies. About half of those interviewed knew about ASTI evidence and reported that they used it quite often. Finally, most of the development partners (including donors) were aware of the ASTI evidence, but their usage was low.

These findings are not surprising given the lack of robust outreach activities to promote ASTI evidence in Nigeria and the challenges related to the ownership of the data and analyses. One finding suggested that substantial gaps in awareness and usage existed at the research organizations involved in ASTI's data collection activities, which was surprising. This applied both to the research agencies that provide data to ASTI, as well as the ARCN Secretariat, which coordinates the data collection in Nigeria.

Phase II. Promoting the Use of Agricultural Research Evidence in Nigeria

Since ARCN's mandate includes coordinating an effective agricultural research network, it was the obvious choice to take the lead in implementing the pilot study. A strategy was developed to engage country stakeholders by leveraging existing platforms with the aim of advocating for increased research investment based on ASTI evidence. The most suitable platform was deemed to be the Joint Sector Review Committee based on the diversity and influence of the attendees of its quarterly meetings. Another important platform identified at the state level was the Research Extension Farmer Input Linkage Systems, which bring together researchers, extensionists, farmers, and state-level policymakers to discuss agricultural policy and research needs. Finally, the Agricultural Society of Nigeria was also seen as relevant because it had been at the forefront of discussions on diverse issues related to Nigeria's agriculture sector. It was also recommended that, to increase credibility and the breadth of outreach, ASTI data be linked with the National Bureau of Statistics (NBS).

A few sensitization meetings were held with the management of ARCN, the 15 NARIs, and leaders of the colleges of agriculture and faculties of agricultural and veterinary science of Nigerian universities. Contact was also made with NBS regarding linking ASTI's website to NBS. Unfortunately, further progress during the term of the study was stalled due to uncertainty in ARCN's leadership. The Executive Secretary position was vacant, with several senior management staff filling an "acting" role

during the study period. The leadership issue also led to communications gaps during the study's implementation phase. Moreover, a number of bureaucratic constraints hindered ARCN's ability to mobilize the physical, human, and financial resources needed for ASTI's regular data collection within the timeframe of the study.

Tanzania

Agriculture is the main source of livelihood for the majority of the Tanzanian population. [5] The country had a predominantly agrarian economy until the mid-1990s, but has undergone significant structural transformation since then. Tanzania's second Five-Year Development Plan for 2016–2021 focuses on growth, transformation, and poverty reduction by promoting industry. However, even with the country's plans to industrialize, the government recognizes the central role of agriculture: the sector provides two-thirds of industrial inputs, employs two-thirds of labor, and accounts for 30 percent of exports.

Investing in agricultural R&D is fundamental to achieving the goals set in the development plan. Tanzania, however, has been underinvesting in its NARS for decades. The country only invested 0.17 percent of its AgGDP in agricultural R&D in 2016 (Table 3), well below the recommended 1 percent target. As a result, the country's agricultural research infrastructure is outdated and has been poorly maintained. Moreover, volatility in yearly funding levels has hindered activities at the country's main crop and livestock research institutes and led to unprecedented delays in the release of new technologies.

Table 3. Agricultural indicators for Tanzania, 2016

Agriculture's role of in the economy		Agricultural R&D spending trends	
Agriculture's share in total GDP	27%	Total (in million 2011 PPP dollars) [a]	69
Rural population's share in total population	66%	As a share of AgGDP	0.17%
Agricultural labor in total workforce	68%	Yearly growth rate, 2010–2016	–7.5%

Sources: Beintema, Lwezaura, and Munishi (2018); FAO (2019); and World Bank (2019).

Note Total agricultural R&D spending excludes the private sector.

[a] Purchasing power parities (PPPs) measure the relative purchasing power of currencies across countries by eliminating national differences in pricing levels for a wide range of goods.

[5] This section is based on the mapping and final reports prepared as part of the Tanzania pilot study (Katera and Mboghoina 2017, 2018) and ASTI's most recent country factsheet (Beintema, Lwezaura, and Munishi 2018).

Phase I. Mapping Interest in Agricultural Research Evidence in Tanzania

As in the case of Ethiopia and Nigeria, the study team in Tanzania interviewed key stakeholders in the government and higher education sectors, as well as in the donor community. At the government level, the Ministry of Agriculture, Livestock, and Fisheries (MALF), the Ministry of Finance and Planning, and the Commission for Science, Technology and Innovation (COSTECH) are the most important stakeholders. MALF is responsible for developing and implementing the agriculture sector policies in Tanzania and the coordination of agricultural research and training. It therefore has strong interest in the use of agricultural research evidence to inform government policies and interventions, as well as strong capacity to influence policy. The Ministry of Finance and Planning through its Planning Commission coordinates all activities related to the planning process and, as such, is in a strong position to influence policy. COSTECH—which formulates science and technology policy, sets R&D priorities, and allocates resources—was perceived as a potentially strong ally within government for promoting agricultural research. CSOs and the media have a strong role in advocating for the uptake and dissemination of research outputs. One of the leading advocacy groups in Tanzania is the Agricultural Non-state Actors Forum. The Forum comprises a wide range of stakeholders—including, parliamentarians, CSOs, and producer organizations—focusing on the adoption of policies that benefit smallholder farmers and can play a critical role in the undertaking and promotion of agricultural research evidence.

Engaging key stakeholders is crucial to promoting agricultural research, both in terms of the production and use of agricultural research evidence. But the mapping study found a general lack of awareness concerning ASTI evidence, especially among government officials and policymakers. Even within the research community the level of awareness was modest at best.

Some stakeholders also raised the issue of data gaps, including limited information on the methodology ASTI uses. It was recommended that ASTI partner with NBS to build user confidence in the credibility and reliability of ASTI evidence, link ASTI with popular national data networks, and conduct a series of promotion activities to create awareness, all of which was taken under consideration in the development of the pilot activities.

Phase II. Promoting the Use of Agricultural Research Evidence in Tanzania

The team, which was led by the Tanzanian Agricultural Research Institute (TARI), consulted the key actors and organizations identified in the mapping study, first on an individual basis and later through a collective working session that took place in Dodoma. These consultations were important for building awareness of, and a positive attitude toward, evidence-informed policymaking. Although the session was an important milestone, results cannot be achieved through a single event. Momentum needs to be created through ongoing engagement with actors involved in undertaking and utilizing agricultural research.

In this spirit, TARI collaborated with COSTECH in the preparation of two policy briefs to showcase local success stories of investment in agricultural research.[6] It is expected that these policy briefs and other research materials will be shared at an event with the Parliamentary Committee on Agriculture, Livestock and Water. To enhance availability and accessibility of ASTI evidence, and to link it more directly with other evidence relevant to agricultural research policy, MALF linked ASTI's data on Tanzania to their website. Efforts are also being made to forge stronger relations with NBS, the publisher of Tanzania's official statistics. Finally, a project on improving skills in science, technology, and innovation.[7]

The pilot phase was short and occurred simultaneously with the shift of government offices from Dar es Salaam to Dodoma. There was also an institutional redefinition of the leading NARI from the Department of Research and Development under MALF to a quasi-independent institute, TARI. In spite of all this upheaval, the working sessions held in Dodoma, together with other stakeholder consultations, lay the foundation for future engagement by TARI with policymakers, as well as state and nonstate actors, to promote evidence-informed policymaking related to agricultural research funding.

[6]The briefs showcase how technologies related to cassava intensification and chicken health developed by TARI and Tanzania Livestock Research Institute can be used to address different constraints faced by farmers and livestock keepers.

[7] The main objective of this project was to build capacity of agricultural and livestock researchers through the train-the-trainers approach in order to increase competences in communicating research findings to researchers and non-researchers.

6. FINDINGS AND IMPLICATIONS

The Framework

Returning to the framework discussed in Section 3 (and illustrated in Figure 1), the ***intent*** of the study was ASTI's interest in promoting the use of its evidence and its integration into national agriculture data systems. In the past, insufficient consideration was given to this aspect and what mechanisms might be needed for success. It was clear that success would require a long-term perspective in terms of the ***time*** needed to achieve a shift in the ownership and implementation of the process of gathering and analyzing data. The pilot study provided some clearer indications of what would be involved, the current situation, and potentials for future change. These insights will inform future work by ASTI in the implementation of its new network approach. To ensure its long-term sustainability and relevance, ASTI is establishing an active network of relevant national, regional, and international partners. This means that ASTI will evolve from an IFPRI-led, supply-driven, one-size-fits-all program to one that is country-owned and institutionalized, producing data and analyses of local policy relevance. This transformation will enhance the impact of ASTI's data and analyses at the national level.

The exploration of context in the national mapping exercises was revealing. While ***operating context*** was considered in the design of the mapping and the pilot work that was initiated, transitions in governance slowed progress. In Ethiopia the installation of a new government resulted in a wholesale change at both ministerial and senior institutional levels, with consequent disruptions and the need to build new relationships. In Nigeria, a leadership crisis combined with bureaucratic processes within ARCN diverted the energy of those involved. In Tanzania, the change in the location of the seat of government (from Dar es Salaam to Dodoma) preoccupied decision-makers, and the transition of agricultural research management from a department to a quasi-independent institute—which also included a change in leadership—preoccupied the research community. These are not unusual implementation challenges, but they are certainly unpredictable and reinforce the need for a long-term perspective to establish effective engagement, and the importance of institutionalization processes within

formal systems to ensure continuity as new people and institutions emerge to take leadership in agricultural research systems.

The ***decision context*** was assessed as being of medium to high potential at the beginning of the work. In Ethiopia, EIAR remains committed to expanding its role and responsibility despite the change in leadership. As such, the foundation has been laid for further progress once senior leadership can be engaged and resources identified to proceed. In Tanzania, the agricultural research team at TARI clearly remains committed, and the foundations are in place for action. In both countries, institutionalization of the evidence process is a critical next step, requiring active engagement at both political and bureaucratic levels. In Nigeria, initial assessments were not borne out due to the challenges previously described. The data collection process was largely stalled, so the evidence with which to make the case for its value was not in place. The first priority, therefore, will be to determine how to update the basic database for Nigeria before moving forward with promoting its utility and use.

In terms of the ***mechanisms*** for use (relationships, networks, communications and institutional knowledge), the three pilot case studies generated remarkably similar outcomes. Across the board, ASTI had strong relationships, networks, and communications with the core agricultural research community defined by the respective NARI. ASTI evidence was assessed as being clear and of high quality (with some suggestions for additional areas of data collection). Challenges emerged in the linkages and relationships beyond the NARIs/NARS into other communities that could influence the use of the evidence, or indeed into the decision-making communities themselves. This suggests that ASTI rose to become a global public good within CGIAR at a time when data systems for and capacities to collect and analyze data on agricultural research were weak or nonexistent in many developing countries. Although these systems are expanding and strengthening in many countries, they seldom appear to be a priority in national agendas as drivers of agricultural transformation and economic growth.

The Findings

Based on the outcomes of the three pilot studies, the following four key findings were identified.

1. ***Lack of awareness of ASTI evidence***. Lack of awareness of ASTI data at the national level (among ministries of agriculture, planning, and finance, as well as national statistical agencies) was even less than originally anticipated.[8] This makes it clear that insufficient attention has been paid to outreach in the past. The evidence generated from the agricultural research data is clearly presented in the ASTI factsheets, which give strong messages about the state of countries' agricultural research systems. To date, outreach has relied on the factsheets themselves to deliver these messages, rather than the factsheets being a tool for ongoing dialogue and awareness-building by the NARIs. The evidence shows that early linkages and relationship building with decision-makers is as key factor in successful efforts to influence policy (Court, Hovland, and Young 2005; Carden 2009). As Cartwright and Hardie (2012) note, multiple factors go into the process of policymaking. This not only includes evidence itself, but also political expedience, perceived effectiveness, resources, values, and side effects, among other factors, all of which are equally important. Early engagement with the policymakers can aid the identification of how other influences will affect the potential for use of evidence and allow researchers to present their case in the context of these other factors.
2. ***Missing link with national data systems***. The evidence presented through data gathered by ASTI is not yet linked to national data systems. Since it has not been institutionalized, there is no expectation within the national system that it should be incorporated into decision-making. To date, ASTI evidence has often been treated as "project evidence" by the NARIs. As a result, ownership of the data and responsibility for outreach were never integrated into the NARIs' mandates. For efforts to be successful, NARI leadership needs to be the central

[8] This finding was also confirmed in some preliminary research in Ghana on this topic.

driving force. Thus far, no formal connections have been made with national data systems. Initially, developing the dataset as a separate entity made sense, but the need to forge better linkages has become more important over time as national data systems have developed and as ASTI shifts its approach to that of a support network. Furthermore, many governments have established policies stipulating that the country's official data systems are their primary sources of national decision-making data, not national level data and evidence generated externally. Comparative data across countries remain important, and internationally developed datasets, such as those of the World Bank and FAO, continue to play important roles. What is crucial here is supporting the development of higher quality, locally generated data to increase the accuracy and utility of the regional and international comparisons.

3. ***Promotion of local owner/leadership.*** When data are not integrated into national data systems, political and organizational changes have a much more significant impact on the collection and use of agricultural research evidence than would otherwise be the case. This was clear in Ethiopia, where changes within the NARI and major changes after the 2017 elections led to a significant setback in progress. Lack of progress in Nigeria was partially attributed to this issue, but additional challenges stemmed from bureaucratic issues surrounding the actual ASTI data collection. The most common solution to addressing this challenge was to further promote local ownership and leadership to fully institutionalize the data collection, analyses, and use in-country. This has been the mantra for many years in the development community, but progress has been limited, at least in terms of agricultural research R&D.

4. ***The need for external expertise***. The national experts on policy influencing played a valuable role in supporting the NARIs based on their knowledge and experience of national policy processes. As the NARIs expand their competencies in and ownership of the evidence, as well as its dissemination, national expertise on the use of evidence will be an important adjunct to building skills.

7. RECOMMENDATIONS AND CONCLUSIONS

The findings derived from the pilot studies point to opportunities for improving the availability, accessibility, appropriateness, and ownership of ASTI evidence to ensure that it is integrated into national data systems and contributes more effectively as a valuable resource. Strong relationships and networks are needed to increase awareness of ASTI data and linkages with national datasets. Outcomes from the workshops indicated both interest in ASTI evidence and recognition of its merit. Increasing outreach and building bridges with local institutions may be useful next steps. These findings lead to some general recommendations for improving the use of evidence, along with specific recommendations for the ASTI new network approach moving forward.

General Recommendations

The following recommendations emerged from the pilot study for promoting more concrete ownership and leadership when it comes to promoting the use of evidence in policy processes.

1. ***Take an ecosystem approach***. Agricultural research evidence is not independent of its context. Any program needs to consider the implications of the broader environment and the roles different agencies and individuals play. Both social and technical dimensions need to be considered in attempting to expand support for agricultural research.
2. ***Institutionalize the processes of data collection and analysis***. The evidence produced by ASTI in collaboration with the NARIs has been collected and used outside the national data processes and systems. As such, while useful—and clearly relevant given its use at regional and international levels—it has not been incorporated into the systems that national governments rely on for evidence. Building relationships and advocacy with national bureaus of statistics is an important step in creating the conditions necessary to integrate additional data into official statistical channels. Nevertheless, other actors—such as farmers' associations, other government agencies, and the research community—should not be overlooked because they also constitute potential advocates and supporters.

3. ***Develop a networked approach***. Issues are too complex for single organizations to resolve. There is often a need for multiple partners working together on the political, bureaucratic, and public dimensions of an issue to promote change. Mapping the key actors provides a crucial starting point toward identifying potential and actual networks of support. These key actors have many existing linkages within their national political, bureaucratic, and community spheres. Putting these relationships and networks to work with the intention of strengthening the role and perceived value of agricultural research evidence would be a significant contribution.
4. ***Define incremental stages to change***. While it is impossible to "blue print" the path to change, a clear vision of the change required enables opportunities to be identified as they emerge and serves to highlight potential challenges to progress. "Small wins" are important signs of progress and offer important lessons about potential options and how they might be adapted for different and changing contexts. Key advice would be to expect the unexpected and develop the capacity to adapt accordingly to ensure progress.
5. ***Plan for the time needed***. Major change requires time, allowing for changes in leadership, changes in political systems, and various unexpected crises and opportunities. This reality does not fit well with tight project timelines and, hence, presents a particular challenge to the implementation of development programming. Wherever possible, timeframes should not be driven by an external schedule but by an internal one. This suggests the importance of long timeframes for program and project support, as well as an ability to adapt and change direction if and as the need arises.
6. ***Enhance Outreach***. A "whole systems" approach requires engagement with a much broader constituency. The challenges observed in the uptake in this pilot study reflect the broader challenge of linking to different parts of the system that can support or block an initiative. Roles and responsibilities are diffuse, especially in a complex national system comprising multiple actors that need to be engaged.

7. ***Keep evidence relevant, of high quality, and up-to-date***. The successes that ASTI and the NARIs have achieved to date are partly reflected in the fact that the data are carefully verified, have been collected continuously over a long period of time, and have been updated at regular (two- to three-year) intervals. In addition, programs are strongest where relationships and communications are strongest.
8. ***Enhance capacity for the collection, storage, analysis and use of evidence***. This is a final, general recommendation. Without stronger national-level capacity it will be extremely challenging to affect the shift in ownership and collection of the data. This goes beyond training programs to include support and mentoring of the actual processes of data collection, validation, storage, analysis, and use.

Implications for the ASTI Network

ASTI is in process of shifting from a largely self-contained approach to a networked approach to generating agricultural research data. In this new approach ASTI will play a key role in strengthening networks and capacities with a view to shifting to a combined regional/national ownership model for agricultural research data, analysis, and outreach that is more integrated into other regional and national agricultural systems and initiatives In the meantime, ASTI anticipates maintaining its global relevance and reputation as the trusted repository for internationally comparable long-term agricultural R&D data and analysis. The general recommendations outlined above have specific applicability for ASTI as it transitions its role. The short-term challenge is to maintain the integrity of the data through the transition. The medium-term challenge is managing the approach to the transition. Long-term, sustainability challenges are critical.

As was previously noted, the call for local ownership and leadership requires an intentional strategy. That strategy needs to address the inherent challenges, the long lead-time required, and the numerous incremental steps needed to shift responsibilities from IFPRI to a regional platform and eventually to national systems and processes. The likelihood of rapid transition of ownership and control

of national agricultural research data and analysis is low. At this point, agricultural R&D evidence remains most used and useful at the regional and international levels as a public good. Few governments in Africa are in a position to use ASTI evidence directly—not through lack of capacity, but due to limited resources. The continued collection and analysis of agricultural R&D data will rely on international support for the foreseeable future. That said, steps can be taken to build a new support and resource base concurrently with promoting national ownership and use of the data.[9]

In addition to countries taking ownership of their national data, ASTI needs to work with countries on effective, policy-relevant analyses, as well as in creative outreach activities to incorporate messages into national and regional decision-making processes, as it is outlined in the program's new strategy.

Conclusions

This study identified the key elements of a strategy toward more effective use of agricultural research evidence in national planning:

- ***Know your stakeholders.*** Map the key actors at all levels (political, bureaucratic, community-level, and so on).
- ***Know your ecosystem.*** Know how and who interacts (directly and indirectly) with and is affected by agricultural research.
- ***Be intentional.*** Develop a strategy to build relationships, networks, communications, and institutional understanding to foster change.
- ***Act incrementally.*** Expect change to take time, define interim progress measures, and celebrate small wins.

[9] The same can be said for shifting ownership of data systems in other fields. For example, in the health field, significant data are collected through international systems, whereas national data collection remains weak in many countries. Identifying both the ways and means of strengthening local ownership and control of data systems has not been satistactorily addressed.

- ***Be reflective and learn from progress***. Strategy is not sacred; change your strategy as conditions change.

The ASTI evidence across Africa points to long-term underinvestment in agricultural research. Moreover, new ASTI data show that total regional investments declined during 2014–2016 as a result of diminishing government allocations and waning donor support (Beintema and Stads 2019). This suggests a continuing need for advocacy on the importance of agricultural research to improve agricultural, economic growth, and poverty reduction; more than ever, efforts to institutionalize agricultural research evidence are central. Shifting ownership of the data and systems to the regional and national levels is a long-term undertaking. A transition period, accompanied by a deliberate plan to shift responsibility and action is needed, first to the regional level and then to the national level where feasible. A sudden withdrawal of the donor community and CGIAR threatens both the continuity and survival of the datasets, not to mention their analysis, and could easily result in the need to recreate systems.

Inescapably, investment in agricultural research evidence is a public rather than a private good. Its collection, analysis, and use depend on the appreciation of its long-term value by leadership at national, regional and international levels.

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