Capacity Needs Assessment for Improving Agricultural Statistics in Kenya

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Preface

Agriculture is a critical sector for poverty reduction and achievement of the Millennium Development Goals (MDGs) in Africa. In Kenya, agriculture is a key sector for the country's economy, contributing an estimated 25 percent of gross domestic product (GDP); however, just like in other developing countries, reliable statistical data on food and agriculture and a blueprint for evidence-based decision making and for long-term sustainable agricultural statistical systems are required to achieve the MDGs. Unfortunately, at present, many African countries do not have adequate systems to collect, store, and disseminate food and agricultural statistics. Furthermore, they lack the capacity to utilize the information that is available for analytical studies, despite the increasing demand from data users both nationally and internationally. Even where data are available, their reliability is often questionable. In particular, national agricultural statistical systems in Africa remain weak, under-resourced, under-performing, and in need of strengthening.

It is encouraging that many developing countries have embraced the Global Strategy to Improve Agricultural and Rural Statistics (GSARS). This initiative assists countries in designing, implementing, and monitoring their National Strategy for the Development of Statistics (NSDS) as outlined in the Partnership in Statistics for Development in the 21st Century (PARIS21). Several international organizations support these calls, for example, the World Bank through the Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA) project supports advancements in survey methods, including the use of new technologies and the development of analytical tools to improve data quality and data access. The Food and Agriculture Organization of the United Nations (FAO), through the African Commission on Agricultural Statistics (AFCAS), brings together senior statistics officials from FAO member countries of the African continent to review and exchange ideas on the state of food and agricultural statistics in the continent and advise member countries on the development of their agricultural statistical systems.

Many developing countries including Kenya have felt the need for agriculture statistics and developed their Strategic Plan for Agricultural and Rural Statistics (SPARS) recommended by the Action Plan for Africa of the Global Strategy for improving agricultural statistics. The SPARS is to be integrated into the NSDS for planning and decision making and as a framework for coordination of statistical activities including international and bilateral assistance in the agricultural sector. It is also noteworthy that countries such as Kenya have embraced initiatives such as the Global Open Data for Agriculture and Nutrition (GODAN) that supports the proactive sharing of open data to make information about agriculture and nutrition available, accessible, and usable to deal with the urgent challenge of ensuring world food security.

To fulfill the commitments made toward the achievement of the MDGs, it is critical for countries to fully develop their agriculture statistics systems. This can be done through many factors, including strong legal, regulatory, and policy frameworks; adoption of international standards and methodologies of data collection, analysis, and dissemination; and collaboration with other providers and users of the data including the private sector. This will contribute to greater food security, reduced food price volatility, and improved income and well-being for rural populations. This will also provide a framework to enable national and international statistical systems to produce valuable information on economic, social, and environmental aspects of agriculture to guide decision making for the 21st century.

Acknowledgments

Acronyms and Abbreviations

ADAPT	Advanced Data Planning Tool
AFA	Agriculture and Food Authority
AFCAS	African Commission on Agricultural Statistics
ANES	Agriculture, Nutrition, and Environmental Statistics
APES	Agricultural Production Estimates Survey
ASDS	Agricultural Sector Development Strategy
CABI	Centre for Agriculture and Biosciences International
CAPI	Computer-Assisted Personal Interviewing
CATI	Computer-Assisted Telephone Interviewing
CD	County Director
CEC	County Executive Committee
CFSVA	Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey
CIDP	County Integrated Development Plans
CSO	County Statistical Officer
CV	Coefficient of Variation
DDI	Data Documentation Initiative
EA	Enumeration Area
FAO	Food and Agriculture Organization (of the United Nations)
GDP	Gross Domestic Product
GHS	General Household Survey
GIS	Geographical Information System
GODAN	Global Open Data for Agriculture and Nutrition
GSARS	Global Strategy to Improve Agricultural and Rural Statistics
HQ	Headquarters
HR	Human Resources
ICT	Information and Communication Technology
IT	Information Technology
KALRO	Kenya Agricultural and Livestock Research Organization
KAPP	Kenya Agricultural Productivity Programme
KCSAP	Kenya Climate Smart Agriculture Project
KIHBS	Kenya Integrated Household Budget Survey
KII	Key Informant Interviews
KNBS	Kenya National Bureau of Statistics
LSF	Large-scale Farmer
LSMS-ISA	Living Standards Measurement Study-Integrated Surveys on Agriculture
M&E	Monitoring and Evaluation
MoALF	Ministry of Agriculture, Livestock, and Fisheries
MoU	Memorandum of Understanding
MSF	Master Sampling Frame
NADA	National Data Archive
NAS	National Agricultural Survey
NISR	National Institute of Statistics of Rwanda
NSAS	National Seasonal Agriculture Survey
NSDS	National Strategy for Development of Statistics
NSS	National Statistical System
OECD	Organisation for Economic Co-operation and Development
OPM	Oxford Policy Management
PARIS21	Partnership in Statistics for Development in the 21st Century

PPP	Public-Private Partnerships
PSU	Primary Sampling Unit
QLFS	Quarterly Labour Force Survey
RCMRD	Regional Centre for Mapping of Resources for Development
SAGIS	South African Grain Information Services
SDDS	Special Data Dissemination Standards
SDG	Sustainable Development Goal
SPARS	Strategic Plan for Agriculture and Rural Statistics
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TIA	*Trabalho de Inquérito Agrícola*

Concepts and Definitions

Survey
The Organisation for Economic Co-operation and Development (OECD)[1] defines a survey as "an investigation about the characteristics of a given population by means of collecting data from a sample of that population and estimating their characteristics through the systematic use of statistical methodology." The KNBS undertakes surveys such as the Kenya Integrated Household Budget Survey (KIHBS) and the Population Census.

Administrative data
The OECD defines administrative data collection as "the set of activities involved in the collection, processing, storage and dissemination of statistical data from one or more administrative sources. The equivalent of a survey but with the source of data being administrative record rather than direct contact with respondents. The administrative source is the register of units and data associated with an administrative regulation (or group of regulations), viewed as a source of statistical data." The Ministry of Agriculture routinely collects through its programs and services data, including information collected by extension officers as well as programs such as the fertilizer subsidy program.

National Statistical System
The National Statistical System (NSS) is the ensemble of statistical organizations and units within a country that jointly collect, process, and disseminate official statistics on behalf of the national government (OECD).

Official statistics
Official statistics are statistics disseminated by the NSS, including the National Statistical Office and government departments and agencies and will be specified within the National Statistics Act.

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[1] OECD glossary of statistical terms https://stats.oecd.org/glossary/detail.asp?ID=6.

Executive Summary

Introduction

The Kenya National Bureau of Statistics (KNBS); Ministry of Agriculture, Livestock and Fisheries (MoALF); and the autonomous county governments currently inadequate capacity to produce and provide the minimum set of agricultural statistics needed to monitor national trends. However, Kenya's national government and the 47 autonomous county governments are increasingly demanding high-quality agricultural statistics for evidence-based decision making, planning, and the development of policies for the adaptation to factors such as climate change. The program beneficiaries, including farmers, require specialized and timely information to increase agricultural outputs, raise productivity, and adapt to climate change.

As agricultural data collection activities in Kenya occur at the county level, county visits were deemed important to provide insights into the capacity constraints and challenges prevalent at the administrative level where data collection activities occur. In addition, during the national stakeholder consultations undertaken in Nairobi during July 2017, it was noted that the devolution of activities from the national to the county level in 2013 has resulted in challenges in obtaining and consolidating data on agriculture from 47 counties and in ensuring consistency in data collected across counties. To undertake the capacity assessments, the study team visited 6 counties over two weeks in early October 2017. The counties were selected to represent a wide number of agroecological zones in Kenya and were Bungoma, Uasin Gishu, Nakuru, Nyeri, Embu, and Machakos counties. While the study of these six counties can only provide case study insights, the common issues which have emerged imply that the analysis and recommendations are useful beyond the counties visited.

The two organizations at the center of agricultural data collection, the KNBS and MoALF, comprise different institutional structures and arrangements at the national and county levels. The KNBS is a semi-autonomous national government Agency with representation at the county level. All budget allocations, procurement, and staff requirements are centralized at the national level. In contrast, the MoALF functions have been devolved to the county level. Thus, while there is some interaction between the MoALF at the national level and county technical departments around critical areas such as food security information, there are no institutionalized reporting lines following the devolution process. This has created uncertainty among county-level staff who no longer know what data to provide to whom, and as such the sharing of data between the two spheres of government was adversely affected. In addition, the institutionalization of the coordination between the KNBS and MoALF at the national and county levels is also required to better align programs and activities.

The KNBS is mandated to collect official statistics (Statistics Act, 2006) through its nationally representative survey program and censuses including the Population and Housing Census conducted every 10 years. The MoALF collects administrative data through programs such as the fertilizer subsidy program and data collected by extension officers from farmers. While there is no single best approach and any system should consider the country-specific circumstances, a centralized statistical office has a number of financial advantages with respect to program costs and budgets that can be leveraged to reduce per unit costs. There are also advantages associated with 'common services' that are shared and available to all its divisions.

Key Findings

The two key organizations in the production of agricultural statistics in Kenya are the KNBS and MoALF. In addition, county governments collect data at subnational level given that agriculture is a devolved function in the county. The KNBS is the custodian of official statistics and responsible for surveys and censuses while administrative data are collected mainly through the county MoALF extension services and program-related data such as the fertilizer subsidy program as shown in the list of findings below.

Legal Framework

Official statistics (surveys and censuses). The KNBS is a national entity with representation at the county level. All institutional activities (including budgeting and recruitment) are centralized at the national level. The Statistics Act of 2006 legally mandates the KNBS to "act as the principal agency of government for collecting, analyzing and disseminating statistical data in Kenya."

Administrative data. The Kenyan constitution has devolved the functions of implementing sector policies and strategies, supporting and facilitating knowledge, skills and technology transfer activities to the autonomous county governments, but no legal framework for sharing information with the MoALF head office has been established. Less than 50 percent of the counties share their data with the KNBS headquarters (HQ). While it is not clear why some counties still share data, our engagements pointed to the role of previous personal relationships and issues related to capacity (skills and technical) in providing the required data.

Data Collection and Sharing

While there are examples where data sharing between the county-level KNBS and MoALF is occurring, including the County Statistical Abstract produced by the KNBS, statistics on livestock slaughtered, and food security, there are still a number of deficiencies in the arena of data collection and sharing. CPI data on extended markets is lacking as well as retail market prices at rural, urban and county levels. Lower level of disaggregated data is lacking in Integrated Household Budget Survey, while there is a lack of consistency in the periodicity of collecting continuous Seasonal Agricultural Surveys.

Official statistics (sample surveys and censuses). While the Statistics Act and National Strategy for the Development of Statistics (NSDS) should provide the institutional framework for the collaboration on data collection between the KNBS and all stakeholders including the MoALF, currently there is limited collaboration in terms of data collection and sharing. Our consultations found that in certain counties, data collection activities by the county technical department is planned with no or little input from the KNBS and national MoALF. The MoALF statistical unit (livestock) does not have qualified statistician and statistics work is being done by technical officers from the Directorate of Livestock Production alongside other functions

Establishing the legal framework that underpins the sharing of information and data between the county-level MoALFs and the national state department as well as between the KNBS and national MoALF is an essential first step in establishing an institutional framework for sharing data. Developing the institutional framework for data sharing and collection at the national and county levels should occur concurrently to ensure all stakeholders are included and coherence in the approach at both levels of government is achieved.

Administrative data collection. Data dissemination is negatively affected by the fact that there is no protocol or Memorandum of Understanding (MoU) for data sharing between governments at the national and county levels; this has particularly affected the efficient functioning of the MoALF. Staff therefore lack clarity regarding who is eligible to receive data and under what conditions the sharing may take place. More effective sharing of data between the national and county levels would also minimize the potential for duplication and overlap in survey activities. It is important for the national and county governments to renegotiate the issue to facilitate data sharing and accountability.

Users have also highlighted the fact that there are no forums to facilitate the interaction between the demand side (users) and supply side (producers) of agricultural statistics.

Unintended Consequences of the Devolution of Agricultural Statistics

Administrative data collection. The devolution of authority to the counties negatively affected the statistical programs, with agricultural data not provided on a regular basis to the national MoALF while county staff were unclear regarding which data must be provided at the national level due to the new reporting lines. The resulting uncertainty has disrupted, what was in the past, a close relationship between national and county government employees.

Official statistics (surveys and censuses). While the KNBS was not affected by the devolution process, as it remained a national function with representation at the county level, devolution negatively affected the cooperation between the KNBS and MoALF at the county level. County Governments do not have an established MoALF statistics unit to complement the efforts made by the National Government and data is collected and managed by field offices who are alos quite few to represent the counties adequately/

Statistical Methods and Practices

There is a lack of reliable data for planning and evaluation purposes or for evidence-based decision making.

Official statistics (surveys and censuses). The fact that the Census of Agriculture has not been conducted since the 1960s has resulted in the declining quality of data on agriculture, a limited survey program, and increased use of desk-based or eye estimation approaches to fill gaps.

Administrative data collection. No statistically sound methodology such as probability sampling is used for data collection. The practice of 'eye observations' or 'desk-based estimation' is commonly used by agricultural officers for crops, livestock production, veterinary services, and fisheries. To obtain information, farmer groups, village elders, and other local officials provide an opinion on the total area planted and harvested; however, this is not an acceptable statistical practice. Over time, these current practices will have a bias toward overestimation and have a negative impact on food security assessments.

Data users, including the Kenya Agricultural and Livestock Research Organization (KALRO) and Kenya Agricultural Productivity Programme (KAPP), have highlighted concerns regarding the quality of agricultural data collection.

The overestimation of crop production negatively affects planning for food security. The use of nonscientific measures in data collection activities threatens to undermine data users' confidence in the quality of data, leading to the data collected by the MoALF and KNBS not being used for research, policy-making and other decisions.

Lack of Metadata and Harmonization of Concepts and Definitions

Administrative data collection. There is a need for metadata to accompany all statistical estimates, especially those produced by the MoALF. Metadata document the current statistical information, specifically the survey or data collection methodology, concepts, definitions, and data collection procedures. The protocols for producing metadata would need to be established in the first instance, followed by documentation detailing concepts and definitions relevant to administrative data collection undertaken by extension officers.

There is also a need to begin the task to ensure that the KNBS and MoALF harmonize and adopt, where relevant, the international standards established by the Statistics Division of the United Nations and the FAO with regard to concepts and definitions for food and agriculture.

Human Resources

Official statistics and administrative data. Staff at the MoALF need formal training in data collection and the use of sound statistical methods and practices. The only training currently available is on-the-job training..In addition, both the KNBS and MoALF staff need to develop skills in data analysis (beyond descriptive statistics) and report writing. The self-assessment questionnaire completed by the MoALF highlights the need for training across a number of areas including sampling design, the use of statistical packages, data processing, and report writing. The KNBS county statistical officers (CSOs) highlighted the lack of skills in relation to the interpretation of data, decision making, and the use of data to set targets. The aging staff in both the KNBS and MoALF and the lack of succession planning may result in the loss of critical skills and negatively affect future data collection activities. While succession planning for the KNBS and MoALF appears to have received more attention at the national level, the teams' interaction at the county level highlighted this lack of planning to be acute at the county level.

Administrative data collection. Extension officers in the MoALF at the county level require training in basic packages such as Microsoft Word and Excel. In addition, the benefits from training can quickly dissipate if there are no structures in place to select the most relevant staff for training, while succession planning is also important to ensure that aging staff are replaced with sufficient lead time. Thus, training should take place in the context of a broader human development strategy.

Physical Resources

Vehicles, buildings, and information technology (IT) equipment are lacking—there are insufficient means of transport including 4x4 vehicles at the county, subcounty, and ward levels to conduct current data collection and supervision activities, a problem that would be exacerbated if data collection activities are expanded. There are no or only minimal transport allowances in cases where there is no government-owned transportation available. Limited or no equipment means that employees are required to use their own laptops and mobile phones and pay for data bundles to perform official duties, which is problematic from

a data confidentiality perspective in addition to the issues around staff incentives. There is also limited or no Internet, particularly at the subcounty and ward levels. Financial constraints are also hampering the effective production of agricultural statistics. Underfunding of activities occur at the county level, while disbursements occur at irregular intervals, which negatively affects planning. The County Integrated Development Plans could present an opportunity for institutionalizing the need to allocate sufficient funding for data collection.

Priorities for Action Plans and Costing

Based on the capacity assessment undertaken at the county, subcounty, and ward levels, the following are the key priorities identified for action in the short to medium term and inform our proposal for high-level costing.

Organizational and Administrative Capacity

- Develop the legislative framework that governs the interaction between the MoALF, KNBS and related institutions such as Kenya Meteorological Department (KMD) at the national level. This activity can build on the review of the Statistics Act undertaken by the KNBS but will also include the development of MoUs between the two organizations.

- Develop a legislative framework for data sharing between the county MoALF and the national MoALF. This will also involve the development of protocols and tools for data collection between the two spheres of government, followed by the harmonization of concepts and definitions where appropriate. The existing work on the development of the county statistical acts can provide the basis for the legislative framework.

- Establish structures where users and producers of agricultural data can interact. This activity may build on the ANES but will expand its reach and establish sector-specific engagement forums for agriculture, livestock, and fisheries.

- Address the human constraints and risk associated with the aging staff component and lack of succession planning in both organizations. It is essential that a succession plan be developed with details on the replacement rate. This should also include a skills audit of the existing staff and the skills required over the next five years. The training of extension officers can build on the outcome of the skills audit. It should also be noted that the training of staff should include establishing structures in the context of a broader HR development plan.

- Investigate the pathways for engagement with the private sector around data sharing, including data collaborative[2] and PPPs and the use of technology. The review of existing pilot projects such as CABI Plantwise and E-extension service and the lessons learned can also feed into this process.

Statistical Practices and Procedures

- Development of an SAS by the KNBS. It is our understanding that a pilot SAS will be conducted by the KNBS in 2018.

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[2] http://datacollaboratives.org/.

- Establishment of M&E/Statistics Units in each county comprising of officers from the State Department for Crops Development, State Department for Livestock as well as State Department for Fisheries and the Blue Economy. Currently the Agricultural Statistics Unit (ASU) comprises of only staff from the State Department for Crops Development.

- Harmonization of concepts and definitions between the MoALF and KNBS where appropriate.

- Development of protocols for producing metadata as well as documentation detailing concepts and definitions related to administrative data.

Costing

Based on the priorities and action plan, cost estimates are provided for legislative framework for sharing data, harmonizing concepts and definitions, establishing user and producer engagement forums, conducting a SAS, and building human resources in the KNBS and MoALF through a skills audit.

World Bank Support for Improving Agricultural Statistics

There are two windows for World Bank support for improving agricultural statistics in Kenya. The first window is through agriculture projects under the MoALF, with the Kenya Climate Smart Agriculture Project (KCSAP) already having a provision for strengthening the Statistics Unit. The second window is through Statistics Payment for Results (PforR) Program for generating better and more accessible data to inform policy-makers and contributing to strengthening statistical capacity. Funding through these windows can be used to support four key interventions: (i) developing the legislative framework for agricultural statistics; (ii) developing the legislative framework for data sharing between county governments and MoALF; (iii) establishing structures where users and producers of agricultural statistics interact; and (iv) developing a Seasonal Agricultural Survey (SAS).

Conclusions and Way Forward

The staff in both the KNBS and MoALF are well aware of the importance of collecting quality agricultural data. They are also frank about the constraints and limitations they face in collecting data. However, in general, they remain committed to performing their daily tasks to the best of their abilities within the constraints (human, physical, and financial) they face.

Based on the county capacity assessments, complemented by key informant interviews (KII) with stakeholders and self-assessment questionnaires, it is proposed that, in the short term, investing in the legislative framework to govern data sharing between the key role players, KNBS (national and county) and the national MoALF, and county governments (including county MoALF) will be essential for improving the flow of existing information for decision making. In addition, raising the profile of the importance of quality data to support evidence-based policy making and implementation can be supported by the establishment of M&E units within the MoALF county offices. Ensuring that staff have the required skills to perform their jobs, in particular the use of Microsoft Office and other technology for data collection, will assist staff in performing their jobs more efficiently. Succession planning in the context of the aging staff component in both the KNBS and MoALF will ensure the continuity of data collection, while planning for future skills requirements in the form of a skills audit will complement this activity.

The KNBS needs to invest in a robust annual survey program to collect benchmark agricultural statistics, the key component to be an SAS reporting on the key agricultural crops and livestock. This is particularly important even if Kenya undertakes a Census of Agriculture. The Population Census 2019 preparation, especially the geographic information system (GIS) based cartography and coordinated householder listing operation, is well positioned to provide the necessary information for either an area or list frame for the SAS. The SAS sample design and sample selection costs would be minimal.

Existing initiatives including the E-extension services and CABI Plantwise project[3] in the MoALF as well as the review of the Statistics Act by the KNBS can be leveraged by new initiatives to utilize existing infrastructure and build on lessons learned. In addition, the Strategic Plan for Agricultural and Rural Statistics (SPARS, 2016), through its consultative process at the national level, presented a prioritization of activities with the aim of moving toward producing quality agricultural data. However, as this capacity assessment has identified, at the county, subcounty, and ward levels where data collection activities occur, constraints across a number of areas have negatively affected data collection activities in terms of the number of activities undertaken and quality of these.

The recommendations made in this study are based on the study team's engagements with staff of the KNBS and MoALF at the county and national levels. However, going forward, the implementation of these recommendations will depend on the buy-in from the staff from these institutions and the management. The validation workshop provided an opportunity for all stakeholders to engage on the findings. It will also be important to engage higher-level policy makers to present the findings to ensure support for improving agricultural statistics and that required funding is allocated for data collection activities. As a way forward, the KNBS and MoALF are encouraged to expedite the legislative reforms around data sharing, conduct an SAS, invest in human resources including the establishment of M&E units at the county level, and undertake succession planning including conducting a skills audit. Building technical and institutional capacity of counties is also quite crucial towards improving agricultural statistics in the country.

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[3] Please see Annex H: Bungoma County Case study for more details on the CABI and E-extension services program.

CHAPTER 1: Background

Over the last 20 years, the Food and Agriculture Organization of the United Nations (FAO) has noted that the quality of agricultural data in many developing countries has declined. Many countries, especially those in the developing world, lack the capacity to produce and report even the minimum set of agriculture statistics required to monitor national trends (GSAR, 2010). Agriculture surveys are expensive to run regularly, and as most available data are out of date, policy makers are hesitant to use them as evidence for planning and decision making. There is also a need to modernize conventional data collection and management methods, streamline and harmonize agricultural data collection across agencies, and improve the entire statistical production cycle from design to dissemination to produce high-quality agriculture data for use by policy makers and the public with the statistical disaggregation across domains such as gender that are needed for effective planning, policy design, and monitoring.

The Global Strategy to Improve Agricultural and Rural Statistics (GSARS) adopted in 2010 aims to address some of the root causes of the declining quality of agricultural statistics. The three pillars of the strategy are as follows:

1. Establishing a minimum set of core indicators that countries will produce to meet current and future demands.

2. Integrating agriculture into the National Statistical System (NSS) with the aim of meeting policy makers' and other users' needs for comparability of statistics across locations and time. This integration will be achieved through the implementation of a set of methodologies (IMF 2003) including the development of a Master Sample Frame for Agriculture, the implementation of an Integrated Survey Framework, and ensuring that information is made accessible through a Data Management System in each of the countries.

3. Supporting the sustainability of the agricultural statistics system through governance structures, processes, and statistical capacity building.

Following on from the GSARS, the African Development Bank produced a country assessment of agricultural statistical systems in 52 African countries in 2013 (AfDB 2014). According to the resulting composite indicators, Kenya has strong institutional infrastructure (65 percent) and scores well on availability of statistical information (70 percent) and has average performance on statistical methods and practices (59 percent) but weak resource capacity (35 percent). Looking closely at the individual indicators, Kenya shows little strategic vision in agricultural statistics planning and only a limited integration of agricultural statistics in the NSS. However, this assessment was conducted before the development of the SPARS of Kenya in 2016. In terms of resource capacity, financial resources seem to be lacking in addition to adequate staffing. While Kenya has performed well overall in statistical methods and practices, there is a gap when it comes to data quality, software capability, data collection technology, and reliable agriculture market and price information.

In Kenya, agriculture is a key sector for the country's economy, contributing an estimated 25 percent of gross domestic product (GDP). The importance of the sector for Kenya has been highlighted in a number of key policy documents including the Agricultural Sector Development Strategy (ASDS), 2009–2020, Kenya Vision 2030, while the need for timely, accurate, and relevant agricultural data in support of policy development is emphasized through the Strategic Plan for Agricultural and Rural Statistics (SPARS) Kenya, 2015–2022, and the KNBS Strategic Plan. SPARS Kenya strategic goals are to: i) review the statistical legal frameworks in line with the Kenya Constitution and emerging data needs; ii) develop and improve physical, statistical and modern ICT infrastructure; iii) strengthen human capacity and enhance

statistical operations across the Agricultural and Rural Statistics System (ARSS); iv) address agricultural statistics data gaps; and v) secure adequate financial resources on a sustainable basis for agricultural statistical activities. The SPARS presents the areas for investments, but the plan does not highlight the priority data items to be produced nor their required periodicity. Also, the investments required to improve administrative data sources and the production of estimates at a lower geographical level, for example, the subcounty or ward level, is not addressed. On the other hand, the KNBS Strategic Plan, 2013-2017 is an essential planning and management framework for aligning the KNBS mandate at the National and County governments' levels. The successful implementation of this Strategic Plan will provide a roadmap for institutional changes, development of statistical capacities, and a well-coordinated NSS culminating into the provision of quality statistics. In addition, Kenya is currently a member of the Global Open Data for Agriculture and Nutrition (GODAN) and committed in support of open data.

The capacity assessment undertaken adds to the SPARS activities and the KNBS strategic plan by identifying the country-level constraints and providing a methodology for the SAS through the detailed costing provided and the underlying assumption on which the costing is based. This assessment aims to identify capacities and gaps for agricultural data collection, analysis and dissemination at national and subnational levels; quantified the costs needed to address the identified capacity gaps; and made recommendations on the support required for improving agricultural statistics in the two countries. The support for improving agricultural data comes at the request of the Ministry of Agriculture, Livestock, and Fisheries (MoALF) and the Kenya National Bureau of Statistics (KNBS) based on the challenges faced by the two institutions in providing quality statistics.

The two organizations at the center of agricultural data collection, the KNBS and MoALF, comprise different institutional structures and arrangements at the national and county levels. The KNBS is a semi-autonomous national government agency with representation at the county level. All budget allocations, procurement, and staff requirements are centralized at the national level. In contrast, the MoALF functions have been devolved to the county level. Thus, while there is some interaction between the MoALF at the national level and county ministries around critical areas such as food security information, there are no institutionalized reporting lines following the devolution process. This has created uncertainty among county-level staff who no longer know what data to provide to whom, and as such the sharing of data between the two spheres of government was adversely affected. In addition, the institutionalization of the coordination between the KNBS and MoALF at the national and county levels is also required to better align programs and activities. The KNBS is mandated to collect official statistics (Statistics Act) through its nationally representative survey program and censuses including the Population and Housing Census conducted every 10 years. The MoALF collects administrative data through programs such as the fertilizer subsidy program and data collected by extension officers from farmers. While there is no single best approach and any system should consider the country-specific circumstances, a centralized statistical office has a number of financial advantages with respect to program costs and budgets that can be leveraged to reduce per unit costs. There are also advantages associated with 'common services' that are shared and available to all its divisions.

The KNBS, the national MoALF, and the autonomous county governments currently lack the capacity to produce and provide the minimum set of agricultural statistics needed to monitor national trends. However, Kenya's national government and the 47 autonomous county governments are increasingly demanding high-quality agricultural statistics for evidence-based decision making, planning, and the development of policies for adaptation to factors such as climate change, among other uses. The program beneficiaries,

including farmers, require specialized and timely information to increase agricultural outputs, raise productivity, and adapt to climate change.

This report undertakes a capacity needs assessment is in terms of physical, organizational, and human capacities for the production of high-quality agricultural statistics in support of generating data for evidence-based policy making. The diagnostic is also focused on the existing gaps in the current data collection value chain, providing recommendations for addressing these gaps in the short, medium, and long term based on a strengths, weaknesses, opportunities, and threats (SWOT) analysis for prioritization. In addition, the gap analysis points to certain key priority investment areas, which provides direction for the costing of these priority activities.

The remainder of this report is organized as follows. Chapter 2 maps a host of activities and actors in the Kenya Agricultural Statistics System, while Chapter 3 describes the methodology for capacity assessment and costing of priority items to bridge the capacity gaps. Chapter 4 presents the findings of the assessment at national and local levels, while Chapter 5 provides cost estimates for the identified capacity gaps, while Chapter 6 discusses recommendations for strengthening agricultural statistics in Kenya. Chapter 7 concludes with global best practices for agricultural data and statistics.

CHAPTER 2: Mapping of Activities and Actors in the Agricultural Statistics Sector

The NSS refers to the "statistical organizations and units within a country that jointly collect, process and disseminate official statistics on behalf of national government" (OECD, 2002). Official statistics are normally collected by the National Statistical Office, which is mandated to perform such activities on behalf of the national government through the Kenya Statistics Act of 2006. However, the NSS also includes other data producers such as the MoALF which is responsible for administrative data collection.

Because of the interconnectedness of the various components of the NSS, it is important to consider how, for example, efforts to improve the quality of data will also affect the rest of the statistical system. The NSS highlights the key aspects of capacity and infrastructure that are essential for the delivery of quality agricultural statistics, including the legislation under which the statistical system operates and the need for coordination among data producers.

Users and Producers of Agricultural Statistics in Kenya

As a starting point, the identification of user needs requires engagement with the various users of data to align data collection to the requirements of those users, for example, researchers, policy makers, and the private sector. Data producers need to focus on the training of staff, the development of data collection tools, collection of data through conducting surveys or administrative data sources, development of protocols for data entry and processing, quality assurance, and analyses (which would also include the skills required to analyze data). In addition, information needs to be disseminated and staff should be trained to write statistical publications and supported to use tools such as visualizations and infographics to improve the uptake of the results produced by policy makers.

Underlying these activities are other important aspects related to capacity including data management, development of metadata, database and database warehousing, human resources (HR) capacity, and the institutional and legal framework that guides the collaboration and interaction between producers—in this case the MoALF and KNBS. The information and communication technology (ICT) infrastructure required to support the statistical value chain from collection to dissemination and archiving is also key. In addition, the use of harmonized concepts and definitions across data producers is important to ensure that data across sources can be compared (FAO, 2000) As the main producers of agricultural data, the MoALF and KNBS should bear in mind the need for collaboration and coordination across the NSS throughout the process of agricultural data production.[4]

Based on the study team's engagements with stakeholders during the inception and implementation phases, the key actors and activities of the Agricultural Statistical System in Kenya were identified, focusing on the producers and users of agricultural data as well as the data collection sources and methods. The key producers are the KNBS and MoALF at the county level, supported by data collection institutions such as Tegemeo Institute of Egerton University (Maize Cost of production survey, tbc 2017) and various agricultural institution boards and cooperatives. Users of the data include farmers, international development partners, ministries, and cooperatives. Between users and producers are platforms for

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[4] National Quality Assurance Framework, UNStats.

accessing data, including through reports or downloading of microdata. Figure 1 highlights the users and producers of agricultural statistics.

Figure 1: Mapping of users and producers of agricultural statistics in Kenya
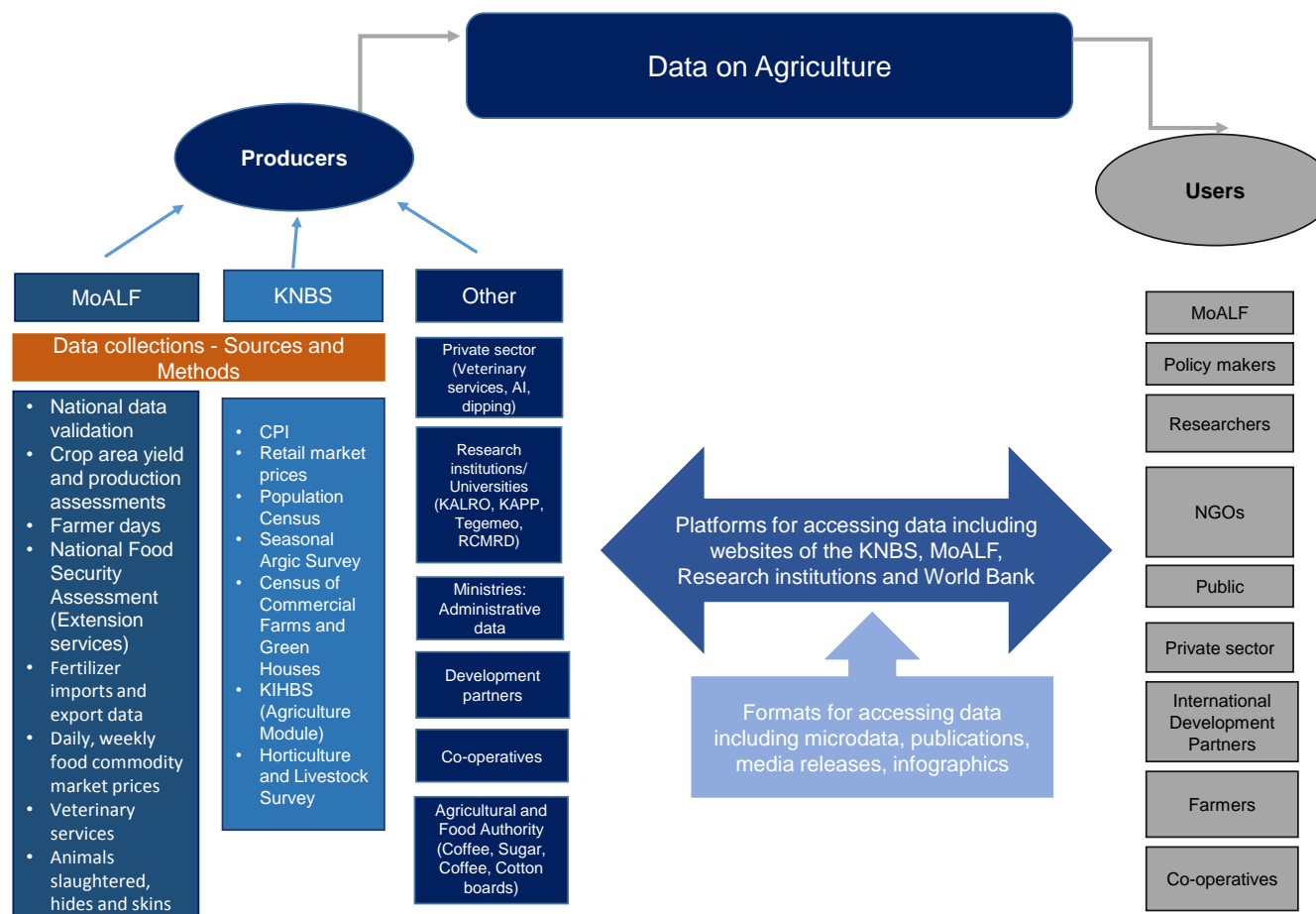
Source: CPI = Consumer price index; KALRO = Kenya Agricultural and Livestock Research Organization; OPM = Oxford Policy Management.

Data Collectors: KNBS and MoALF

Based on key informant interviews (KII) at the national and county levels, the team was able to identify the data collected by these two institutions although there are more institutions, especially county governments that collect agricultural data. The self-assessment questionnaires also elicited information on the survey program in the case of the KNBS (Table 1) and administrative data collected by the MoALF extension officers as well as other program data, including the fertilizer subsidy program (Table 2.

Table 1: KNBS data collection calendar

Activity (survey, census, or administrative data source)	Name of data producer	Is the data collection a funded activity or planned activity over the next 10 years	Date of next data collection (planned and funded)	Publication year	Last data collection year
Census of Agriculture	KNBS, Agricultural Survey Unit	Funded from national budget	2019	2024	1960
Census of Commercial Farms and Green Houses	KNBS, Agricultural Survey Unit	Funded from national budget	2017/2018	2020	1987
KIHBS (agriculture module)	KNBS, Agricultural Survey Unit	Funded from national budget	2020/21	2018	2015/2016
Continuous Seasonal Agricultural Surveys (Pilot)	KNBS, Agricultural Survey Unit	Funded from national budget	2018	2020	2019
Horticulture Survey	KNBS, Agricultural Survey Unit	Funded from national budget	Not specified	2021	—
Livestock Survey	KNBS, Agricultural Survey Unit	Funded from national budget	Not specified	2022	—

Source: Self-assessment questionnaire Producer: KNBS (National).

Note: KIHBS = Kenya Integrated Household Budget Survey.

Currently, the main survey that collects agricultural data is the KIHBS (KNBS. 2008) that includes an agricultural module. The Population and Housing Census of 2019 will include an agricultural module and will form the basis for a development of a frame for the Continuous Seasonal Agricultural Survey pilot.

The data collected by the MoALF at the county level relate mainly to data collected by extension officers, daily and weekly food commodity prices, and data collected through programs such as the fertilizer subsidy program. The department also relies on the data collected by other agencies including the KNBS and donors such as the FAO.

Table 2: MoALF data sources and data collection activities

Administrative data source activity	Name of Data producer	Is the data collection a funded activity or planned activity over the next 10 years	Date of next data collection (planned and funded)	Publication year	Last data collection year
National data validation in all counties	County extension officers, AFA directorate, other state corporations	Funded by KNBS and State Department of Agriculture	February 2018	May 2018	March 2017
National food security assessment	County extension officers	Funded by the State Department of Agriculture	December 2017	January 2018	September 2017
Rice Statistics Survey	KNBS, Agricultural Statistics Unit	Funded by the FAO and JICA	November 2017	February 2018	First-time collection
Fertilizer import and export data	Farm input division, Agricultural Statistics Unit	Funded by the International Fertilizer Development Centre	May 2018	2018	September 2017
Daily, weekly and monthly food commodity market prices	Markets Development Division, State Department of Agriculture	Funded by the State Department of Agriculture	Daily, weekly, monthly	Weekly	Every week
Maize Cost of Production Survey	Tegemeo Institute of Egerton University	Funded by Tegemeo Institute	June 2018	2017	September 2017
Seasonal agricultural production survey	KNBS, Agricultural Statistics Unit	Planned funding in the MoALF (awaiting approval)	July/August 2018	October/November 2017	First-time collection
Census of Large Commercial Farms	KNBS, Agricultural Statistics Unit	KNBS	February/March 2018	August/September 2018	First time collection
Food Consumption Survey	KNBS	KNBS	2021	2022	2016
Grain Postharvest Loss Survey	KNBS, Agricultural Statistics Unit	Proposed funding	2018	2019	First-time collection
Seed production data collection	KEPHIS	Funding by KEPHIS	2018	2018	April 2017
Fertilizer subsidy program	State Department of Agriculture	Funded by the State Department of Agriculture	Ongoing	Ongoing	Ongoing

Source: Self-assessment questionnaire Producer: MoALF (National).

Note: AFA = Agriculture and Food Authority; JICA = Japan International Cooperation Agency; KEPHIS = Kenya Plant Health Inspectorate Services.

Data and Capacity Constraints: KNBS and MoALF

The KNBS and MoALF comprise different institutional structures and arrangements at the national and county levels. The KNBS is a semi-autonomous national government agency with representation at the county level. All budget allocations, procurement, and staff requirements are centralized at the national level.

In contrast, the MoALF functions have been devolved to the county level. Thus, while there is some interaction between the MoALF headquarters (HQ) and MoALF county ministries, around critical areas such as food security information, there are no institutionalized reporting lines following the devolution process.

In Table 3 and Table 4, we summarize the key findings from the assessment of data collection activities based on the interactions and discussions with county and subcounty staff of both the KNBS and MoALF. The color-coded traffic light gap assessment identifies areas of high priority (red), medium (yellow), and low priority (green).

Table 3: KNBS data collection activities currently undertaken

Current data collection	Periodicity	Future data collection	Gaps	Priority (color code)
CPI	Monthly	CPI	Extending markets	🟨
Retail market price	Weekly	Retail market price	Extending geographical coverage (rural/urban/county level)	🟨
Integrated Household Budget Survey (2015/2016)	Collected once every 5 years	Integrated Household Budget Survey (2020/2021)	Lower-level disaggregation—below county level	🟩
Kenya Housing and Population Census (2009)	Collected once every 10 years	Kenya Housing and Population Census (2019)	Census of Agriculture	🟥
	Unclear	Continuous Seasonal Agricultural Surveys (Pilot) (2018)	Annual Continuous Seasonal Agricultural Surveys	🟥
	Unclear	Horticulture Survey (2021)	Annual	🟨
	Unclear	Livestock Survey (2022)	Annual	🟨
	Unclear	Census of Commercial farms and Greenhouses (2017/2018)	Annual	🟩

Table 4: County MoALF data collection activities currently undertaken

Current data collection	Detail	Future data collection	Gaps	Priority (color code)
Crops	• Crop production: coffee, macadamia, sunflower, • Food crop: maize, pulses, sweet and Irish potatoes, cassava • Commercialized crops • Horticultural crops: fruits and vegetables	No details on future data collection plans; Bungoma county running survey on crops, livestock, and fisheries	Quality of data: eye and desk-based estimation techniques used for data collection around crop production and yields	(red)
Livestock production	• Population of livestock, for example, cattle poultry, sheep, and beehives • Production levels of milk, egg, honey, meat, and animal products • Extension activities in the field: farmer training, tours, shows, and exhibitions • Processing and value add for milk, eggs, and honey	No details on future data collection plans	Quality of data: eye and desk-based estimation techniques for data on population of livestock	(red)
Veterinary services	• Data on health, hide and skin, tick control, while breeding and clinical services have been privatized • Disease control, vaccinations data when doing routine vaccinations, and disease outbreaks • Livestock markets in the county: disease surveillance, detect diseases, and then any necessary actions for control • Veterinary public health: inspect meat on daily basis, types of animals slaughtered compiled on a monthly basis • Slaughterhouses	No details on future data collection plans	Quality of data: no quality assurance, especially with regard to private service providers	(yellow)
Fisheries	• Fish production, type of fish • Stocking of fish, kilos of fish, inputs used in fish production • Harvesting and value add, market demand • Fish from lakes and dams: area, type, quantity	No details on future data collection plans	Quality of data: eye and desk-based estimation techniques	(yellow)

CHAPTER 3: Methodology for Conducting the Capacity Needs Assessment

During the inception phase, through national-level consultations with key stakeholders, the study team identified a number of constraints, which flowed from the devolution of activities from a national responsibility to the establishment of autonomous counties. This was also the case for agricultural data collection activities.

Data collection for both the KNBS and MoALF occurs at the county and ward levels, and thus an assessment of capacity at this level of administration was deemed very important. Tools were developed to capture the key elements of capacity at the individual, organizational, and institutional levels and across the data collection, processing, and analysis value chain. The tools reflected the specific circumstances within the Kenyan agricultural data landscape and were adapted based on information gathered during the national consultations as well as to some degree during the county visits based on how these engagements progressed.

The capacity assessment approach also identified the bottlenecks in the current system related to institutional arrangements, roles and responsibilities, lines of accountability, and the commitment to quality data production by producers. The four aspects assessed through the self-assessment questionnaires were focused on the requirements for quality agricultural statistics: (a) the institutional infrastructures; (b) the input dimension, that is, the resources required to produce quality statistics (financial, human, and physical); (c) the throughput dimension which focuses on the statistical methods and practices that are used to collect agricultural data; and (d) the output dimension which identifies the core data availability, timeliness, data quality, and data user perception of data quality and data accessibility (PARIS21, 2002)

The three tools used for the capacity assessment were as follows:

1. A producer self-assessment questionnaire

2. A user self-assessment questionnaire

3. A checklist for the capacity assessment used during the county- and subcounty-level engagements

The producer and user self-assessment questionnaires were sent to stakeholders identified during the inception phase conducted in July 2017 in Nairobi. The producer self-assessment questionnaire was completed by the focal points at the KNBS and MoALF at the national level. In addition, five county-level questionnaires from the KNBS were received (Uasin Gishu, Nakuru, Nyeri, Embu, and Machakos).

The data user self–assessment questionnaires were sent to the Ministry of Devolution and Planning under the Presidency, the KALRO, Tegemeo Institute of Agricultural Policy and Development, Egerton University, Kenya Agricultural Productivity Programme (KAPP), Department of Resource Surveys and Remote Sensing (DRSRS) of the Ministry of Environment and Natural Resources, Regional Centre for Mapping of Resources for Development (RCMRD), and APA. Completed questionnaires were received from staff of KAPP and the DRSRS of the Ministry of Environment and Natural Resources.

The producer self-assessment questionnaire covered the following areas:

1. The existence of a data collection calendar.

2. A summary of data sources produced including type of information collected, level of geographical disaggregation, and frequency of data collection.

3. Institutional and statistical infrastructure.

4. Resources (financial, human, training, and physical) and resource gaps.

5. Data skills audit which comprised a set of questions where respondents rated their ability on a scale of 0 (no confidence) to 100 (full confidence). Questions included "I can check data accuracy" and "I can explain findings and their implications."

6. Statistical information which includes core data,[5] time lines, data users' perceived quality, dissemination, and data accessibility.

The **user self-assessment questionnaire** included the following information:

1. Frequency in accessing data

2. Purpose data used for

3. Challenges related to agricultural data and the use of data

4. Users' perceived perceptions around data quality, accessibility, and timeliness

5. Participation in stakeholder engagement structures

6. Data gaps (GSARS 2015b) and core data requirements

The checklist for the capacity assessment was used to guide the county-level engagements with staff from both the KNBS and MoALF and to verify the information collected through the self-assessment questionnaires (Figure 2). It was initially envisaged that the checklist would be completed with each respondent during the meetings. However, as the meeting comprised quite a large number of participants and given the time constraints, it was decided to structure the discussion by allowing staff representing the various units in the KNBS and MoALF to describe the data collected and the data collection procedure (methodology, data collection instruments, data capturing, quality assurance, data storage, and archiving) and finally to identify challenges based on the areas of the capacity assessment.

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[5] Core agricultural data as defined by the Global Strategy, for example, crops: wheat, maize, and cotton; livestock: births and production; and fisheries: area cultivated and production, were defined in the questionnaire.

Figure 2: Components of the checklist for the Kenya statistical capacity assessment
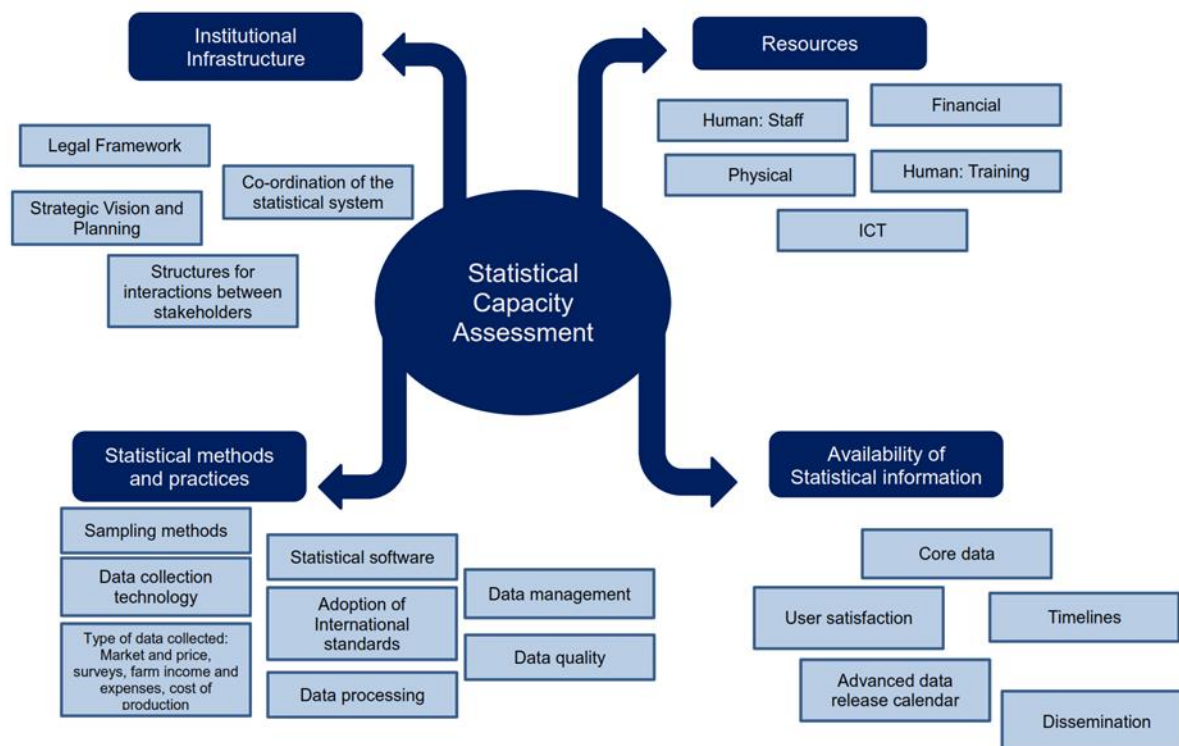
Understanding Data Collection at the County Level: County Visits

As data collection activities in Kenya occur at the county level, county visits were deemed important to provide insights into the capacity constraints and challenges prevalent at the administrative level where data collection activities occur. In addition, during the national stakeholder consultations undertaken in Nairobi during July 2017, it was noted that the devolution of activities from the national to county level has resulted in challenges in obtaining data on agriculture from counties.

The study team visited six counties: Bungoma, Uasin Gishu, Nakuru, Nyeri, Embu, and Machakos (Table 5). The counties were selected across agroecological zones to capture diversity in Kenya's agricultural system (Figure 3). While the counties represent case studies, a number of commonalities emerged across these six counties and as such the issues identified may point to patterns relevant for the agricultural statistics system in Kenya more broadly. Insecurity problems and social unrest due to political elections delayed fieldwork and prevented some critical counties like north eastern to be included in the study.

Figure 3: Mapping of six counties visited during capacity assessment
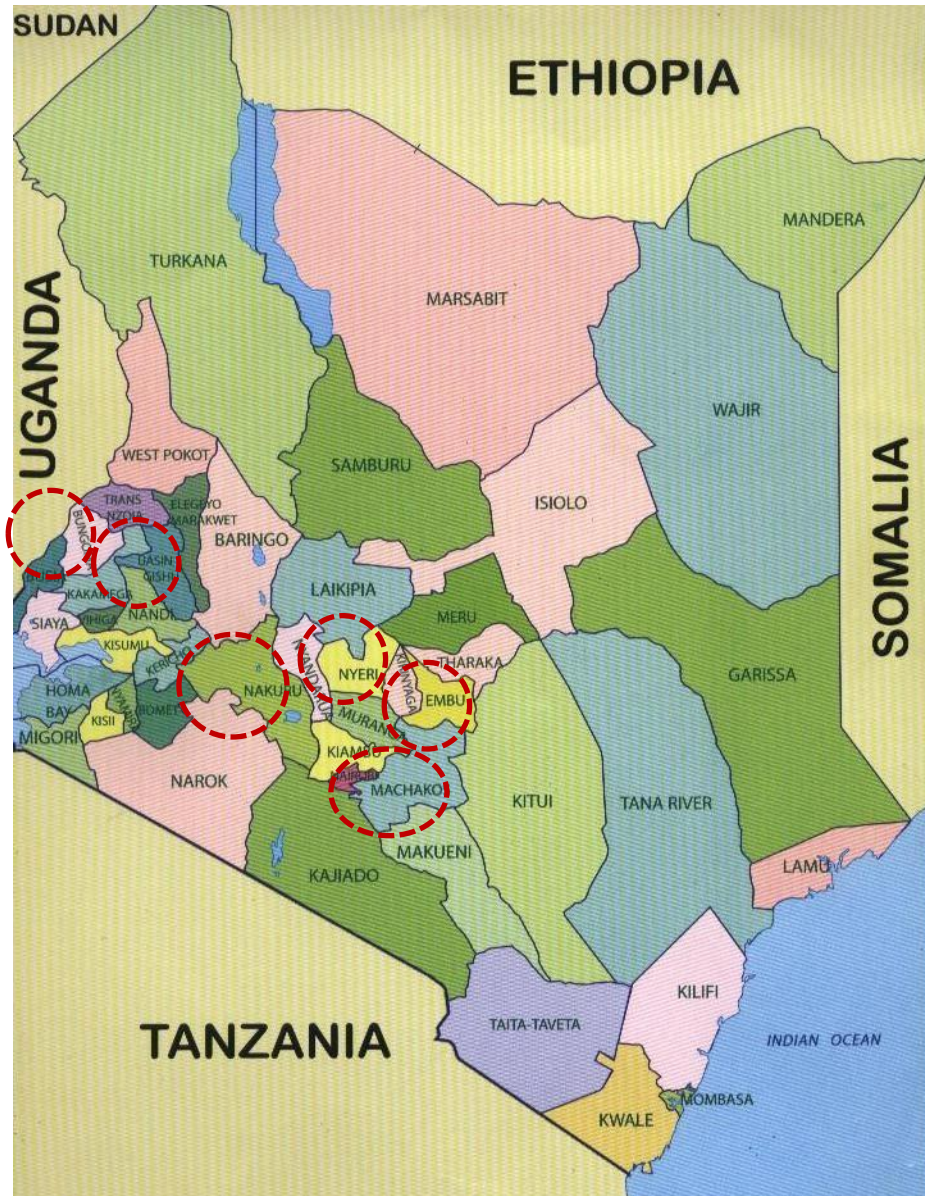
Source: Kenya Country Guide http://www.kenyacountyguide.co.ke/47-counties-of-kenya

Table 5: Details of counties visited during October 2–13, 2017

County	Agroecology	Products/livestock/fisheries	World Bank projects
Bungoma	Medium to high rainfall area	Crop: Maize, sweet potatoes, vegetables, fruit and beans, tomatoes, bananas, cabbages, and mangoes Livestock: Cattle, poultry, goats, and sheep Fisheries: Freshwater fish	World Bank National Agricultural and Rural Inclusive Growth project
Uasin Gishu	High rainfall area, (Non-arid and semiarid land, ASAL)	Crop: Maize, wheat, beans, Irish potato Irrigated crop: Tomato, cabbage, kales Livestock: Dairy and beef cattle, hair sheep, pigs Fisheries: Marine, inland, and culture fish.	World Bank Kenya Climate Smart Agricultural Project
Nakuru	Semiarid, humid	Crop: Maize, wheat, beans, peas, cabbages, tomatoes, kales, and carrots Livestock: Dairy cattle, sheep, indigenous birds	World Bank National Agricultural and Rural Inclusive growth project
Nyeri	Semiarid	Crop: Cabbages, carrots, bananas Livestock: Cattle, sheep, goats, pigs, cattle, and sheep skins	World Bank Kenya Climate Smart Agricultural Project
Embu	Semiarid	Crop: Beans and maize, green gram, and tea Irrigated crops: Tomatoes, kales, melons, bananas Livestock: Cattle Fisheries: Freshwater fish	World Bank National Agricultural and Rural Inclusive growth Project
Machakos	Semiarid	Crop: Mangos, maize, pigeon peas, sweet potatoes, cassava Livestock: Chicken indigenous, goats, cattle, bee hives Fisheries: Tilapia, cat fish	World Bank Kenya Climate Smart Agricultural Project

The team's approach to the county visits was to use the Checklist for Agricultural Statistical Capacity Assessment as a guide for the questions to be asked during meetings with the county staff of the KNBS and MoALF. Based on the consultations with stakeholders during the inception phase, the checklist covered four capacity elements: the institutional infrastructure (prerequisites), resources (input), statistical methods and practices (throughput), and availability of statistical information (output). The structure of each of the county visits is given in Table 6.

Table 6: Meeting Schedule for Kenya County Visits during October 2–13, 2017

Meeting schedule	Activity
KNBS	Meeting with Chief Statistical Officers at the county level
MoALF	Meeting with Directors at county level
MoALF	Meeting with staff at the subcounty and ward level
Farm visit	Engagement with farmers

During meetings, the study team requested staff to describe the data collection value chain to assess the

- Type of data collected;

- Tools for data collection (paper-based questionnaires or reporting formats, use of technology, for example, smart phones, tablets, or SMS)

- Data capturing (Microsoft Excel or Word);

- Data quality assurance; and

- Data backup, storage, and archiving.

Challenges experienced relating to the areas of the capacity assessment were also covered:

- Resources: financial, human (staff and training)

- Physical infrastructure (equipment and so on)

- Stakeholder engagement and dissemination activities

Approaches to Costing of Surveys

To estimate agricultural survey costs, three important elements would need to be considered: the total available budget; the data quality expectations for the largest crops, such as maize and rice (measured in terms of coefficients of variation) at the national, county, subcounty, or ward level; and crop season data. It should be determined if data for both crop seasons need to be collected and whether the information on the crop area planted/seeded has to be collected along with the harvested area or it is to be collected at the time of planting to ensure timeliness.

The information about the available budget would provide a statistician with the information on the amount of money available for the survey, which, together with information on costs of data collection of previous household survey operations, would be used to determine the sample size that the budget can be expected to provide. In addition to the sample size, the coefficients of variation (FAO, 2016), which are a measure of statistical precision and an indicator of data quality for the most widely grown food crops and most numerous and widely held types of livestock, can also be calculated.

Alternatively, information about the data quality expectations for selected key indicators has to be made available. The development of surveys is guided by data quality expectations at the subnational level and a focus on small area data that in Kenya is at the county, subcounty, or ward level. This raises a number of issues because the sample size is critical to data quality and data users will find that data quality (measured in terms of the coefficient of variation) deteriorates rapidly at the subcounty and ward levels and the data are no longer fit for use unless the sample size for those geographic areas is increased. Increasing the sample size to accommodate small area data requirements is expensive as it is the conventional wisdom among statisticians that it is normally necessary to have a minimum sample size between 200 and 300 households per small area such as the ward, subcounty, or county, to have estimates that are of acceptable statistical quality and fit for use.

The study team investigated the availability of survey cost data at every opportunity during the study, but the response both by the county and national government management is that many agriculture statistics activities are often a cooperative effort of the county and national government. In addition, the budgets of the county and national governments were not designed to record information on a statistical program basis.

The exceptions are a small number of large household surveys/censuses that include the Population Census and the Household Budget Survey.

Governments require specific information with predetermined requirements and reporting dates. Potential development partners will also have specific non-negotiable needs and requirements, and it is critical that they are all informed in advance and that the costing framework and the accounting system are designed to meet the requirements.

The primary objective of the costing framework is to provide frequent and timely reports on the resources used (personnel, transport equipment, and consumables) and activities undertaken, for example, staff recruitment, data user consultations, development of training programs, questionnaire preparation, survey design and sample selection, pilot survey (testing interviewer and supervisor training materials and data processing system), the field collection operation (that includes any necessary transport vehicles), monitoring and evaluation (M&E), data processing, edit, imputation, data analysis, and finally data dissemination and archiving.

Kenya will not likely have to create a costing framework from first principles as any of Kenya's large multiyear projects, such as the most recent Population Census, could be used as the basis for developing a survey-costing framework on the resources used and the various activities undertaken. In addition, any survey conducted with a development partner will also have information from a costing framework.

Costing Framework for Household Surveys

The costing of a sample survey is closely linked to the sample size required by the survey design (World Bank, 2017). In addition, the costs will comprise a set of fixed overhead costs and variable costs, related to the selection and processing of the sample units.

The United Nations (2005) proposes that the components of a costing framework should include the following cost categories:

- Personnel costs
- Per diems
- Transportation
- Consumables
- Equipment
- Other costs, for example, for printing of questionnaires, communication, and photocopying of maps, listing, and instruction manual

In addition, it is important to include budget lines for all required activities to ensure that the costs are taken into account. The activities for sample survey cost categories, which would need to be costed, include the following:

- Publicity, pre- and post-enumeration
- Procurement of ICT (tablets, laptops, software, database, and so on)
- Questionnaire design, translation, and testing

- Survey design and sample preparation

- Listing activities

- Pretesting activities

- Pilot survey: Training, data collection, data analysis, report on pilot survey

- Training: Preparation of training material, translation of training material, and conducting of training

- Survey implementation, monitoring, supervision, and data retrieval

- Quality assurance and validation in the field, during data entry, editing, and imputation and during analysis of the results

- Data input (entry) and checking

- Data processing, cleaning, indicators production, and tables of analysis (dummy table presentation)

- Report writing

- Dissemination: Report printing, distribution, workshops, and releases

Costing Approach for Key Priorities in Kenya

The study team undertook a high-level costing exercise by requesting information on the national and county budgets from both the KNBS and MoALF, as well as the costing of surveys/census activities from the KNBS. Information on the budgets of four KNBS county offices was received during the study.[6] To overcome this lack of actual financial information, especially with regards to the costs associated with conducting surveys, we based our costing estimates on experience of conducting surveys in Kenya and the East African Region to provide estimates for conducting an SAS. The costing includes training of field staff, listing activities, a pretesting and piloting phase, and the actual data collection of four visits to farmer operators, covering the planting and harvesting activities across the two rainy seasons. In addition, the provision of technical assistance in drafting the required legislative amendments and the Memorandums of Understanding (MOUs) between the KNBS and MoALF is costed. The approach for expanding user engagement forums is based on the cost of the Africa Statistics Day celebrations hosted by the KNBS. The costing of setting up an M&E/Statistics Unit in the county MoALF is based on the running costs of the KNBS county offices and information obtained from the Civil Service Salary Scales and Allowances for 2016 to estimate salary cost,[7] as the KNBS county budgets did not obtain salary cost other than that for data collectors related to routine data collection.

Approach for Identifying Underlying Problems Related to Agricultural Data

The study team used a number of tools to better identify the capacity constraints underlying agricultural statistics in Kenya. The tools used included a fishbone analysis to identify the main problem and root causes

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[6] The KNBS county budget spreadsheet contained limited information on surveys as none are currently undertaken at the county level. Daily subsistence allowance of supervisors, enumerators, and drivers but not salary cost for the CSO is provided for routine data collection such as the CPI and retail market price survey.
[7] https://mywage.org/kenya/home/salary/public-sector-wages.

as well as a SWOT analysis based on the KII. These tools assisted in visualizing the findings from the capacity needs assessment and were also used during the validation workshop.

Fishbone Analysis

Problem identification and resolution requires an evaluation of the main problem and the root causes of these. A fishbone diagram of cause and effect can be used to present an analysis of the main causes underlying the poor quality of agricultural statistics in Kenya and subsequently evaluating the possible solutions. This approach was also used during the stakeholder verification workshop to encourage participants to think about the problems related to agricultural statistics and the constraints that underpin the problem and to start a discussion of possible solutions, their prioritization, and sequencing of activities to address these constraints.

SWOT

The study team undertook a SWOT assessment of both the internal (strengths and weaknesses) and external (opportunities and threats) aspects affecting the production of quality agricultural statistics in Kenya. Based on the information obtained during the KII at the national, county, and ward levels, the study team classified these findings into strengths, weaknesses, opportunities, and threats. The value of the SWOT analysis lies in the fact that it provides an analytical framework for evaluating a problem and helps identify key areas that need attention in terms of threats but also where there are opportunities for building on and expanding areas of strengths.

Validation Workshop

The validation workshop during the finalization phase of the study provided an opportunity for all the relevant stakeholders to engage in the issues, identify priorities, and jointly map a way forward. It was also hoped that the workshop would serve as a networking opportunity for key players to interact and assist in initiating the setup of the user/producer engagement structures. The workshop also served as an opportunity for stakeholders from the public and private sectors and research and academic institutions to interact and discuss the findings from the capacity assessment.

User and Producer Self-Assessment Questionnaires

User and producer self-assessment questionnaires were sent to users and producers identified during the national consultations and before the county field visits.

CHAPTER 4: Findings of the Assessment

Key Findings from National- and County-level Assessments

The KNBS and MoALF comprise different institutional structures and arrangements at the national and county levels. The KNBS is a semi-autonomous national government agency with representation at the county level. All budget allocations, procurement, and staff requirements are centralized at the national level. In contrast, the constitution has devolved MoALF functions to the county level. Thus, while there is some interaction between the MoALF HQ and MoALF county ministries around critical areas such as food security information, there are no institutionalized reporting lines following the devolution process.

The two key organizations in the production of agricultural statistics in Kenya are the KNBS and MoALF. The KNBS is the custodian of official statistics and responsible for surveys and censuses while administrative data are collected mainly through the county MoALF extension services and program-related data such as the fertilizer subsidy program.

The six counties selected for the in-depth field visits to represent a wide number of agroecological zones in Kenya were Bungoma, Uasin Gishu, Nakuru, Nyeri, Embu, and Machakos counties. While the six counties can only provide case study insights, the common issues that have emerged imply that the analysis and recommendations are useful beyond the counties visited. A summary of the findings from the county visits is presented across the areas of the capacity needs assessment framework.

i.   Legal Framework

Official statistics (surveys and censuses): The KNBS is a national entity with representation at the county level. All institutional activities (including budgeting and recruitment) are centralized at the national level. The Statistics Act of 2006 legally mandates the KNBS to "act as the principal agency of government for collecting, analyzing and disseminating statistical data in Kenya."

Administrative data: MoALF activities have been devolved to the autonomous county governments, but no legal framework for sharing information with the MoALF head office has been established. Less than 50 percent of the counties share their data with the KNBS HQ. While it is not clear why some counties still share data, our engagements pointed to the role of previous personal relationships and issues related to capacity (skills and technical) in providing the required data.

ii.   Data Collection and Sharing

Official statistics (sample surveys and censuses): While the Statistics Act and National Strategy for the Development of Statistics (NSDS) should provide the institutional framework for collaboration on data collection between the KNBS and all stakeholders including the MoALF, currently there is limited collaboration in terms of data collection and sharing. In certain counties, data collection activities by the county MoALF is planned with no or little input from the KNBS and national MoALF.

Establishing the legal framework that underpins the sharing of information and data between the county-level MoALFs and the national state department as well as between the KNBS and national MoALF is an essential first step in establishing an institutional framework for sharing data. Developing the institutional

framework for data sharing and collection at the national and county levels should occur concurrently to ensure all stakeholders are included and coherence in the approach at both levels of government is achieved.

Administrative data collection: Data dissemination is adversely affected by the absence of protocol or MoU for data sharing between governments at the national and county levels; this has particularly affected the efficient functioning of the MoALF. Staff therefore lack clarity regarding who is eligible to receive data and under what conditions the sharing may take place. More effective sharing of data between the national and county levels would also minimize the potential for duplication and overlap in survey activities. It is important for the national and county governments to renegotiate the issue to facilitate data sharing and accountability.

Users have also highlighted that there are no forums to facilitate the interaction between users and producers.

iii. Unintended Consequences from the Devolution on Agricultural Statistics

Administrative data collection: The devolution of authority to the counties adversely affected the statistical programs, with agricultural data not provided on a regular basis to the national MoALF while county staff were unclear regarding which data must be provided to the national level due to the new reporting lines. The resulting uncertainty has disrupted, what was in the past, a close relationship between national and county government employees at the 'working and program delivery level' in the county and subcounty offices.

Official statistics (surveys and censuses): While the KNBS was not affected by the devolution process, as it maintained a national function with representation at the county level, the devolution process did negatively affect the cooperation between the KNBS and MoALF at the county level.

iv. Statistical Methods and Practices

There is a lack of reliable data for planning and evaluation purposes or for evidence-based decision making.

Official statistics (surveys and censuses): The fact that the Census of Agriculture has not been conducted since the 1960s has resulted in the declining quality of data around agriculture, a limited survey program, and increased use of desk-based or eye estimation approaches to fill gaps.

Administrative data collection: Statistically sound methodology such as probability sampling is not used for data collection. 'Eye observations' or 'desk-based estimation' is commonly used by agricultural officers. To obtain information, farmer groups, village elders, and other local officials provide an opinion on the total area planted and harvested; however, this is not an acceptable statistical practice. Over time, these current practices will have a bias toward overestimation and have a negative impact on food security assessments.

Data users, including KALRO and KAPP, have highlighted concerns regarding the quality of agricultural data collection.

The overestimation of crop production negatively affects planning for food security. The use of nonscientific measures in data collection activities threatens to undermine data users' confidence in the

quality of data, leading to the data collected by the MoALF and KNBS not being used for policy-making and research purposes.

v.   Lack of Metadata and Harmonization of Concepts and Definitions

Administrative data collection: There is a need to provide metadata to accompany all statistical estimates, especially those produced by the MoALF. Metadata document the current statistical information, specifically the survey or data collection methodology, concepts, definitions, and data collection procedures. The protocols for producing metadata would need to be established in the first instance, followed by documentation detailing concepts and definitions relevant to administrative data collection undertaken by extension officers.

There is also a need to begin the task to ensure that the KNBS and MoALF harmonize and adopt, where relevant, the international standards established by the Statistics Division of the United Nations and the FAO with regard to concepts and definitions for food and agriculture.

vi.   Training and Professional Development - Human and Physical Resources

Official statistics and administrative data: Staff at the MoALF need formal training in data collection and the use of sound statistical methods and practices. The only training currently available is on-the-job training. In addition, both the KNBS and MoALF staff need to develop skills in data analysis (beyond descriptive statistics) and report writing. The self-assessment questionnaire completed by the MoALF highlights the need for training across a number of areas including sampling design, the use of statistical packages, data processing, and report writing. The KNBS county statistical officers (CSOs) highlighted the lack of skills in relation to the interpretation of data, decision making, and the use of data to set targets. The aging staff in both the KNBS and MoALF and the lack of succession planning may result in the loss of critical skills and negatively affect future data collection activities. While succession planning for the KNBS and MoALF appears to have received more attention at the national level, the teams' interaction at the county level highlighted this lack of planning to be acute at the county level.

Administrative data collection: Extension officers in the MoALF at the county level require training in the use of Microsoft Word and Excel. In addition, the benefits from training can quickly dissipate if there are no structures in place to select the most relevant staff for training, while succession planning is also important to ensure that aging staff are replaced with sufficient lead time. Thus, training should take place in the context of a broader human development strategy.

Official statistics and administrative data collection: Physical resources such as vehicles, buildings, and information technology (IT) equipment are lacking. There are insufficient means of transport including 4x4 vehicles at the county, subcounty, and ward levels to conduct current data collection and supervision activities, a problem that would be exacerbated if data collection activities are expanded. There are no or only minimal transport allowances in cases where there is no government-owned transportation available. Limited or no equipment means that employees are required to use their own laptops and mobile phones and pay for data bundles to perform official duties, which is problematic from a data confidentiality perspective in addition to the issues around staff incentives. There is also limited or no Internet, particularly at the subcounty and ward levels. Financial constraints are also hampering the effective production of agricultural statistics. Underfunding of activities occur at the county level, while disbursements occur at

irregular intervals, which negatively affects planning. The County Integrated Development Plans could present an opportunity for institutionalizing the need to allocate funding for data collection.

Key Findings from the Producer and User Self-Assessment Questionnaires

a) The analysis of the KNBS self-assessment questionnaires revealed the following:

Statistical infrastructure exists at the national level including statistical software such as SPSS and Stata and common IT surveys for storing data. In addition, the maps on administrative boundaries, list of farms, satellite maps, and master sample frames exist. The agricultural data collection activities currently undertaken by the KNBS relate to market and price information, farm income, expenses, and cost of production. There are plans to conduct an agricultural survey, but currently none is conducted, with the exception of the Household Budget Survey, which contains an agricultural module. At the national level, funding appears to be adequate, while constraints around human resources include high staff turnover and vacancies. Staff require training in the use of statistical techniques, including sample design, the use of statistical packages, conducting of field operations, data processing, and report writing. Physical infrastructure constraints include lack of sufficient transport, ICT, laptops, and computers.

Most of the core agricultural data are collected through administrative data sources. While an advance release calendar for data collection is publicly available, international time lines are not adhered to. User perceptions around data quality have not been measured and published data are not accompanied by an assessment of data quality. However, users have been engaged to determine their needs around agricultural statistics; in addition, data are disseminated widely and special requests for data not routinely published can be requested through the Director General's office.

The KNBS's county-level producer questionnaires indicated that data collection for the KNBS occurs at the county level. Currently, there are no sample surveys conducted by the KNBS. The Population Census 2019 is currently undertaking a listing and mapping exercise in which county staff are also involved. Data collection at the county level relates to the CPI, [8] retail market prices, and livestock data obtained from the veterinary services from the MoALF at the county level. CSOs highlight deficient resources across all areas including financial, human (staff and training), and physical infrastructure (equipment and building). KNBS CSOs were asked to rate their data skills based on a set of questions. The results highlight that while there are some disparities across the five counties in skills categories, on average high scores were self-assessed in the areas of checking data accuracy, calculating percentages, and plotting data. There was lower self-assessed ability in areas relating to the use of data in decision making, for example, explaining findings and their implications, identifying gaps, and using data for decision making.

b) The producer self-assessment questionnaire received from the national MoALF indicated the following:

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[8] Data collection is only in 25 data collection zones, and thus the CPI is not collected across all counties.

The department undertakes an annual data verification process in all counties in collaboration with the KNBS. A national food security assessment is also conducted annually. Data collection by extension officers occurs at the ward level. Daily and weekly food commodity market prices are also collected by data collectors. The department has not reviewed the relevance of the data collected, and while there are currently no structures in place for user/producer engagements, it is planned that these will be established. Data are collected by physical observation through the use of paper-based questionnaires/forms. Data are entered manually and quality assurance/assessment is not undertaken on a regular basis. No data archiving system or server exists and this requires urgent attention.

There is no dedicated budget line for most statistical activities at both national and county levels, while a Statistical Unit has been established at the national level covering Livestock, Crops and Fisheries (Annex A).

- The Livestock Statistical Unit lacks resources and qualified statistician and statistics work is being done by technical officers from the Directorate of Livestock Production alongside other functions.

- Both the Crops Statistics Unit and Fisheries Statistics Unit lack adequate desktop and laptop computers.

In addition, the following general comments were noted:

- There is a need for career progression plans for statisticians.

- An employment policy that allows for the employment of statisticians in the MoALF is required.

- Top management should be aware of the need and importance of statistics for evidence-based decision making and general work improvement.

c) Five user self-assessment questionnaires were received from: i) KAPP: Kenya Agricultural Productivity Programme; ii) KCSAP: Environmental and Social Safeguards; iii) KALRO: KCSAP research component including ICT infrastructure design; iv) KAPP: Component coordinator for agro-weather, market, climate and advisory services of KCSAP; and Ministry of Environment and Natural Resources: Department of Resource Surveys and Remote Sensing (DRSRS).

An analysis of the user self-assessment questionnaires highlights the following:

Users retrieve data at different frequencies but mainly by accessing websites or via e-mails. The respondents of the self-assessment questionnaires indicated that they use the data for research, performance reviews, management, strategic planning, and M&E.

The main challenges respondents experienced with regard to agricultural data centered on difficulty in accessing data as they do not know where to access the data or because of a lack of training/skills and difficulty in accessing the data even if they know where to find the data. The most important aspects highlighted around data quality were accuracy, frequency, and time lines. The current agricultural data gaps highlighted by users included crop and livestock statistics, information on

subsistence farmers, areas vulnerable to climate change Early Warning Systems (EWS), and productivity and production costs. Respondents also indicated that there were no structures for users and producers to interact.

Key Findings Fishbone Activity

There are a number of reasons for the poor quality of agricultural data in Kenya, each with its own underlying causes. For example, the problem of 'no scientific approaches to collect agricultural data' has a root cause in that no sample survey is conducted that would provide statistically robust estimates of crop production. This in turn results in the MoALF staff using 'eye or desk-based' estimation across all three areas of data production in the ministry (livestock, agriculture, and fisheries). In addition, a lack of skills across a number of areas results in the use of nonscientific approaches to data collection, including lack of skills in sampling methods, in the use of statistical packages, and in effectively managing field operations to achieve high levels of quality (Figure 4)

To address these root causes, Figure 5 sets out the possible solutions for addressing each of these causes. The possible solutions include the development of a sampling frame for agricultural statistics as well as a regular sample survey, training of staff in questionnaire and sampling design, the use of statistical packages for analysis, and training in conducting field operations.

Figure 4: Fishbone diagram: Problem identification for underlying causes of poor quality of agricultural data

No scientific approaches to collect Agricultural data
- No sample survey conducted
- Use of estimation
- Lack of skills to use scientific methods
- Lack of skills in sampling design
- Lack of skills to use statistical packages
- Lack of skills to conduct field operations

No protocol for data collection, quality assurance, processing and analyses
- Lack of quality assurance by county
- Insufficient staff to collect data
- Lack of skills for data analysis
- Lack of technical skills for data collection

No Policies/legislation exists for data sharing
- Devolution process meant the end of data sharing
- No collaboration between county and national level
- No clarity on roles and responsibilities related to Agricultural data collection

Problem Statement
Poor quality of Agricultural Statistics

Lack of Physical Resources
- Insufficient/No scanners
- Insufficient/No printers
- Insufficient/No laptops or desktop computers
- Insufficient/No equipment for specialised data collection
- Insufficient/No vehicles or motorbikes
- Physical environment poor e.g. old buildings

Lack of Human & Financial Resources
- No dedicated funding for data collection
- Budget constraints
- Lack of skilled staff to undertake specialised activities
- No succession planning
- Aging staff
- No recruitment drive
- Lack of sufficient staff to undertake data collection

Lack of use of Technology for data collection
- No smartphones/tablets for data collection
- Lack of skills to process data
- Lack of internet access/email to transmit data
- Technology not maintained
- Lack of ICT for data collection
- Paper based data collection (PAPI)

Note: PAPI = Paper and pencil interviewing.

Figure 5: Fishbone diagram: Problem solution for addressing poor quality of agricultural data
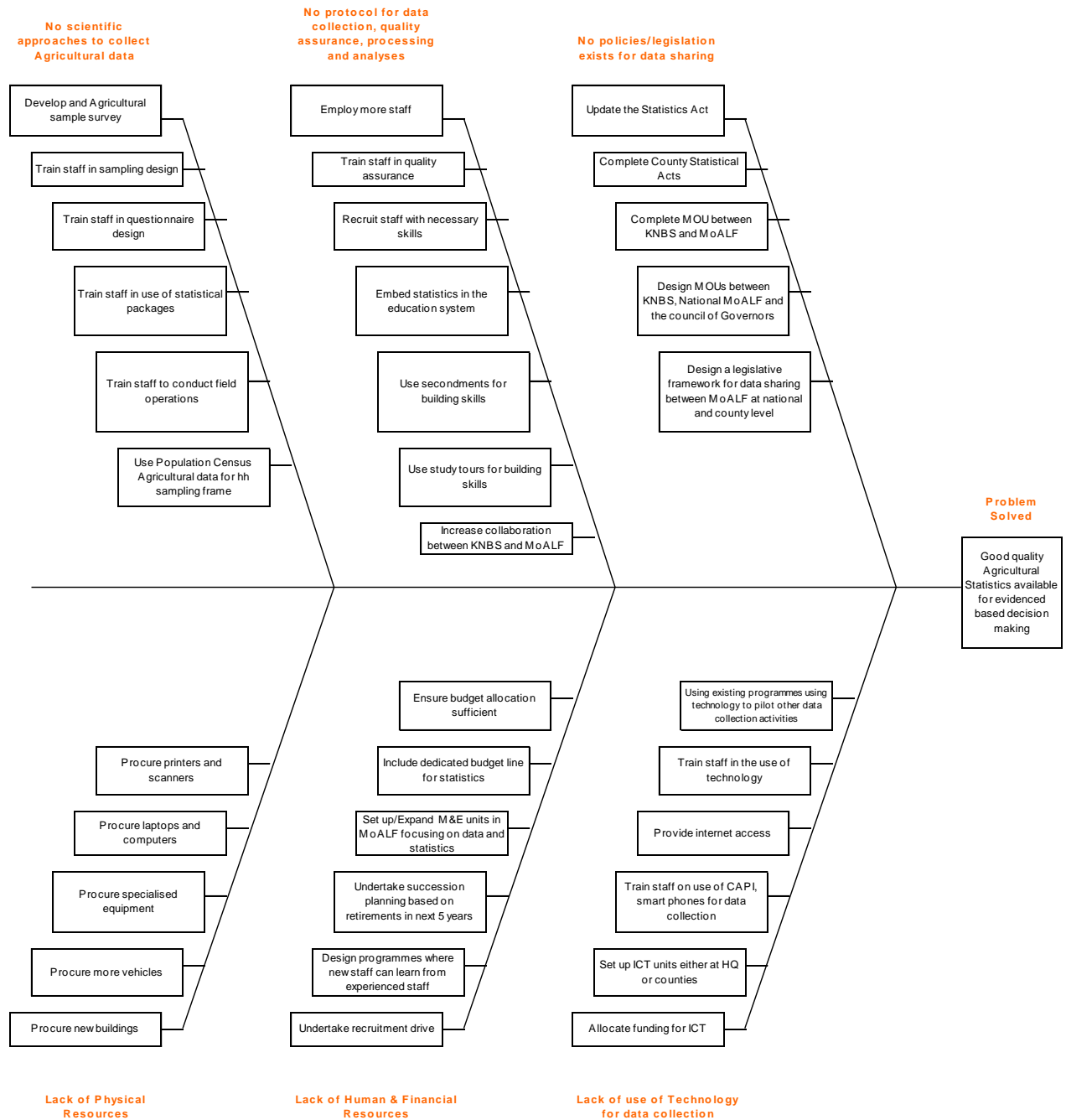
Key Findings from SWOT Analysis

The study carried out SWOT assessment of both the internal (strengths and weaknesses) and external/internal (opportunities and threats) aspects affecting the production of quality agricultural statistics in Kenya. Together with the problem analysis presented earlier, this exercise can assist in prioritizing solutions for improving statistical capacity for agriculture. For example, one of the threats to the continuity of the data collection is the aging staff component, especially in the MoALF, and the lack of succession planning in the department. In contrast, an area of opportunity is the Population Census mapping and equipment (smartphones, mapping software, and so on) that can be harnessed for other survey activities in the KNBS. The SWOT analysis builds on the problem identification process and can help the KNBS and MoALF identify where resources (human and financial) should be directed.

The strengths identified in the SWOT analysis include capable staff at both the technical and management levels. The personnel in both the KNBS and MoALF, at both the national and county levels, are well trained and have performed their jobs for a number of years. They acknowledge the fact that their statistical program falls short of meeting the generally acceptable statistical practices. Capable senior management at HQ and the county level for both the KNBS and MoALF support investment in data collection. Some county and ward officers use administrative and program data, such as fertilizer subsidy information, crop insurance, and field days to bridge the gap in available data and improve data quality. The Population Census 2019 conducted by the KNBS is using advanced technology for data collection including smartphones, remote sensing, and GPS, which can be used in other survey programs going forward. In addition, the KNBS is also rolling out computer-assisted personal interviewing (CAPI) for its regular survey program, which will assist in improving the timeliness of agricultural statistics for decision making.

The SWOT analysis has found a number of areas that require improvement. The devolution process has resulted in increased uncertainty among staff and truncated the working relationship between the various levels of government. In addition, the coordination between the KNBS and MoALF is limited or nonexistent at the county level with the exception of the annual verification process; however, this process does not seem to occur every year. There is a lack of a legislative framework that sets out the working relationship between technical staff across the various levels of government and across departments. The lack of a framework or MoU for data sharing has resulted in a lack of clarity around whom data can be provided to, and accountability lines have also been negatively affected. In terms of statistical practices, the MoALF extension officer uses eye/desk-based estimation methods for providing estimates on crop production, yields, and acreage, which is linked to lack of resources including transport, constrained human resources, and lack of training in data collection methods and statistics. In the MoALF, data is predominantly collected through paper-based questionnaires, and there is limited use of technology. No metadata exist, including lack of documentation for detailing methodologies, concepts, and definitions. Concepts and definitions are also not harmonized between the KNBS and MoALF. Financial constraints including lack of funding for data collection and training, as well as funding being received late and at irregular intervals, affect ability to invest and plan for better data collection.

On the positive side, there are some opportunities that the statistical system can build on for future investment. The willingness of staff to implement the changes and adopt new practices bodes well for improving agricultural statistics in Kenya. There are exciting pilot projects undertaken by the MoALF, including those related to crop insurance and CABI Plantwise that can provide the opportunity for expansion for other data collection activities, as well as for the use of technology. The investment made in infrastructure around Population Census 2019 can be harnessed for future data collection as well. The plans by the MoALF to establish a dedicated Statistical Unit in each county will assist in building capacity and elevating the importance of data within the county departments. The review of the Statistical Act by the

KNBS in consultation with stakeholders will reflect the devolution of activities and assist in establishing the enabling legislation for improved cooperation between stakeholders.

The **threats identified by the SWOT analysis** require urgent attention as it may negatively affect the ability of both organizations to deliver their mandate; these include the aging staff in both organizations, with the lack of succession planning negatively affecting negatively the continuation of data collection activity going forward. The fact that the Census of Agriculture has not been conducted since the 1960s has resulted in the declining quality of data and the increased use of desk-based/eye estimation. The use of nonscientific measures in data collection undermines the confidence in the quality of data produced by users, which could result in the data not being used for evidence-based policy making. The overestimating of crop production negatively affects planning for food security. It is not clear that the implementation of the SPARS has been funded, which results in the activities becoming outdated and significant resources would have to be allocated to update and amend the plan.

CHAPTER 5: Quantifying the Costs Required to Address the Identified Capacity Gaps

Costing of Agricultural Surveys Needed to Strengthen Agricultural Statistics in Kenya

The costing of activities ideally would consider both

1. The development of agricultural surveys programs to be undertaken by the KNBS (including agricultural census, household and agricultural operator surveys) and

2. The financing of activities focused on the improvement of administrative data sources collected by the MoALF. This would also include the costing related to the use of technology, transport, equipment for data collection, and ICT equipment, as well as the training of staff in the use of technically sound methods of data collection.

Based on the interactions with the KNBS, the list of costed priority activities, as highlighted by the SPARS document, is aligned with the planned survey program. Two gaps that can be identified based on the SPARS costing activity relates to the analysis of administrative records and the development of a subcounty-specific sampling frame. The development of a sampling frame will assist in providing estimates at lower geographical levels including county, subcounty, and ward levels. This will assist county governments in better planning and designing policies, which are best tailored to reflect subcounty characteristics. However, estimates at a lower geographical level such as the subcounty level will have significant cost implications and may be unaffordable.

The analysis of administrative records is negatively affected by the lack of integrated databases where data are stored (data are mostly stored on personal laptops) and the low quality of the data that are collected by the MoALF, which in most cases are based on estimation and extrapolation and not physical data collection.

The approach to the costing of activities is to identify key priorities for action by the two spheres of government (national and county) and across the two organizations (KNBS and MoALF). The costing for the SAS is based on experience in conducting surveys in Kenya as well as costing technical assistance of experts who can assist in drafting legislative amendments and MoUs. The resources (time and financial) required by the current staff complement for implementation of these activities are not costed. The costing is a high-level exercise and as such should only be viewed as providing broad funding requirements and not as definitive costs.

Costing of the Capacity Assessment

Based on the problem identification in the Error! Reference source not found., the following key constraints were identified and costed for implementation in the short and medium term. These activities provide the basis for developing quality agricultural data and can form the basis for future capacity development activities:

- Develop the legislative framework, which governs the interaction between the MoALF and KNBS at the national level. This activity can build on the review of the Statistics Act undertaken by the

KNBS but will include the development of MoUs between the two organizations at the national and county levels.

- Develop a legislative framework for data sharing between the county and national MoALF. This will also involve the setting of protocols and tools for data collection between the two spheres of government. The existing work on the development of the county statistical acts can provide the basis for the legislative framework.

- Establish structures where users and producers of agricultural data can interact. This activity may build on the existing ANES structures but expand its reach and establish sector-specific (agriculture, livestock, and fisheries) engagement forums. The SPARS process did not identify the key indicators around agriculture that would be reported and their required reporting periodicity. The user and producer forums can also be used to discuss and agree on these indicators as well as the criteria for prioritization of these indicators.

- Develop an SAS by the KNBS. It is our understanding that a pilot SAS will be conducted by the KNBS in 2018. The core agricultural crops and livestock that could be covered by the survey are listed in the following Table 7:

Table 7: Core Agricultural Crops and Livestock activities

Agricultural activity and livestock	Detail
Food crops	Maize, wheat, sorghum, cassava, rice, peas, beans, sugarcane, plantains, bananas
Horticulture crops	Kale, cabbage, onions, Irish potatoes, sweet potatoes
Livestock	Cattle, dairy cattle, sheep, goats, pigs, chickens

Note: These are based on the proportion of households growing crops using the results of the KIHBS (2005/2006) undertaken by the KNBS.

- Establishment of M&E units in each county MoALF that has close ties to the newly established Agricultural Unit within the national MoALF.

- Address the human constraints and risk associated with the aging staff component and lack of succession planning in both organizations. It is essential that a succession plan be developed with details on the replacement rate. This should also include an audit of the existing skills set of the staff and the skills required over the next five years.

Table 8 sets out an approximate costing of priorities based on available information and assumptions by the team and grouped around the areas of the development of a legislative framework, harmonization of concepts and definitions, user and producer engagement forums, data collection activities (survey program), and HR planning. The approach to the cost calculation for each item is further described in this section.

Table 8: Costing of priority areas

Legislative framework	Activity	Subactivity	Responsible entity	Required budget (US$)	Time lines	Qualifications on costing
Lack of legislative framework for guiding statistical capacity after devolution process	Updating of the Statistical Act		KNBS	97,000	Unclear	Excludes the cost and resources to implement this by the KNBS. Based on the SPARS estimate of K Sh 10 million (K Sh 1 = US$0.0097).
Lack of legislative framework for guiding statistical capacity after devolution process	Develop County Statistical Acts		KNBS	9,700	Unclear	Excludes the cost and resources to implement this by the KNBS (K Sh 1 = US$0.0097). Given the fact that the acts have been presented to Parliament, the funding could be used to develop costing to set up the county statistical offices and fund.
No legislative framework for engagement between the KNBS and MoALF at the national level	Develop an MoU between the KNBS and national MoALF	Hire a TA to design and develop an MoU and draft required legislation	KNBS/MoALF and Council of Governors	21,000	February 2018–March 2018	Does not include the cost and resources to implement this by the KNBS and MoALF
No legislative framework for engagement the national- and county-level MoALF	Develop legislative framework to institutionalize these engagements	Hire a TA to design and draft required legislation	MoALF national and county governments	21,000	April 2018–May 2018	Does not include the cost and resources to implement this by the MoALF
Harmonization of concepts and definitions						
No metadata exist for detailing data collection	Develop metadata	Hire a TA to design and develop metadata standards, templates, and the process for collecting these	MoALF national and county governments	45,000	April 2018–May 2018	Does not include the costs and resources required to implement and maintain by the MOALF and county departments

Legislative framework	Activity	Subactivity	Responsible entity	Required budget (US$)	Time lines	Qualifications on costing
No common concepts and definitions	Development of harmonized concepts and definitions	Hire a TA to design and develop harmonized concepts and definitions	MoALF national and county governments	67,500	June–August 2017	Does not include the costs and resources required to implement and maintain by the MOALF and county departments
Next step: Harmonize data collection between the KNBS and MoALF	Development of harmonized protocols and tools for data collection	Hire a TA to design and develop harmonized tools for data collection	MoALF national and county governments and KNBS			Activity following on from the prioritized areas
User and producer engagement						
Coordination of users and producers: Output is identification of key indicators and their reporting periodicity	What are the key crops and livestock that will be reported with regular periodicity	Use ANES as first point of engagement to discuss prioritization	MoALF national and county governments	n.a.	Ongoing	Existing structure
Lack of forums for user and producer engagement	Establish structures for engagement	Set up a biannual meeting for 3 subsectors (agriculture, livestock, and fisheries)	MoALF and KNBS, national and county	18,500	FY2017/2018: 2 meetings a year	Does not include any allowances to staff for attending forums. Based on cost associated with hosting Africa Statistics Day activities by the KNBS
Limited/no involvement of private sector in data collection, sharing, and dissemination	Review of possible approaches for private sector involvement including data collaboratives and PPP	Hire a TA to undertake review	MoALF/KNBS and other data public Agricultural data users. Private sector data producers	30,000	2017/2018	Will require close partnership with private sector
Data collection activities						
No seasonal agricultural operator survey	Develop SAS	Cost related to undertaking the SAS	KNBS	2,500,000 – 4,000,000	FY2017/2018	Comprises a sample of 300 farmer operators across 47 counties. Lower bound cost excludes the need for hiring an additional 61 vehicles and drivers for 20 days to undertake data collection activities.

Legislative framework	Activity	Subactivity	Responsible entity	Required budget (US$)	Time lines	Qualifications on costing
						Livestock module can be added to this survey or separate sample for livestock moving beyond borders can be developed. This survey will exclude large enterprises (possible to use admin data or Census of Enterprises). Also will be dependent on the completion of Population Census 2019 listing activities for sample to be drawn.
Next step: Support to design SAS from sampling perspectives (CV < 15%) as well as questionnaire design	Design the SAS sample	Hire a TA to undertake sampling and questionnaire design for SAS	KNBS	32,000		Activity following on from the prioritized areas
Human resources						
Lack of dedicated resources for supporting data collection in the MoALF	Set up M&E unit in the county MoALF	Allocate resource human and financial to set up the unit	MoALF	700,000	FY2017/2018	Includes only the initial cost relating to establishing the unit and does not include subsequent recurring costs
Aging staff and no succession planning	Undertake a skills audit in KNBS HQ	Hire a TA to undertake a skills audit	KNBS	8,000	FY2017/2018	Cost estimate does not include the cost and resources (financial and time) of KNBS HQ staff to participate in the audit.
	Undertake a skills audit in KNBS at the county level (47 counties)	Hire a TA to undertake a skills audit	KNBS—county	94,000	FY2018/2019	Cost estimate does not include the cost and resources (financial and time) of KNBS county staff to participate in the audit.
Aging staff and no succession planning	Undertake skills audit in MoALF HQ	Hire a TA to undertake a skills audit	MoALF	8,000	FY2017/2018	Cost estimate does not include the cost and resources (financial and time) of MoALF HQ staff to participate in the audit.

Legislative framework	Activity	Subactivity	Responsible entity	Required budget (US$)	Time lines	Qualifications on costing
	Undertake a skills audit in MoALF at the county level (47 counties)	Hire a TA to undertake a skills audit	MoALF—county departments	94,000	FY2018/20 19	Cost estimate does not include the cost and resources (financial and time) of MoALF county staff to participate in the audit.

Note: Please see Annex C for detailed costing. Annex C provides the assumption for TA fee rates.

PPP = Public-private partnership; TA = Technical adviser.

To address the lack of a legislative framework that institutionalizes and sets out the working relationship between the KNBS, MoALF, and county governments, the study team costed the use of technical adviser to support the drafting of the legislation and MoUs that would establish the reporting requirements and framework for data sharing between the KNBS and MoALF at the national level as well as those between the national-level and county-level departments of the MoALF. The costing does not take into account the resources (time, human, and financial) of the staff of these institutions for the implementation phase. The KNBS activities related to the updating of the Statistics Act and drafting of the county Statistical Act, which are important preparatory activities for the subsequent development of a legislative framework, while presented, are assumed to be funded by the KNBS. Please see Annex C for details on the assumptions underlying the costing of technical assistance.

The lack of metadata detailing data collection and the harmonization of concepts and definitions between the MoALF directorates at the county level and with the national department requires a team of experts to first design and develop the metadata standards and the process for collecting these and, second, to design and harmonize concepts and definitions. The cost related to this would amount to US$112 500, which excludes the costs and resources required to implement and maintain the metadata. The next step, which is not costed, would be to align data collection tools between the KNBS and MoALF as well as evaluating the role that the KNBS can play in the quality assurance of the data produced by the MoALF at the county level.

The user self-assessment questionnaires and KII conducted in July 2017 indicated that the lack of user and producer forums for engagement in agricultural data collection is of concern to stakeholders. This report proposes the establishment of a forum with representation from the 47 counties and MoALF and KNBS at the national level to meet biannually to deal with the issues. The cost related to this activity includes venue hire and catering based on the budget for hosting African Statistics Day by the KNBS county office. The cost related to allowances paid to staff for attending the forum is excluded.

As a rule of thumb, sample sizes of around 7,000 agricultural operators will provide 'fit for purpose' and reliable estimates at the national level. As in most countries, and in addition to having national statistics, Kenya's decision makers require statistics at the county, subcounty, or ward level. Statistical data of equivalent quality at the national level require a sample of around 300 farmers per county or 14,100 farmers (47 counties × 300 farm operators). Providing estimates at lower geographical levels, for example, at subcounty and ward levels, would imply significantly larger sample sizes and be unaffordable and slow to deliver estimates. The costing is based on assumptions that include the sample size required to provide county-level estimates based on generally acceptable benchmarks.

The costing of the SAS was based on experience in conducting household surveys in the East African area including Kenya. To produce estimates that are 'fit for purpose' at the county level and produce coefficients of variation less than 5 percent, a sample size of 14,100 collected over three weeks by 313 enumerators and 104 supervisors was costed. There are two main rainy seasons, each with a corresponding planting and harvesting activity, implying that four visits would need to be undertaken by enumerators. The amount of US$4.1 million includes activities such as training, pretesting, listing, a pilot survey, and main survey collection for the full sample. In this costing estimate, it is assumed that tablets (for 331 enumerators) would have to be procured but that with regard to vehicles, each county would have 1 vehicle available and the remaining 61 would have to be hired for 20 days, at a cost of US$296, 000. An audit of all vehicles available in the KNBS will assist in determining the actual number of vehicles that are available. In addition, the

training of field staff (enumerators, supervisors, and coordinators) for seven days is costed at US$145,500. For detailed costing, please see Annex D for detailed costing.

The proposal for building the human resources in statistics across the two spheres of government involves the setting up of an M&E/Statistics Unit in each of the 47 county MoALF offices. Initially, this unit would be staffed by one person but as more funding becomes available, additional staff should be recruited, in particular statisticians and economists, to build data collection and analysis capacity in the county-level departments. These units should closely liaise with the newly established Agricultural Statistics Unit in the MoALF at the national level. The initial cost for setting up an M&E/Statistics Unit is US$14,715 and for 47 counties would cost around US$690,000. Recurring costs for operationalizing the units have not been costed and would need to be included in the county MoALF annual budgets. Please see Annex E for details on the costing assumptions.

To address the lack of succession planning, there is a need to undertake a skills audit at the national departments of the KNBS and MoALF. This will be undertaken by a local HR specialist in consultation with the staff of these organizations (staff costs are not included in the costing activity). Both the internal HR staff and technical experts of the departments would need to be engaged to undertake the skills audit. The cost of the HR specialist to undertake the HQ-level skills audit in both the KNBS and MoALF would amount to US$16,000. In addition, a similar exercise will need to be undertaken at the county level for both KNBS and MoALF staff. This will involve a longer period, and while there may be some commonalties in skills required across the counties, the consultant would need to interact with the relevant staff in each of the counties (technical and HR). Collaborating with the private sector can lead to more efficient ways to collect and use data. PPPs and data collaboratives can provide the basis for such engagements.

> **Box 1: Note on costing of surveys**
>
> The cost of sample surveys is a function of the sample size and the geographical level at which estimates need to be provided. Below are examples of a number of survey operations, the sample size, and related costs.
>
> **Malawi Agricultural Production Estimates Survey (APES) 2014–2017:** The revised APES proposal was a sample of around 5 percent of the agricultural households (25,000). Households were interviewed three times a year. Cost per household interviewed was estimated to be US$59, with a total cost of US$1,475,000. (*Source:* Agriculture Statistics Master plan [2013], APES Methodology Document, Ministry of Agriculture and Food Security [2008])
>
> **Mozambique Census of Agriculture and Livestock (CAPII) 2009–2010:** It was a sample of approximately 35,000 smallholder households as well as a list of all large farms. For the project, 40 new 4x4 vehicles were procured and data collection was undertaken using smartphones and laptops for data entry in the field. Cost amounted to US$314 per household and total costs of around US$11 million. (*Source:* Mozambique Strategic Plan for Agriculture [unpublished])
>
> **Mozambique Trabalho de Inquérito Agrícola (TIA) 2008 (discontinued):** TIA was a stratified two-stage sample of 752 sample enumeration areas (EAs) and 6,016 small farm holdings, 100 percent of the large farm holdings in a separate list frame, and all the medium-size farms found in the sample EAs. (*Source:* Observation of activities during the KNBS Nyeri County visits.)

CHAPTER 6: Recommendations

Priority Issues: Statistical Capacity Assessment

Based on the capacity assessment, the following have been identified as key areas that need to be addressed to improve the quality of agricultural statistics available for decision making.

i.   Unintended Consequences of Devolution on Agricultural Statistics

Devolution of authority to the counties negatively affected the statistical programs and the resulting uncertainty has disrupted the hitherto working relationship between national and county government employees at the 'working and program delivery level' in the county and subcounty offices. The review of the Statistics Act will be an important step to creating the framework for coordination. In addition, the development of MoUs between the KNBS and MoALF, at the county level, will assist in closer collaboration around data collection activities, verification, and dissemination, particularly among technical staff. There is an urgent need to improve coordination and cooperation with regard to the current arrangements governing the working relationships between the county and national government employees in the county offices

ii.   Human Capacity Constraints

The moratorium for hiring civil servant has been in place for over a decade in Kenya. Throughout the agricultural sector (Research, Extension, Regulatory Agencies) the staff is aging, there is no succession plan, and replacement is curtailed. Therefore, the issue of human resource capacity should be looked at as a sector-wide problem and a HR development plan and succession plan should be developed in collaboration with the Public Services Commission. At the county government level, the number of extension officers is extremely low. Therefore, building capacity for agricultural statistics would mean that the county governments hire more extension staff. Staff in the MoALF and KNBS needs formal training in data collection and the use of sound statistical methods and practices. The only training currently available is on-the-job training. The aging staff in both the KNBS and MoALF, and the lack of any succession planning, may result in the loss of critical skills and negatively affect future data collection activities. An HR development plan should be developed, including succession planning to address the replacement of aging staff.

iii.   Vehicles, Buildings, and IT Equipment - Physical Resources

There are insufficient 4x4 vehicles to support statistical activities at the county, subcounty, and ward levels). There is a lack of or minimal transport allowances in cases where there is no official transportation available. Employees are often required to use own laptops and mobile phones and pay for data bundles to perform official duties, and there is limited or no Internet, particularly at the subcounty and ward levels. The investment made by the Population Census 2019 in equipment and transport should assist the staff in the KNBS to address shortages. However, in the MoALF, this investment in equipment and transportation is required to assist, in particular, extension officers to undertake their daily activities including being able to visit farmers.

iv. Sound Statistical Methods and Practices

There is a lack of reliable data for planning and evaluation purposes or for evidence-based decision making. The fact that the Census of Agriculture has not been conducted since the 1960s has resulted in the declining quality of data around agriculture and increased use of estimation.

No statistically sound methodology such as probability sampling is used for data collection (USAID 2013). The widely used unscientific practice of 'eye observations' or 'desk-based estimation' commonly used by agricultural officers' farmer groups, village elders, and other local officials who provide an opinion on the total areas planted and harvested is not an acceptable statistical practice. Over time, these current practices will have a bias toward overestimation and have a negative impact on food security assessments.

The overestimation of crop production negatively affects planning for food security. The use of nonscientific measures in data collection activities undermines the confidence in the quality of data produced by users, leading to the data not being used and ultimately resulting in the irrelevance of the data collected by the MoALF and KNBS. Investment in human resources, including training, the use of technology, and addressing constraints in equipment and transportation, would assist in building the capacity to use sound statistical practices.

v. Role of the Private Sector

There is a need to further investigate the pathways for engagement with the private sector around data sharing including data collaborative[9] and PPPs and the use of technology. The review of existing pilot projects such as CABI Plantwise and E-extension service and the lessons learned can also feed into this process. In addition, the private sector can play a role around the need for sustainability of data collection, which could be in the form of PPP, use of new technology, and the 'private data market'.

vi. Metadata

There is a need to provide metadata descriptions to accompany all statistical estimates. Metadata document the current statistical information specifically the survey methodology, concepts, definitions, and data collection procedures.

There is also a need to begin the task to ensure that the KNBS and MoALF harmonize and adopt the international standards established by the Statistics Division of the United Nations and the FAO with regard to concepts and definitions for food and agriculture

vii. Data Dissemination

There is no protocol or MoU for data sharing between governments at the national and county levels. There is a lack of clarity among staff regarding who is eligible to receive data and under what conditions the sharing may take place. The sharing of data between the national and county levels also minimizes the potential for duplication and overlap in survey activities. It is important for the national and county governments to renegotiate the issue to facilitate data sharing and accountability.

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[9] http://datacollaboratives.org/.

viii.   Data Gaps

Kenya's KNBS, MoALF, and 47 autonomous county governments currently lack the capacity to produce and provide even the minimum set of agriculture statistics to monitor national trends. Currently, MoALF does not have an established statistics unit in the counties and data is collected and managed by field offices. There is currently no agricultural survey program due to the lack of a sampling frame as the Census of Agriculture has not been conducted since 1960. As a first step, Kenya needs to identify the key agricultural data that would be collected on an annual basis, the related indicators, and the required reporting periodicity, secondly, there is need to establish statistics unit at County level to complement the efforts made by the National Government. Building technical and institutional capacity of counties is crucial towards improving agricultural statistics in the country.

Priority Recommendations and Timeframe

The action plan as shown in Table 9 sets out the time frames for activities, the prioritization based on the various capacity areas, namely, institutional, financial, human (staff and training) and physical infrastructure, statistical capacity and approach, data gaps, and availability of data (dissemination), which need to be addressed over the short, medium, and long term and can provide the basis for the KNBS and MoALF to plan for improving agricultural statistics.

Based on the capacity assessment undertaken at the county, subcounty, and ward levels, the following are the key priorities that are identified for action in the short to medium term and that informed our proposal for high-level costing.

Table 9: Recommended priorities for action by responsible entity and time frames

Area of recommendation	Recommendation	Responsible entity	Time frame
Organizational and administrative capacity			
Institutional framework	Update the Statistical Act	KNBS	Short term
	Develop and promulgate the County Statistical Acts	KNBS and county governments[10]	Short term
	Sign an MoU between KNBS and MoALF at both levels of government (to be completed simultaneously)	KNBS and MoALF at national and county levels	Short to medium term
	Develop a legislative framework for data sharing and collection between the national- and county-level MoALF	MoALF national- and county-level governments	Short to medium term
Resources: human	Establish an M&E/Statistics Unit in MoALF at the county level	MoALF at national and county levels	Medium to long term

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[10] While the County Statistical Act has been submitted to Parliament, it is not clear whether the costing of setting up the county statistical offices and statistical fund has been undertaken.

Area of recommendation	Recommendation	Responsible entity	Time frame
	Undertake a skills audit of staff at KNBS and MoALF at national and county levels	KNBS, MOALF at national and county levels	Medium term
	Undertake succession planning in light of aging extension officers (part of a more comprehensive HR development strategy)	MoALF at the county level, extension officers, and KNBS	Short term
Resources: physical	Procure vehicles for county offices	KNBS and MoALF at the county level	Short to medium term
	Procure IT equipment (computers, laptops, printers, scanners, scanners, and tablets)		
Resources: financial	Dedicated budget lines to be allocated for data collection in MoALF, especially at the county level	MoALF county	Short to long term
	Funding to be disbursed timeously and not delayed. Ensure that county offices are not underfunded	KNBS at the county level	Short to long term
Resources: technical	Train KNBS staff on using statistical packages and undertaking analysis beyond descriptive statistics	KNBS national and county offices	Short to medium term
	Train MoALF extension officers on data collection. Also, the use of Microsoft packages, for example, Excel and Word	MoALF at subcounty and ward levels	Short to medium term
	Conduct an SAS	KNBS in consultation with the MoALF (at national and county levels)	Short to medium term
	Train staff at county and national levels on use of statistical packages and data analysis	MoALF and KNBS at national and county levels	Short to medium term
	Train staff on data management including archiving, development of data collection tools and metadata	MoALF at national and county levels	Short medium term
User engagement forums	Set up a user and producer engagement forums at the national and county levels	KNBS, MoALF at national and county levels	Short term
	Expand ANES for 3 sectors (fisheries, agriculture, and forestry) such that county and national staff from the KNBS and MoALF are represented	KNBS, MoALF national and county level	Short term
	Private sector engagements: Explore opportunities for collaboration around areas of technology, data collection, and sharing (data collaborative, PPP)	KNBS, MoALF at national and county levels, and agricultural private sector intuitions	Short term
Statistical practices and procedures			

Area of recommendation	Recommendation	Responsible entity	Time frame
Country case studies	Identify relevant countries (with devolved structures), based on the relevance for Kenya, for country study tours or desk-based research	KNBS, MoALF at national and county levels	Short term
Learning from existing pilots	Review CABI Plantwise pilot, E-extension services, and the Pilot Fertilizer Subsidy and Crop Insurance Projects to compile experiences	MoALF at county and national levels	Short to medium term
Methodological review	Undertake a review of all existing surveys including the KIHS and the Census of Establishments to identify what information can be obtained relative to the data that will be collected in the proposed NSAS pilot	KNBS with consultant	Short term

Note: Short term: 1–3 years; medium term; 3–5 years; long term: 5–10 years. NSAS = National Seasonal Agriculture Survey.

A more detailed action plan is provided in Table B.1.

Based on the county capacity assessments, complemented by KII with stakeholders and self-assessment questionnaires, it is proposed that, in the short term, investing in the legislative framework to govern data sharing between the key role players, KNBS (national and county) and the national MoALF, and county governments (including county MoALF) will be essential for improving the flow of existing information for decision making.

Additional recommendations are also highlighted below:

- In addition, raising the profile of the importance of quality data to support evidence-based policy making and implementation can be supported by the establishment of M&E units within the MoALF county offices.

- Ensuring that staff have the required skills to perform their jobs, in particular the use of Microsoft Office and other technology for data collection, will assist staff in performing their jobs more efficiently.

- Succession planning in the context of the aging staff component in both the KNBS and MoALF will ensure the continuity of data collection, while planning for future skills requirements in the form of a skills audit will complement this activity.

- The KNBS needs to invest in a robust annual survey program to collect benchmark agricultural statistics, the key component to be an SAS reporting on the key agricultural crops and livestock. This is particularly important even if Kenya undertakes a Census of Agriculture. The Population Census 2019 preparation—specifically the GIS-based cartography and coordinated householder listing operation—is well positioned to provide the necessary information for either an area or list frame for the SAS. The SAS sample design and sample selection costs would be minimal.

The recommendations made are based on engagements with staff of the KNBS and MoALF at the county and national levels. However, going forward, the implementation of these recommendation will be dependent on the buy-in from the staff from these institutions, in particular the management. The validation workshop provided an opportunity for all stakeholders to engage in the findings. It will also be important to engage higher level policy makers to present the findings to ensure support for improving agricultural statistics and that required funding is allocated for data collection activities.

As a way forward, the KNBS and MoALF are encouraged to expedite the legislative reforms around data sharing, conduct an SAS, invest in human resources including the establishment of M&E units at the county level, and undertake succession planning including conducting a skills audit.

World Bank Support for Improving Agricultural Statistics

There are two windows for World Bank support for improving agricultural statistics in Kenya. The first window is through agriculture projects under the MoALF, with the Kenya Climate Smart Agriculture Project (KCSAP) already having a provision for strengthening the Statistics Unit. The second window is through Statistics Payment for Results (PforR) Program for generating better and more accessible data to inform policy-makers and contributing to strengthening statistical capacity. Funding through these windows can be used to support four key interventions: (i) developing the legislative framework for agricultural statistics; (ii) developing the legislative framework for data sharing between county governments and MoALF; (iii) establishing structures where users and producers of agricultural statistics interact; and (iv) developing a Seasonal Agricultural Survey (SAS).

CHAPTER 7: Global Best Practices for Agricultural Data

Country Example of Agricultural Data Collection and Survey Programs

The World Bank highlighted the role of South-South Learning in building capacity around agricultural statistics in Kenya. Two countries: Rwanda, which is part of the East African community, and South Africa, can provide opportunities for learning and country case studies. Rwanda has a very good agricultural survey program while the South Africa administrative data collection experience provides some pointers for improving data collection for the MoALF. In addition, as part of the action plan, the team recommends undertaking country study tours and/or desk-based research to gathering learnings relevant to Kenya in terms of agricultural survey programs but also a devolved structure where statutory powers are delegated from the central government to the subnational level.

Rwanda

The National Institute of Statistics of Rwanda conducts two survey programs around agricultural statistics.

National Agricultural Survey

The National Agricultural Survey (NAS), last conducted between September 2007 and August 2008, collected information on the two agricultural seasons and covered a sample of 10,080 agricultural households over 30 districts.

The survey collects data on

- Demographic and social characteristics of agricultural farmers;

- Farms characteristics;

- Agricultural practices and crop production;

- Livestock practices and production;

- Fishery, aquaculture, and beekeeping practices;

- Forestry practices and income; and

- Food stocks and nutrition.

SAS

The SAS aims to cover all three agricultural seasons in Rwanda: Season A, which starts in September and ends in February of the following year; Season B, which commences in March and ends with June of the same year; and Season C, which starts in July and ends in September of the same year. The National Institute of Statistics of Rwanda (NISR) conducted the first SAS in 2013 and the last survey was conducted between September 2016 and February 2017. The respondents of the survey are categorized into two groups, namely, agricultural operators (small-scale farmers) and large-scale farmers (LSFs). The NISR classifies LSFs according to specified criteria, namely, farmers growing crops on 10 ha or more of land or

any farmer raising 70 or more cattle, 350 goats and sheep, 140 pigs, or 1,500 chicken or managing 50 bee hives.

The survey collects information on the characteristics of the agricultural operators, the farm characteristics including the area yield and production, agricultural practices, inputs, equipment, and use of crop production (NISR 2016). The survey uses multiple-frame sampling techniques based on probability sampling and estimation techniques combining an area and list frame. Imagery with a very high resolution of 25 cm is used to divide the county into strata (12 strata in total). The survey interviewed a sample of 195 LSFs (out of 774) and 5,089 of a total of 25,346 agricultural operators. Data collection is undertaken through paper-based questionnaires but data entry was completed through the CSPro data entry software, while summary tables were created through SPSS and Excel.

A total number of 540 segments were spread throughout the country as coverage of the survey, with 25,346 and 23,286 agricultural operators in Season A and Season B, respectively. From these numbers of agricultural operators, subsamples were selected during the second phases of Seasons A and B. Furthermore, the total number of enumerated LSFs was 774 in Season A and 622 in Season B. Season C considered 152 segments counting 8,987 agricultural operators from which 963 agricultural operators were selected for survey interviews.

The following six strata were selected for sampling based on cultivated land and other land use characteristics (Table 10).

Table 10: Land use strata codes, definition, and areas

Stratum	Description	Total (ha)	Percent
1.1	Intensive agricultural land (Season A and B)	1,479,081	81.9
1.2	Intensive agricultural land (Season A and B with potential for C)	48,388	2.7
2.1	Other marshlands	95,821	5.3
2.2	Marshlands potential for rice	20,201	1.1
3.0	Rangeland	133,849	7.4
10.0	Tea plantations	28,763	1.6
Total agricultural land		1,806,103	

Source: SAS, NISR 2016.

The results of the SAS are presented based on the five strata defined. Other sources of agricultural data in Rwanda include:

- Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey (CFSVA) (2012);

- Census of Population and Housing (most recent in 2012); and

- Integrated Household Living Conditions Survey (most recent in 2015).

South Africa

Department of Agriculture, Forestry, and Fishing[11] (Administrative Data)

The following institutions exist under the ambit of the department:

- **Meat Inspection Scheme.** Setting out of the legislative mandate, authority for inspection services, procedures, and standards. Inspection services also distinguish between low-frequency slaughter houses and high-frequency slaughter houses and collect data in these.

- **Crop Estimating Committee.[12]** Comprises officials from the following institutions: Department of Agriculture, Forestry and Fisheries; Provincial Departments of Agriculture; various Agricultural Research Council (ARC) -Institutes (Soil, Climate and Water; Small Grains Institute; and Grain Crops Institute); Bureau for Food and Agricultural Policy (BFAP) and Statistics South Africa (SA).

- **Abstract of Agricultural Statistics.** South African Grain Information Services (SAGIS) is the main source of information on crop production, boards such as Sugar Cane Board, Customs and Excise Data (tax authority and South African Revenue Service (SARS)), Red Meat Abattoir Association, Cape Wool SA, and Milk SA.

Organogram of the Ministry of Agriculture, Forestry and Fishing, South Africa is found below (Figure 6).

Figure 6: Organogram of the Ministry of Agriculture, Forestry, and Fishing, South Africa
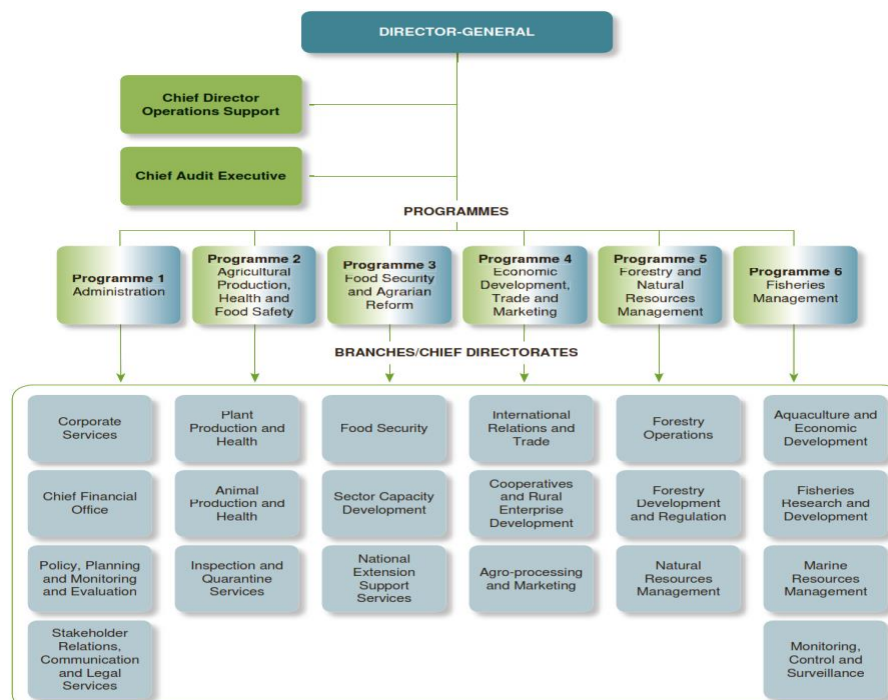
Source: MoALF South Africa Strategic Plan 2015/2016–2019/2020.

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[11] http://www.daff.gov.za/.
[12] South African Grain Information Services: http://www.sagis.org.za/.

Statistics South Africa (Survey and Census)

Statistics South Africa (Stats SA) based on the Population Census of 2011 published an 'agricultural households' report. This report covers three types of agriculture, namely, subsistence, smallholder, and commercial. The census provided some information on subsistence and smallholder agriculture but excluded important data on land farmed and yields.

The Census 2011 questionnaire included questions on the following agricultural activities:

1. What kind of agricultural activity is the household involved in?

2. How many of the following (livestock) does the household own?

3. Where does this household operate its agricultural activities?

In addition, a regular survey program also collects information related to agriculture through two surveys:

1. The Quarterly Labour Force Survey (QLFS) collects detailed information on employment in the agricultural sector on a quarterly basis. It is a panel survey in that 25 percent of the sample is rotated out every quarter. Employment in the sector can be disaggregated by sex, age, and province as well as remuneration levels. The sample is representative at a provincial level and within provinces at the metro/non-metro level.

2. The Annual General Household Survey (GHS) collects information on food security and agricultural activity based on a sample of 21,228 households. Characteristics of households involved in agriculture, main reason for involvement in agricultural activity, and type of agricultural production activity are collected (livestock, poultry, grain and food crops, industrial crops, fruit and vegetables crops, fodder grazing, pasture grass for grazing). The sample is representative at a provincial level and within provinces at the metro/non-metro level.

Sweden

The System of Official Statistics in Sweden

Statistics Sweden is a central government authority for official statistics and other government statistics. In 1994 a statistical reform was implemented of Sweden's official statistics, implying a decentralised system for official statistics and 25 government authorities were given responsibility for official statistics in defined sectoral areas instead of a centralised system and one governmental authority responsible. One of the main purposes of the 1994 statistical reform was to give the users more influence over the statistics, for flexibility and that the efficiency of statistics production would improve.

The System for Official Statistics includes the statistics, statistical products, metadata, the production systems, final observation registers, publications, separate tables and databases. Databases can be interactive or include fixed tables that the user cannot change. The system also includes laws, ordinances, regulations, general recommendations, guidelines, tools (that are

developed for the system such as methods, classifications, etc.), the statistical authorities, the Council for the Official Statistics, and Statistics Sweden as the coordinating authority.

According to the decision by Parliament, the Government determines the subject areas and statistical areas for which official statistics are to be produced, and which authorities are to be given the responsibility. For the moment there are 22 different subject areas. The statistical authorities decide on the content and scope of statistics within the statistics area(s) for which unless otherwise specified by the government. The statistical authorities also decide, in consultation with important users of the statistics and taking into account the demands made by the European Union, which objects and variables are to be studied, which statistical measurements and study domains are to be used, the periodicity of the surveys etc. Except for Statistics Sweden there is normally no special appropriation for statistics; funding for statistics is included in the authorities' appropriation framework for their main task. The System for Official Statistics includes the statistics, statistical products, metadata, the production systems, final observation registers, publications, separate tables and databases. Databases can be interactive or include fixed tables that the user cannot change. The system also includes laws, ordinances, regulations, general recommendations, guidelines, tools (that are developed for the system such as methods, classifications, etc.), the statistical authorities, the Council for the Official Statistics, and Statistics Sweden as the coordinating authority.

A Council for Official Statistics was established in 2002 with the purpose to improve coordination and overall view of the system for official statistics. The Council, which is an advisory body, deals with matters of principle concerning the availability, quality and usefulness of the official statistics, as well as issues on facilitating the response process for data providers. The Council works to improve cooperation between the statistical authorities, and to develop and manage a statistics network. It consists of one chair and six other representatives who are managers at the statistical authorities. The Council is supported by a secretariat and different workgroups. All authorities responsible for official statistics are invited to participate in the different workgroups. Due to the users of official statistics the system and the cooperation is judged to function rather well. The duties of the Council are set out in Statistics Sweden's Directives. The authorities to be represented in the Council are appointed by Statistics Sweden after consultations with all the statistical authorities. Members serve on the Council for a period of not more than three years. Statistics Sweden's Director General is Chair of the Council, and the Council appoints its own Deputy-Chair.

To provide a picture of this, the statistical authorities annually complete questionnaires on the provision of data and on costs and staff who work with the official statistics. The authorities also submit a list of their active products. As a complement to this information, special measurements have been made on punctuality and production time, documentation, the use of the Official Statistics of Sweden (SOS) logotype and reporting by sex in the statistics.

The cooperation within and improvement of the system Statistics Sweden, in its role as coordinator, has the mandate to issue regulations to statistical authorities regarding documentation, quality declarations and publication. The main coordination tool since the Council was established has been coordination by cooperation (soft coordination) and the development of a well-functioning infrastructure. Participation in the workgroups has been on a voluntarily basis and great interest in participating has been observed.

Common guidelines for deciding what Official Statistics are and a definition of what a statistical product is, for sufficient quality, for preliminary statistics, for the websites at different authorities have been developed. There are specified routines for deciding on which statistics are to be official. There is a database of all Official Statistics and all changes in the statistical system are continuously registered in the database. It is therefore possible to follow a statistical product from cradle to grave. The users have now one main single point of contact with the Official Statistics via Statistics Sweden's website, though there is a decentralised system. There are slightly more than 300 statistical products within the Official Statistics and they are described in a consistent manner on the website. There is a common publishing plan that is continuously updated and there are links to the different authorities' websites where Official Statistics are published.

To date, the cooperation has led to a common view of Official Statistics, an increase in competence, more systematic assessments related to user needs of what should be included in the Official Statistics as well as a much better overview of the content of the Official Statistics. The authorities responsible for official statistics have generally organised contact nets with their users. The availability of statistics for users who have an interest in statistics covering different areas has improved. The work is still in an initial phase. Today we deal with aspects of statistics such as quality, documentation, response burden, use of administrative data and security of information. Other aspects will emerge in the future. The value of systematic cooperation has the potential to increase as there are mutual benefits which can be derived from the joint development of statistics and common statistical systems rather than the development of separate solutions for each authority

Best Practices for Agricultural Data: Probability Samples and Two-stage Multiframes

Evidence-based decision making relies on information that is based on timely, consistent, and statistically sound information, from either probability sample surveys, censuses, or administrative data. The widely used unscientific practice of 'eye observations' by agricultural officers, farmer groups, village elders, and other local officials who provide an opinion on the total areas planted and harvested is no longer an acceptable practice, especially in the context of climate change and the importance of monitoring impact on food security.

In the absence of highly developed administrative data systems, the use of probability sampling surveys is regarded as the most appropriate approach for obtaining robust estimates with acceptable periodicity of data collection. A sample is the collection of data from a sample of units, unlike a census that would contact all units in the population. With good fieldwork planning and management, a well-designed sample survey can be completed relatively quickly and is representative of the population with known probabilities and measures of sampling variability. In addition, a well-designed sample for producing national estimates also require a surprisingly small number of agricultural holdings. In Kenya, there is currently no agricultural survey program, and a Census of Agriculture has not been conducted since the 1960s. The current mapping and listing activities related to the Census of Population scheduled for 2019 can provide the master sample frame for an agricultural survey program including an SAS.

Box 2: Population Census 2019

The KNBS is currently undertaking a listing and cartographic mapping exercise in preparation for the population Census of 2019. The aim is to divide the country into enumerator areas.

The KNBS will identify the boundaries of each village and chronologically list all the homesteads and households within tat village. The following information is collected during the process: names of homesteads and household heads, the number of usual members of the households, and any agricultural activities, including data on crops planted, fishery activity, and livestock (number and type of livestock).

The project is utilizing smartphones with highly accurate GPS location identification. In addition, infrastructure in support of this activity has been developed, including mapping software and skills to map and analyze these data. A number of laptops were also procured. High-resolution aerial photographs and satellite imagery are being used in the mapping exercise.

This infrastructure can be leveraged for future survey activities while the information collected on agriculture can be used to develop a master sample that can be used to draw samples for future agricultural survey programs such as the SAS.

Source: Observation of activities during the KNBS Nyeri County visits.

Two-stage multiple-frame surveys use two or more sampling frames. One frame is an area frame used to collect data from small farms and the other is a list frame to collect data from large farms. List frames normally provide good coverage of the large commercial farms.

The use of multiple frames brings a great degree of flexibility to the statistician because the sampling methods can be unique to each frame. The only requirement is the need to identify any overlap between the two frames to avoid the possibility of any double counting. In addition, the classification of farms as small, medium, and commercial is required.

Two-stage sampling is a means of surveying large populations using relatively small samples and ensuring that all statistical units have an equal chance (probability) of being included in the sample to be interviewed. The course of action is to divide the area to be surveyed into small geographical units called 'census enumeration areas'). The Population Census 2019 has that supporting cartographic work well under way while the geographic information system (GIS)-based cartography is essentially complete. The EAs are the Primary Sampling Units (PSUs). Designing an NSAS for Kenya would require a systematic unbiased sample of representative EAs and a small random sample of households (with small- and medium-size farms) in those EAs.

> **Box 3: Sampling frames for agricultural statistics**
>
> A Master Sampling Frame (MSF) forms the basis for the selection of probability-based samples of farms and households. The first step in the development of the MSF is to identify the data items to be measured, for example, the total production of maize, the number of beef cattle, or the changes in land cover. The MSF should link the farm or agricultural holding, the household, and the land. The possible sampling frames are the listing of maize fields, animals, people by gender, or land parcels. The MSF comprises a listing of the sampling units that would provide a complete coverage of the population of interest. The listing of the sampling units can comprise the names of farm operators (from an Agricultural Census), the names of households (from a Population Census), a list of commercial agricultural enterprises not linked to households, or a list of area units defined geographically. The MSF is the joint use of two or more of these listings of sampling units.
>
> *Source:* GSARS 2015a.

International Initiatives That Can Be Leveraged to Build Capacity around Agricultural Statistics

Internationally there are a number of initiatives that are aimed at supporting countries in improving agricultural data collection including the GODAN initiative, the Advanced Data Planning Tool (ADAPT) developed by Partnership in Statistics for Development in the 21st Century (PARIS21), as well as various data quality (Eurostat 2007) assurance frameworks.

PARIS21 ADAPT Tool

The tool has been designed to bring together stakeholders to develop the indicators framework related to monitoring development outcomes. The frameworks can be to measure national development plans or the Sustainable Development Goals (SDGs). The tool can also be used to identify reporting, financial, data, or geographic gaps related to the data for measuring indictors (World Bank, 2004)

One of the important elements of the ADAPT tool is its flexibility to map national priorities to global requirements. The Costing Module supports stakeholders in estimating the cost related to data collection for long-term planning and program-specific budgeting, once unit cost information for specific data collections has been entered into the tool. Another important element of the tool is to produce a gap analysis, for data (absolute data gaps, frequency, or disaggregation gaps), methodology, capacity, and funding gaps. The gap identification, before starting the process, requires stakeholders to undertake the costing of activities including identification of activities where there is insufficient funding, while also identifying which SDG indicators are not collected or where the data collection does not align with what is demanded. The resulting plans can then be integrated into the country NSDS.

GODAN

The GODAN initiative "seeks to support global efforts to make agricultural and nutritionally relevant data available, accessible, and usable for unrestricted use worldwide. The initiative focuses on building high-level policy and public and private institutional support for open data." It is a voluntary association launched in October 2013, currently comprising more than 600 partners from the government, nongovernmental organizations, the private sector, and international organizations.

The aims of GODAN are to

- Advocate for new and existing open data initiatives to set a core focus on agriculture and nutrition data;

- Encourage the agreement on and release of a common set of agricultural and nutrition data;

- Increasing widespread awareness of ongoing activities, innovations, and good practices;

- Advocate for collaborative efforts on future agriculture and nutrition open data endeavors; and

- Advocate programs, good practices, and lessons learned that enable the use of open data particularly by and for the rural and urban poor.

The MoALF has signed up for GODAN after hosting the global conference in June 2017. This initiative can be used to support the initiatives to improve agricultural data collection activities in Kenya.

Collaborations between the Public and Private Sectors

Collaborations between the public and private sectors around data collection and funding can present opportunities for improving the quality of agricultural data through sharing of information and freeing up of financial resources. There are a number of models for this interaction.

PPP is one avenue for this collaboration, where the private sector can invest in technology creation, adaption, and transfer through the investment in research and skills development and the dissemination of knowledge, data, and scientific knowledge. FAO (2013a) identifies that the contributions of the private sector can be financial and nonfinancial and engagements are based on the principles of mutual collaboration and sponsorships. The six areas identified for collaboration are

1. Knowledge management and dissemination;

2. Norms and standards setting;

3. Mobilization of resources;

4. Development and technical programs;

5. Policy dialogue; and

6. Advocacy and communication.

Data collaborative is a new form of partnership through which a number of stakeholders from the public and private sectors and research institutions can share and use data to help solve public problems. For this type of collaborations to be applied, there is a need to train data producers and users, matching the public demand for data and the private supply of data in a secure and confidential way, documenting activities and finally using experimentation and focusing on scaling initiatives with potential.

In the sharing of data between the public and private sectors, it is important to set the frameworks through which data sharing will occur, including establishing a code of practice, fairness and transparency, security, governance, individual rights to access information and data, and freedom of information (ICO 2011).

Technology and Quality Assurance Standards

Technology presents various opportunities to improve data quality and timeliness with which data can be disseminated. However, technology is only one aspect of a successful survey design and can only build on the existing good practices for data collection and the skills set of data collectors. To ensure that quality data are collected, a Survey Quality Assessment Framework (SQAF)[13] checklist can be utilized. This framework asks questions around the survey process and emphasizes checking, documentation, and the implementation of the systems to minimize errors and ensure the completeness of information.

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[13] A generic format for surveys is provided by the following resource prepared in collaboration with PARIS21: Statistical Services Centre of University of Reading. 2009. "International Household Survey Network Survey Quality Assessment Framework (SQAF)." http://www.ihsn.org/projects/survey-quality-assessment-framework-SQAF.

Box 4: Use of technology in collecting agricultural data

GPS

An important element of agricultural data is reliable information related to land, either cultivated land, grazing or fertilized land, or wood land. However, farmers often are not able to provide their land size in a standard format. In addition, the traditional measure using a rope in compass leads to sampling errors and is a very time-consuming activity. The advances in geo-positioning and GPS provide the cropped area directly without the need for distance and angle measurements.

Remote sensing

Remote sensing can be used to identify and monitor crops; this type of information combined with GIS can serve as a useful tool regarding crops and assist in decision making around agricultural strategies. Remote sensing can be used to identify crop status including stressed plants, crop yield estimation, and identification

Crop identification

By observing the various kinds of crops, it is possible to map the boundaries of the fields. Mapping of the boundaries of land parcels provides information for the creation of cadastral maps. Cadastral maps are usually in a vector format and in this form can be used in a GIS, along with other types of data (ownership, crop types cultivated, and so on).

CAPI

CAPI is increasingly being used in the collection of data. It involves an interviewer collecting information from a respondent via a questionnaire residing on a laptop, smartphone, or tablet.

CATI

Computer-assisted telephone interviewing (CATI) and self-administered web completion of questionnaires are additional ways in which the high cost of personal interviewing can be reduced.

Software (examples)

Survey solutions is a tool for creating surveys using the World Bank CAPI platform and is provided free of cost. The goal of the tool is to assist developing countries' National Statistical Offices and other data producers with a sustainable method for conducting complex and large-scale surveys. The tool provides functionality for data capturing, survey, and data management.

CSPro refers to the Census and Survey Processing System and was developed by the U.S. Census Bureau. The bureau maintains the system and makes it available at no cost. The system can be used for entering, editing, tabulating, mapping, and disseminating census and survey data and is in use in a number of developing countries.

The proposal by the KNBS for the National Seasonal Agricultural Survey[14] will be using high-precision satellite imagery to construct and verify the list frame of large and institutional farms. In addition, the area frame requires high-resolution images to allow for the stratification and subdivision of the strata into PSUs.

Technology should also be used in the **dissemination of data**. The OECD defines data dissemination as "consisting of distributing or transmitting statistical data to users." There are various release media that can be used for dissemination purposes including the Internet; CD-ROM; paper publications; files available to

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[14] Document received from the KNBS titled "The Proposed National Seasonal Agricultural Survey, November 2017."

authorized users or for public use; fax response to a special request; public speeches; and press releases. Dissemination formats according to the Special Data Dissemination Standards (SDDS) include hardcopy and electronic formats that detail the reference documents through which users can access the data described in the metadata or any additional data not routinely provided.

Box 5: Use of technology in data dissemination: Examples of publishers that are Data Documentation Initiative compliant and of data visualization tools

Nesstar Publisher

This is an editor for the preparation of metadata and data for publishing in an online catalogue. It is provided free of charge and allows for the editing, creation, and exporting of data and is aligned to the Data Documentation Initiative (DDI). The publisher includes tools to validate metadata and variables, compute/recode/label new or existing variables to be added to a dataset before publishing and is multilingual covering a number of languages including English, French, and Arabic (http://www.ihsn.org/software/ddi-metadata-editor).

Microdata Cataloguing Tool National Data Archive (NADA)

NADA is a web-based cataloguing system that serves as a portal for researchers to browse, search, compare, apply for access, and download relevant census or survey information. It was originally developed to support the establishment of national survey data archives but is increasingly being used across a number of organization across the world. The Kenya NADA can be accessed at the following link: http://statistics.knbs.or.ke/nada/index.php/catalog.

Microsoft Power BI

It is a cloud-based service that allows for the creation of visualizations, reports, and dashboard by the users. It is based on Excel and related PowerPivots.

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Annex A: Situational Analysis of Agricultural Statistics in Kenya July 2018

*Amounts in the table below are in Kenya Shillings

S.No		KNBS	Agricultural Statistics Units			47 County Governments
			Crops	**Livestock**	**Fisheries**	
1.	Existing capacity (No. of qualified statisticians)	10	6 Technical officers (HQ office) 3staff- Agric Market information 13- State Corporations	Nil	1	Field officers collect data in the counties. There are no qualified statisticians
2.	Trends in budget allocation for statistics unit in the last 5 years					
	2018/19	Funding is not sector specific	10,000,000	Nil	100,000	Nil
	2017/18		6,000,000	Nil	80,000	
	2016/17		6,000,000	Nil	22,000,000	
	2015/16		4,000,000	Nil	50,000	
	2014/15		4,000,000	Nil	20,000,000	
3.	State the available ICT and logistical equipment to facilitate work	ICT equipment handled by ICT directorate and not sector specific	4 New Desktop Computers- Statistics Unit 2 Old Desktop computers- Statistics Unit 3 Very old Desktop computers- Market Information unit	1 Desktop computer 1 Laptop	1 Desktop computer	ICT equipment is shared by all technical officers
4.	Propose optimal capacity required (organizational and administrative capacity, and statistical practices and procedures) to effectively carry out the statistical functions.	Information not available	Purchase of 2 Desktop computers- Stat Unit 6 Laptops- Stat Unit 3 Desktop- Market Information Unit 3 Laptops- Market Information 2 Data analysis software licence Equip Database management office	4 technical officers, 2 Statisticians, and 1 ICT expert. There should be a budget line for the Livestock Statistics unit Transport	7 statisticians as follows: 1-in charge (Nairobi). 1 statistician for each discipline (Aquaculture, inland fisheries, marine and coastal fisheries and fish quality assurance) - based in Nairobi	Set up a statistics unit in all counties Purchase at least two desktop computers for counties Purchase of data analysis software for each county

			Deploy 3 more staff responsible for: Nutrition and gender statistics; trade statistics; Open data and Data sharing activities ICT data management system Development of data collection Guidelines and Training Manual Development of Area Frame to complement List Frame (to be developed during National Farmers' Registration) Purchase of vehicle for statistics unit Funds for Short courses (3 annually)' funds for long courses (1 biannually)	6 Desktop computers, 6 laptops, 1 heavy duty printer and computer accessories	1 statistician based in Mombasa 1 statistician based in Kisumu	Purchase of tablets for ICT system Funds for Short courses (10 annually)' funds for long courses (4 biannually)
5.	Estimates of financing gaps	Information not available	5 Desktop computers- 400,000 9 Laptops- 1,500,000 2 Data analysis software- 1M Development of data collection Guidelines and Training Manual- 8 Million ICT system- 5 M	Data management manual (2 million) Data validation and report writing (2 million) County backstopping on production parameters (1 million)	Catch assessment surveys (CAS), fish farming, Dams and riverine fisheries need funding allocated for data collection. Approximately, 30 million.	Can be established with further county consultation

			Development of Area Frame: 10 M Purchase of vehicle: 3 M Short courses- 2 M Long courses- 5 M	Total Budget KShs 5 million		

More gaps from MoALF:

- The Livestock Statistical Unit requires an annual budget of KShs 5 million for routine data collection and improvement as stated in the table above, however, this does not include funding for surveys (e.g. milk survey, livestock production systems as recommended in SPARS- Kenya).

- The Crops Statistics Unit lacks specific budget allocation for statistics work, and therefore shares the limited allocation from Food Security branch.

- Fisheries Statistics Unit requires Kshs 25 million for 2018/19 frame survey. This activity enumerates fishing effort (No. of fishermen, gears, Boats, hooks etc).

Annex B: Action Plan for Setting Out Priorities for Action over the Short, Medium, and Long Term

The action plan identifies activities for prioritization based on the various capacity areas, namely, institutional, financial, human (staff and training), and physical infrastructure, statistical capacity and approach, data gaps, and availability of data (dissemination), which need to be addressed over the short, medium, and long term (Table A.1). A color-coded legend identifies activities that are already in progress, have not yet started, or have been completed .

Note: Short term: 1–3 years, medium term: 3–5 years, and long term: 5–10 years.
NGO = Nongovernmental organization.
Legend:

	Action finished
	Action in progress
	Action not yet started

Table B.1: Action plan for the improvement of agricultural data

Action step (what needs to be done)	Responsible person (who should take action to complete this step)	Deadline (when should the step be completed)	Necessary resources (what is needed to complete the step)	Potential challenges (challenges that may impede achievement of action step)	Step to mitigate challenges
Institutional capacity					
Revise Statistics Act	KNBS in collaboration with MoALF and county governments	Short term	Activity has commenced and it is assumed that sufficient resources (human and financial) have been allocated	No buy-in from county government departments and other stakeholders	Ensure that all stakeholders are consulted and establish joint responsibility
Draft and promulgate the county Statistical Acts	KNBS in collaboration with MoALF and county governments	Short term	Funding and human resources	No buy-in from county governments	Build collaborations and buy-in for the need of quality data for policy making
Build/expand M&E/statistics structures at the county-level MoALF	MoALF	Short term	Funding and human resources	No funding for M&E units	Use existing M&E unit as pilots to support the value of these units
Set up Statistical Units in M&E units in the MoALF at the county level	MoALF	Medium to long term	Financial resources • Human (new and existing staff required) • Physical: Office	Autonomous county governments do not see value of Statistical Units and thus do not allocate	Use pilot project rollout in counties to present value of the units Embedding statistics in education systems

Action step (what needs to be done)	Responsible person (who should take action to complete this step)	Deadline (when should the step be completed)	Necessary resources (what is needed to complete the step)	Potential challenges (challenges that may impede achievement of action step)	Step to mitigate challenges
			accommodation	funding to set up the units. Cannot find suitable candidates to recruit staff due to the lack of statistical qualifications	(revising curriculum)
Implement the recommendations of the SPARS	KNBS in collaboration with MoALF and county governments	Based on time lines set out in the SPARS	Financial and human	Unclear why no/limited progress has been made despite the process to draft the document being highly collaborative Lack of funding	Review the document and update with current conditions. Ensure buy-in from all stakeholders. Allocate resources for identified priority areas.
Set up MoUs between the KNBS and MoALF and county governments to facilitate flow of data	KNBS and MoALF	Short to medium term	Human resources	Autonomous county governments no consent to these MoUs	Build collaborative relationships as well as need for quality data.
Train users on agricultural data including public and private sectors and media	KNBS	Short term	Funding and human resources	Lack of skills and funding to undertake training	Use university or research organizations to train trainers. Set up training programs for media and other stakeholders.
Publicize existing engagement structures such as the ANES	KNBS and MoALF	Short term	Funding	Lack of funding to, for example, publicize structures in media	Identify additional financial resources through savings and reprioritization
Develop a database of key users	KNBS and MoALF	Short term and then regular updates	Human resources	Inability to identify key stakeholders Lack of funding	Place link on websites for stakeholders to register. Use attendance registers from workshops, meetings, and

Action step (what needs to be done)	Responsible person (who should take action to complete this step)	Deadline (when should the step be completed)	Necessary resources (what is needed to complete the step)	Potential challenges (challenges that may impede achievement of action step)	Step to mitigate challenges
					events to build user database. Design user satisfaction survey and place on KNBS website.
Expand the scope of ANES structures to include key stakeholders from public, private, NGO, and research organizations)	KNBS and MoALF	Short term	Funding	Inability to identify key stakeholders	Develop a stakeholder database and conduct a survey to identify users
Undertake a user satisfaction survey (public, private, NGO, research institutions, and so on)	KNBS and MoALF	Short term	Funding	Inability to identify the key stakeholder	Use stakeholder database to identify stakeholders to whom survey is sent
Undertake an analysis of data produced by the private sector to identify complementarities and areas for collaboration	KNBS and MoALF, technical assistance	Short to medium term	Funding and technical assistance	Difficulty in identifying private sector producers, lack of funding	Request funding from development partners. Use existing engagement structures, for example, ANES and validation workshop to identify and engage with private sector
Undertake country case studies (desk based and/or study visits). **Countries selected based on their relevance to Kenyan context**	KNBS, MoALF at national and county levels, technical assistance	Short to medium term	Resources (funding and human)	Lack of resources prevents studies from being undertaken Relevant country examples cannot be identified	Undertake a prioritization exercise, identify possible savings. Request funding from development partners. Work with development partners and experts to identify relevant country case studies (Rwanda SAS as presented in report can be one of countries for study)
Set up structures for engagement between the KNBS, MoALF,	KNBS and MoALF	Short term	Funding	No identification	Develop a stakeholder database and

Action step (what needs to be done)	Responsible person (who should take action to complete this step)	Deadline (when should the step be completed)	Necessary resources (what is needed to complete the step)	Potential challenges (challenges that may impede achievement of action step)	Step to mitigate challenges
private sector, and other stakeholders, for example, donors				of key stakeholders	conduct a survey to identify users
Financial resources					
Allocate dedicated budget lines for data collection in the MoALF at the county level	National and county-level MoALF	Medium term	Dedicated budget	No financial resources available No buy-in from county-level government	Undertake a prioritization exercise Improve interactions between county and national MoALF governments
Address underfunding of activities by increasing budget allocations for KNBS at the county level	KNBS national	Medium term	Dedicated budget	No financial resources available	Undertake a prioritization exercise and identify possible savings
Address underfunding of statistical activities by increasing budget allocations for the MoALF at the county level.	National- and county-level MoALF	Medium term	Dedicated budget	No financial resources available	Undertake a prioritization exercise and identify possible savings
Allocate funding to improve equipment (ICT—laptops, desktops, tablets for data collection, printers, scanners)	National- and county-level MoALF and KNBS	Short to medium term	Dedicated budget	No financial resources available	Undertake a prioritization exercise and identify possible savings
Allocate funding to recruit additional staff and replace aging staff	National- and county-level MoALF and KNBS	Short to medium term	Dedicated budget	No financial resources available	Undertake a prioritization exercise and identify savings
Allocate funding to undertake training across all areas of prioritization (use of statistical programs and analysis, statistical methods, use of Microsoft packages, for example, Excel and Word, report writing)	National- and county-level MoALF and KNBS	Short to long term	Dedicated budget	No financial resources available No appropriate training programs available	Undertake a prioritization exercise In-house development of training programs or collaborate with research institutions and universities

Action step (what needs to be done)	Responsible person (who should take action to complete this step)	Deadline (when should the step be completed)	Necessary resources (what is needed to complete the step)	Potential challenges (challenges that may impede achievement of action step)	Step to mitigate challenges
Allocate funding for regular survey program	KNBS	Short to medium term	Dedicated budget	No financial resources available	Identify funding via reprioritization, savings and possible external sources of funding
Ensure that allocated funding is received on time	Ministry of Finance, KNBS, national and county MoALF	Medium term	Human and financial resources	Lack of funding prevents full and timely budget allocation and transfer to relevant departments Lack of systems to disburse funding	Identify cost-saving activities. Develop ICT systems that ensure regular disbursements
Human resources (staff)					
Undertake succession planning	KNBS and MoALF	Short term	Funding limited/No information on staff complement	No financial resources available No information on staff	Identify funding via re-prioritization, savings, and possible external sources of funding Undertake a staff audit of existing and future staffing requirements
Recruit new staff to replace aging staff	KNBS and MoALF	Short term	Funding	No financial resources available	Identify funding via reprioritization, savings, and possible external sources of funding
Recruit staff to address the current staff shortages	KNBS and MoALF	Short to medium term	Funding	No financial resources available	Identify funding via reprioritization, savings, and possible external sources of funding
Develop an HR development plan incorporating outcomes skills audit and succession planning	KNBS and MoALF at national and county levels	Medium to long term	Funding and human resources	No financial resources available	Identify funding via reprioritization, savings and possible external sources of funding
Human resources (training)					

Action step (what needs to be done)	Responsible person (who should take action to complete this step)	Deadline (when should the step be completed)	Necessary resources (what is needed to complete the step)	Potential challenges (challenges that may impede achievement of action step)	Step to mitigate challenges
Train staff in data collection **KNBS:** • **Data quality assurance** • **Refresher training for regular survey program** • **Database management** • **Use of technology in data collection** • **Quality assurance** • **Use of Excel and Microsoft office applications** • **Train staff to analyze data analysis using statistical packages, for example, Stata** • **Report writing** **MoALF:** • **Data collection, especially scientific methods** • **Database management** • **Archiving** • **Metadata** • **Use of Microsoft packages including Word and Excel, especially for older members of staff** • **Data analysis (administrative data)** • **Use of statistical packages** • **Report writing**	MoALF at national and county levels and KNBS	Medium term	Funding and human resources	No information on type of skills required No funding allocated Staff not open to training No courses exist which are aligned to needs	Undertake a skills audit to identify skills required versus job description. Identify funding via reprioritization, savings and possible external sources of funding Make training voluntary and identify staff who can assist older staff in using of technology Develop in-house training or collaborate with research institutions and universities
Physical infrastructure					
Procure new building	KNBS and MoALF	Long term	Funding to rent or build new buildings	Lack of funding	In short-term departments could share office accommodation. In

Action step (what needs to be done)	Responsible person (who should take action to complete this step)	Deadline (when should the step be completed)	Necessary resources (what is needed to complete the step)	Potential challenges (challenges that may impede achievement of action step)	Step to mitigate challenges
					the longer term procure buildings
Procure equipment: ICT—laptops, desktops, tablets for data collection, printers, and scanners)	KNBS	Short to medium term	Funding	Lack of funding to procure equipment	Currently, ICT has been procured as part of the Population Census 2019 listing and mapping activities. Establish ICT units who work in close collaboration with subject specialist to ensure system meet user needs.
Procure statistical packages, for example, Stata	KNBS and MoALF	Short term	Funding	Lack of funding to procure statistical packages	Identify funding via reprioritization, savings, and possible external sources of funding.
Procure equipment: ICT—laptops, desktops, tablets for data collection, printers, and scanners	MoALF	Short to medium term	Funding	No financial resources to procure required equipment	Investigate collaborations with KNBS
Procure vehicles and motorbikes	MoALF and KNBS	Short to medium term	Funding	No financial resources available	Identify funding via reprioritization, savings, and possible external sources of funding.
Procure office equipment, for example, tables and chairs especially at the subcounty level	MoALF and KNBS	Short to medium term	Funding	No financial resources available	Identify funding via reprioritization, savings, and possible external sources of funding.
Utilize the Population Census 2019 tablets/smartphones, laptops, and other ICT infrastructure in future data collection activities (surveys)	KNBS	Short to medium term	Funding	Smartphones used in Census allocated to other activities or lost	Put in place guidelines for use of equipment across survey activities
Procure specialized equipment for data collection	KNBS and MoALF	Short to medium term	Funding	No financial resources available	Identify funding via reprioritization, savings, and possible external sources of funding.
Statistical methods and practices					

Action step (what needs to be done)	Responsible person (who should take action to complete this step)	Deadline (when should the step be completed)	Necessary resources (what is needed to complete the step)	Potential challenges (challenges that may impede achievement of action step)	Step to mitigate challenges
Conduct regular agricultural surveys	KNBS	Medium term	Financial and human resources	No funding available Lack of skills to design and implement survey	Identify funding via reprioritization, savings and possible external sources of funding. Training of staff
Conduct Census of Agriculture	KNBS	Medium term	Financial and human resources	Lack of funding	Could investigate alternatives to Census of Agriculture such as the inclusion of questions in the Population Census or the SAS
Develop standardized templates for data collection	MoALF	Short term	Human resources	No skills to develop these templates	Collaborate with KNBS to develop data collection tools
Adopt the CAPI to replace PAPI data collection	MoALF and KNBS	Medium term	Financial and human resources	No funding available Staff cannot/will not use technology	Identify funding via reprioritization, savings and possible external sources of funding. Run pilots to test transition and develop learnings
Develop metadata to data collection methodology	MoALF and KNBS	Short to medium term	Human resources	No skills	Sharing of learnings between KNBS and MoALF South-South learning
Harmonize agricultural concepts and definitions	MoALF and KNBS	Medium term	Financial and human resources	No skills to undertake harmonization	Sharing of learnings between KNBS and MoALF South-South learning
Review existing initiatives such as CABI, E-extension services, and World Bank projects to collect learnings for development of future projects/interventions	MoALF at national and county levels	Short to medium term	Financial and human resources	No resources (financial and human) to undertake the review	Request financial assistance from development partners
Undertake methodological review of current survey approaches	MoALF and KNBS at national and county levels	Short to medium term	Financial and human resources	No resources (financial and human) to	Request financial assistance from development partners

Action step (what needs to be done)	Responsible person (who should take action to complete this step)	Deadline (when should the step be completed)	Necessary resources (what is needed to complete the step)	Potential challenges (challenges that may impede achievement of action step)	Step to mitigate challenges
and potential surveys for future collections				undertake the review	
Data gaps (absolute)					
No master sample for agricultural surveys	KNBS	Short term	Financial and human resources	No funding allocated to undertake this expensive activity	Use listing data which is being collected as part of the Population Census 2019 mapping exercise
No SAS	KNBS	Short to medium term	Financial and human resources	No funding allocated to undertake this expensive activity	Planned SAS pilot in 2018 with K Sh 290 million allocated funding
No Census of Agriculture	KNBS	Medium to long term	Financial and human resources	Very expensive activity. Not clear if this activity will be undertaken in the near future	Investigate alternatives to Census of Agriculture
Data gaps (partial)					
Crop production/yields	MoALF	Short to medium term	Financial and human resources	MoALF continues with 'estimating' the data if no resources are allocated	Data can be obtained from SAS when rolled out. In the meantime, Population Census 2019 also provides estimates. Other existing sources, for example, KIHBS
Area planted	MoALF	Short to medium term	Financial and human resources	MoALF continues with 'estimating' the data if no resources are allocated	Data can be obtained from SAS when rolled out. In the meantime, Population Census 2019 also provides estimates.
Livestock number by type and breed	MoALF	Short to medium term	Financial and human resources	MoALF continues with 'estimating' the data if no resources are allocated	Data can be obtained from SAS when rolled out. In the meantime, Population Census 2019 also provides estimates. Depending on funding, a separate

Action step (what needs to be done)	Responsible person (who should take action to complete this step)	Deadline (when should the step be completed)	Necessary resources (what is needed to complete the step)	Potential challenges (challenges that may impede achievement of action step)	Step to mitigate challenges
					Livestock Survey can be developed.
Production costs	MoALF/KNBS	Short to medium term	Financial and human resources	MoALF continues with 'estimating' the data if no resources are allocated	Data can be obtained from SAS when rolled out. In the meantime, Population Census 2019 also provides estimates.
Availability of statistical information					
Develop websites where all county-level data can be accessed	KNBS, MoALF national- and county-level governments	Medium term	Financial resources and skills	No funding allocated, lack of skills to develop website	Investigate recruitment of private sector website developers Build internal skills
Increase datasets that can be accessed via websites	KNBS	Medium term	Financial resources and skills	No funding allocated, lack of skills to develop website	Investigate recruitment of private sector website developers. Build internal skills
Improve existing metadata for data survey collection activities	KNBS	Medium term	Financial resources and skills	No funding allocated, lack of skills to develop website	Investigate recruitment of private sector website developers Build internal skills
Develop metadata for administrative data collected including methodology and quality assurance	MoALF National and county governments	Medium term	Financial resources and skills	No funding allocated, lack of skills to develop website	Investigate recruitment of private sector website developers Build internal skills
Make administrative datasets accessible through websites	MoALF National and county governments	Long term	Financial resources and skills	No funding allocated, lack of skills to develop website	Investigate recruitment of private sector website developers Build internal skills
Investigate PPP for data collection and dissemination including data platforms	Private sector	Medium term	Resources and skills	Identifying private sector partners and wiliness of private sector to collaborate	Investigate possibilities for monetizing data to provide funding for additional activities

Annex C: Assumption for Technical Assistance Fee Rates

Priority area for costing	Assumption on fee rates
Legislative framework	
No legislative framework for engagement between the KNBS and MoALF at the national level	International TA at US$695 for 30 days
No legislative framework for engagement between the national- and county-level MoALF	International TA at US$695 for 30 days
Harmonization of concepts and definitions	
No metadata exist for detailing data collection	International TA at US$750 for 60 days
No common concepts and definitions	International TA at US$750 for 30 days. Team reviewing data collection activities. Total team of 3 people
Data collection activities	
Support to design SAS from sampling perspectives (CV < 15%) as well as questionnaire design	TA at US$655 for 30 days TA at US$620 for 20 days
Human resources	
Aging staff and no succession planning	4 months local HR specialists at US$2,000 per month
	47 counties, 1 month at US$2,000 per month in each of the counties
Aging staff and no succession planning	4 months local HR specialists at US$2,000 per month
	47 counties, 1 month at US$2,000 per month in each of the counties
Availability of statistical data	
Limited/no involvement of private sector in data collection, sharing and dissemination	Lump sum US$30,000 for TA undertake review

Note: TA = Technical assistance.

Annex D: Assumption for Costing of the SAS

Cost item	Detail	Units	Rate	Number of days	Total
Salaries					
Project manager		1	36,000	15	540,000
Administration and coordination		1	27,000	15	405,000
Data manager		1	18,000	15	270,000
Field manager		1	27,000	15	405,000
Scripter		1	31,500	15	472,500
TOTAL					**2,092,500**
Listing activities					
Wages		150	1,200	5	900,000
Subsistence		150	2,000	5	1,500,000
TOTAL					**2,400,000**
Preparation					
Staff mobilization	Accommodation (RGA)	4	5,000	1	20,000
	Transport	4	33,000	1	132,000
	Hall hire	4	3,000	1	12,000
TOTAL					**164,000**
Pretest					
Interviewers	Wages	3	1,200	4	14,400
	Subsistence	3	2,000	4	24,000
Supervisors	Wages	1	1,600	4	6,400
	Subsistence	1	3,000	4	12,000
Field coordinators	Wages	1	4,000	4	16,000
	Subsistence	1	5,000	4	20,000
TOTAL					**92,800**
Pilot					
Interviewers	Wages	30	1,200	7	252,000
	Subsistence	30	2,000	7	420,000
Supervisors	Wages	4	1,600	7	44,800
	Subsistence	4	3,000	7	84,000
Field coordinators	Wages	2	4,000	7	56,000
	Subsistence	2	5,000	7	70,000
Drivers	Wages	4	500	7	14,000
TOTAL					**940,800**
Actual fieldwork					
Field-staff costs					
Interviewers	Wages	313	1,200	15	5,634,000
	Subsistence	313	2,000	15	9,390,000
Supervisors	Wages	104	1,600	15	2,496,000
	Subsistence	104	3,000	15	4,680,000
Field coordinators	Wages	30	4,000	15	1,800,000
	Subsistence	30	5,000	15	2,250,000
Additional car hire	Car hire	61	25,000	20	30,500,000
Drivers	Wages	104	500	15	780,000

Cost item	Detail	Units	Rate	Number of days	Total
TOTAL					57,530,000
Other costs					
Translators from other towns					40,000
Telephone airtime	Interviewers	313	100	1	31,300
	DTLs	4	300	1	1,200
Internet		38	50	1	1,900
Telephone	Field Coordinators	30	5,000	15	2,250,000
	Supervisors	104	2,000	15	3,120,000
Tablets		331	26,000	1	8,606,000
Software and docking fees		1	300,000	1	300,000
					14,350,400
SUBTOTAL					*75,170,500*
Contingency (3% of project cost)					*2,255,115*
Total project cost					**92,411,615**
				VAT rate	**0.16**
				VAT	**14,785,858**
				Total including VAT	**107,197,473**
				exchange rate	**103**
				Total US$ per visit	**1,040,752**
				Costs for 4 visits in US$	**4,163,009**

One-off costs		Units	Number of days	Rate	Total
Training -					
Wages of interviewers		331	7	1,000	2,317,000
Wages of supervisors		104	7	3,000	2,184,000
Allowance		465	7	3,000	9,765,000
Coordinators wages		30	7	2,000	420,000
Hall hire		10	1	30,000	300,000
				Total in KSh	**14,986,000**
				Total in US$	**145,495**

Note: VAT = Value added tax.

Annex E: Assumption for Costing of Establishment of an M&E/Statistical Unit in the County MoALF

Cost items	Number	Unit costs	Detail	Total cost (annual)
Personnel				**962,280**
Manager (level 4) (statistics qualification)	1	80,190	Per month	962,280
Equipment				**347,000**
Laptops (Dell Inspiron)	1	60,000	Per laptop	240,000
Tables	1	30,000	Per table	30,000
Chairs	1	12,000	Per chair	12,000
Printer	1	35,000	Per printer	35,000
Scanner	1	30,000	Per scanner	30,000
Recurrent costs				**98,600**
Computer antivirus program	1	5,000	Per antivirus	5,000
Toner	1	10,000	Per toner	10,000
Stationery	1	6,000	Total	6,000
Telephones	1	8,000	Per telephone	8,000
Modems	1	3,000	Per modem	3,000
Ream of printing papers - A4	10	500		5,000
Fuel	10	1,000		10,000
Communication				—
Data bundles	12	300	Per 1G data card	3,600
Monthly telephone line rental	12	4,000		48,000
Transport				—
Assume county office vehicle is available for use				
Training				**116,720**
Database management (Oracle training US$3239) excluding				—
Use of statistical programs (Stata) (US$800)	1	83,000	Per person	83,000
Data quality assurance				
Microsoft Excel training (US$325)	1	33,720	Per person	33,720
Setting-up costs of an M&E unit			Total in KSh	**1,524,600**
			Exchange rate	103
			US$ total per unit	**14,802**
			US$ total for 47 counties	**695,691**

Annex F: Key Findings from the Capacity Assessment

Legend for capacity gap assessment

	Gap analysis	Prioritization
■	Complete gap	High
■	Partial gap	Medium
■	No gap	Low

Table F.1: Key findings based on capacity assessment areas

Capacity area	Findings	Gap
Institutional infrastructure	**Legal framework**: **KNBS** is a national activity with representation at the county level. All institutional activities (budget, recruitment, and so on) centralized at the national level. **MoALF** devolved to 47 counties and no legal framework exists for sharing information with the head office. Some counties send data to HQ, while others do not.	■
	Coordinating structures are limited and not institutionalized: KNBS at the county level interacts with MoALF mainly when drafting the County Statistical Abstract. MoALF interacts with HQ during annual verification process. **Stakeholder interactions**: KNBS interacts with stakeholders during African Statistics Day celebration and with farmers during field days.	■
	Forums: No structures exist for users and producers to interact.	■
	Strategic vision: County Integrated Development Plan (CIDP) guides priorities in the county. MoALF monitors performance against these plans. M&E units exist in a few counties.	■
Resources		
Financial	**KNBS**: Budgeting and work plan submitted at the beginning of the financial year, but, because of limited resources, the final allocated amount tends to be less than the requested submission. Also, funding often received late or infrequently, which affects planning. **MoALF**: Funding received through the county, which is often insufficient, especially the allocation for data collection activities as it is not prioritized. This is because managers do not see the value of data collection activities. Also, priorities may not be communicated up to senior managers.	■
Human: staff	**MoALF**: Staff complements vary by county. In general, at subcounty and ward levels, there are insufficient staff to adequately undertake required activities. Aging staff component with no succession planning is also prevalent. **KNBS**: Staff complements are also a constraint. Projects such as the current listing and mapping project for the Population Census 2019 have resulted in redeployment of staff and vehicles to this activity. Staff will be redeployed for 1.5 years and thus remaining staff, in some cases only 1–2 staff members, would be responsible for all data collection in the county over the period.	■
Human: training	**MoALF**: Aging staff not computer literate (ward level), and thus staff would require training in the use of Microsoft packages such as Excel and in data analysis and management. **KNBS**: Training for ad hoc surveys provided, but staff require refresher training in routine data collection activities, for example, CPI. In addition, with regard to livestock data received from MoALF veterinary services, the KNBS staff require	■

Capacity area	Findings	Gap
	training on specialized areas and how these data are collected to play an oversight/quality assurance role.	🟧
Physical infrastructure	**MoALF**: Office accommodation at the county level is sufficient, and at subcounty and ward levels, there is often limited or no office accommodation. **KNBS**: Staff often housed in county offices but in some cases may have own dedicated building at the county level.	🟧
	Transport: **MoALF and KNBS** • Is a significant constraint, especially at subcounty and ward levels. • Staff often required to use public transport to do data collection (according to interviews self-financed). • Transport, when available, may have to be shared across a number of activities and is thus not always available when required. • Maintenance of transport is lacking and vehicles are often grounded. • If a motorbike is available, aging and female staff are not comfortable to use this mode of transport. • Permission has to be requested for a staff member to use the motorbike, which often takes a long time to be granted.	🟥
	Equipment (office): MoALF and KNBS • County offices are in general well equipped in terms of computers/laptops, but staff also often used private laptops. • Replacement of old equipment does not occur. • Printers, if available, are insufficient and shared among a number of staff members. • There is no scanning equipment. • In sub-counties, office equipment is very old or nonexistent and a number of staff members would have to share a computer.	🟧
	Equipment (data collection): General equipment (for example, weighing scales) is available but specialized equipment is often lacking. It includes, for example, water testing kits for fisheries department.	🟧

Table F.2: Key findings of statistical methods assessment

Statistical methods and practices	Findings	Gap
Standardized templates	**KNBS**: Standardized paper-based templates, developed by HQ, for data collection exist and are used across all counties (CPI and retail market price data collection). **MoALF**: Field officers at the ward level have no template for data collection but have to submit information in a standardized reporting format. Sub-counties compile ward-level data using a reporting format and submit to the county.	🟧
Data collection methodology	**KNBS**: Currently there are no agricultural surveys. County offices collect CPI (2nd and 3rd week of the month) and retail market price information (weekly) at outlets and markets in counties. **MoALF**: Eye estimation or office-based estimation is mostly used for data collection because of staff shortages. For instance, for crops, estimations are based on observations of 1–2 farms or interviews with farmers during field days and extrapolated to production more generally. In certain cases, officers would use crop insurance or fertilizer subsidy program information to obtain data such as farm acreage.	🟥

Statistical methods and practices	Findings	Gap
Data collection technology tools: paper-based questionnaires vs. use of tablets	**KNBS:** Paper-based (PAPI) questionnaires are used for retail market price data collection. CPI was previously collected via tablets, but the system collapsed after handover and is no longer maintained by external contractors. According to KNBS staff, the KNBS is shifting toward data collection via CAPI (could not verify how far along the process is and census mapping is undertaken using smartphones). **MOALF**: At the ward level, staff use field books or a checklist with standardized reporting templates compiled at county and subcounty levels. In general ward staff collect data without standardized templates.	
Verification	Across both organizations, staff shortages have affected quality assurance activities: Field visits are not undertaken and basic quality assurance is undertaken on data collected. **KNBS**: CSO reviews the data collected in the field and compares the trends in, for example, prices month on month. **MoALF**: Data collected by ward staff are verified at the subcounty and county levels based on trend analysis.	
Data entry	**KNBS**: Data entry by county staff via Excel **MoALF**: Compilation of ward information by the subcounty using the reporting format specified in Microsoft Word. Counties, using the subcounty report, compile the county-level report (word reporting formats) For both organizations, there is no validation mechanism at data entry, and there are no built-in checks or use of double entry.	
Data storage and backup	**Data stored on individual desktops or laptops**. E-mails to HQ (with data attached) also serve as a backup. In a limited number of cases, data are stored on 2 computers or a flash disk/external hard drive.	
Data archiving	Hard copies are filed in filing cabinets in individual offices or in some cases in a central registry. Each unit will have its own filing system. Data currently archived relate to the period after devolution; thus, it is very difficult to access older data as these have not been digitized. Because of the filing of data in offices, data security is not optimal and confidentiality of data is a concern.	
Sampling methods	**KNBS**: Currently no agricultural sample surveys are being conducted. **MoALF**: Estimation is used for most data collection across crops, livestock, and fisheries. In crops section, one farmer will be visited to measure yields and this is extrapolated to entire county. There is a lack of alignment in data collection methodology between the KNBS and MoALF. Currently, because of the lack of an Agricultural Census, no sampling frame is available. The current mapping and listing activity related to the Population Census will provide an opportunity for the establishment of a sampling frame.	
Statistical software capability	At the county level, staff are proficient in using Microsoft Office applications, including Excel and Word. However, at the ward level, aging staff are not proficient in using computers and software and often rely on cyber shops for transcribing their data collection on paper into Microsoft Word.	

Statistical methods and practices	Findings	Gap
	In addition, staff require training on the use of statistical packages, for example, SPSS and Stata, for analysis purposes. Staff would also need training in Microsoft Office applications, including advanced Excel, to move beyond its use for only data capturing and including validation and analysis steps.	🟧
IT infrastructure	County staff use personal e-mail addresses (Yahoo and Gmail), which poses security concerns. There is only limited ICT, with Internet access available at the county level but not at the subcounty level. Staff (especially at the ward level) often use own mobile phones and data bundles to transmit data.	🟥
Adoption of international standards	There is a lack of metadata for data collection across both the KNBS and MoALF from the county to subcounty and ward levels. This was highlighted in the context of the livestock, hides, and skins data collected by the MoALF veterinary services and provided to the KNBS for publication. KNBS county officials indicated that they did not know how the data are collected and thus could only undertake very limited quality assurance of the data provided, for example, comparing month-on-month trends. KNBS uses international standards. There is also a lack of harmonization in concepts and definitions between the KNBS and MoALF.	🟧
Agricultural and livestock surveys	**KNBS**: No sample surveys related to agriculture and livestock are currently undertaken. The Population Census 2019 listing and mapping exercise is currently being undertaken and is collecting data on livestock, agriculture, and fishing. This information can serve as the sampling frame for PSUs in future agricultural sample surveys. **MoALF:** In Bungoma, the MoALF is planning to undertake an agricultural survey. The ministry did interact with the KNBS regarding the crop data collection but not on other aspects. Veterinary services provide data to the KNBS on livestock slaughtered by type of animal and hides and skin. Once data are received by the KNBS county offices, the data are sent directly to the KNBS HQ with no or limited data verification as the KNBS staff do not have the skills or staff to undertake quality assurance of these data.	🟥
Agricultural market and price information	**KNBS** collects retail market prices at the county level (weekly data collection). CPI data are collected in the 2nd and 3rd week of the month. **MoALF**: The county MoALF collects market price data daily and sends the data on a daily basis to the national MoALF. No backup of this data is stored by the county.	🟩
Quality consciousness	Staff is very cognizant of data quality and admit that using techniques such as estimation results in a number of problems and contributes to deficient data quality.	🟩
Analysis and use of data	**KNBS**: No data analysis is undertaken at the county level. Most data are sent to HQ for analysis purposes. The exception is the county statistical abstract for which various ministries provide data that are compiled by the KNBS. **MoALF**: County staff analyze the subcounty data. The establishment of M&E sections in some of the counties have also contributed to the use of the	🟧

Statistical methods and practices	Findings	Gap
	administrative data collected for monitoring of programs in relation to the CIDP.	

Table F.3: Key findings of data availability assessment

Capacity area	Findings	Gap
Data accessibility: availability of statistical information	Data are made available to stakeholders via formal requests. However, as users do not know what data are available, very few requests are received and the provision of data is ad hoc.	
Core data availability	Currently, there is no list of agreed core items to be collected on agriculture. With regard to data that are collected, there is concern among users regarding the quality of data due to the use of nonscientific methods (desk-based estimation and observations) for data collection.	
Timeliness	No Census of Agriculture has been conducted since the 1960s. In addition, while there are some surveys planned (although it is not clear if all of these are funded activities), there is currently no survey program running in the counties. Thus, timely data for decision making are not available.	
Overall data quality and data user perceptions of quality	User perceptions of data quality is poor. Staff at the county and subcounty levels also admit that the techniques for data collection are not scientific and often rely on estimation. No effort is being made by the KNBS or MoALF to measure user perceptions around data quality.	

Annex G: Summary of County-level Engagements

County	Institutional infrastructure	Resources: human	Resources: physical	Resources: financial	Statistical methods and practices and data collection
Bungoma KNBS	Minimum interaction between the MoALF and KNBS. There is a steering committee for specific county statistical data.	Not sufficient staff; of 6, 4 are currently working on census. Training is provided only when new tools are rolled out	Only 2 computers between 6 officers and 1 vehicle in the department	Budget insufficient for data collection activities	Surveys, CPI, food commodity retail prices
Bungoma MoALF	No forums for interactions	Technical officers are not statisticians and require training on statistics and data collection. Aging staff	Lack of equipment, but have purchased equipment for soil testing labs and automatic weather stations. No transportation available and need laptops	Activities are not funded, and data do not receive priority	Templates developed to collect data and in some cases not standardized templates. Data collected on livestock, crops, veterinary services and livestock extension services
Uasin Gishu KNBS	Interaction with universities (MoU) to pilot projects Limited involvement with counties Meet with members of the government every Thursday	Require more training and training provided when survey updated; require refresher training on regular data collection	1 vehicle for entire office and paper-based data collection; 2 desktop computers for 7 staff	No funding allocated for fuel and maintenance of vehicle. Budget submitted is cut substantially without explanation. Regular surveys also underfunded.	Data collected on livestock slaughters, skins, and hides from veterinary services. Food commodity retail prices and CPI collected from 80 outlets
Uasin Gishu MoALF	Quarterly interministerial meeting where county executive members meet	Training required on data collection. Insufficient number of staff	7 motor bikes for entire county. Mostly private laptops are used.	Insufficient funding allocated	No standardized forms and templates
Nakuru KNBS	No interaction with the MoALF, but engage with other departments around the	Need for refresher training	1 vehicle and 1 motorbike for entire department	Budget submitted is cut substantially without explanation.	CPI, retail market prices, animals slaughtered

County	Institutional infrastructure	Resources: human	Resources: physical	Resources: financial	Statistical methods and practices and data collection
	annual statistical abstract			Regular surveys also under funded	
Nakuru MoALF	No interaction mechanisms	Training done at HQ; officers who enter data would attend training. Insufficient extension officers, as well as in veterinary services. Require training to analyze data	Only 2 subcounties have computers. Require licenses for Stata/SPSS	Insufficient budget allocations	Do not use scientific methods
Nyeri KNBS	Africa Statistics Day and dissemination worK shops for surveys and publications	Only 2 staff in office and rest are deployed to census	Only 2 computers in good working condition, and office telephone not working. 1 vehicle grounded, 1 motorbike, but no riders	Budgets submitted almost always reduced. Disbursement of funds from HQ comes late at times.	Routine data collection, for example, CPI and ad hoc surveys
Nyeri MoALF	No interaction with other departments	Insufficient staff; 38 staff for 8 subcounties	Electricity is available but no Internet at the subcounty level; old computers	Limited financial resources	M&E department creates format which needs to be completed. However, no standardized form for data collection Plantwise project.
Embu KNBS	CSO forums twice a year and engagement with stakeholders when surveys conducted	Lack of refresher training	2 computers which are new and sufficient. Staff use public transport as vehicle deployed to census activities	Insufficient finances	Do not collect CPI and retail market prices

County	Institutional infrastructure	Resources: human	Resources: physical	Resources: financial	Statistical methods and practices and data collection
Embu MoALF	Data fragmented since devolution. Unsure about how to link with the KNBS in county	Aging staff and retirement, under-staffing	Computers in county and subcounty adequate. No vehicles and IT challenges	Lack of funding	No standardized formats
Machakos KNBS	County statistical abstracts involve stakeholder engagement. Statistics Day	Training not done as frequently as needed	3 officers, 1 dispatched to census	Variety of activities, try to work within the budget, but funding often received late	CPI, hides and skins
Machakos MoALF	No to limited interaction with stakeholders and other departments	No knowledge of data-gathering tools or how to validate data. Aging staff and staff shortages with 1 officer covering 7 wards	Outdated equipment and no vehicles at the subcounty level	Lack of funding allocated for improving data collection	Use of estimation for crop data

Annex H: Case Study of Bungoma County

Bungoma county boarders Uganda to the North West and has a population of 1.4 million people (Census 2009). The economy of Bungoma county is mainly driven by Agriculture, in particular the sugarcane and maize industries. The area experiences high rainfall throughout the year, and is home to several large rivers, which are used for small-scale irrigation.

Kenya National Bureau of Statistics (KNBS): Bungoma

In Bungoma county, the KNBS comprises 6 staff members including the county Statistical officer. Currently 4 staff members and a driver have been "seconded" to the Census 2018 listing and mapping activity and will be away for period of 1.5 years. The remaining staff member is currently responsible for data collection during this period. The main activities of the office relate to routine data collection and national surveys as they occur. The routine data collection include the following:

Food commodity retail prices:

Data on identified products is collected across 3 markets (in selected outlets).The county initially wanted to collect prices in 6 markets but staff constraints has made this impossible. Data is collected weekly during market days via a paper based data collection tool and captured in excel in the office. The data is emailed to KNBS HQ.

CPI:

Data is collected from 3 retail markets (plans to expand to other markets). The 3 markets are Bungoma, Kapsokwon and Kimilili. CPI data is collected between 2nd and 3rd week of every month over a period of 10 days. Additional funding is provided from HQ for the CPI data collection activities. Data collected occurs via a paper based collection tool and submitted monthly to HQ according to set timelines for submission. CPI was previously collected via tablets however the system collapsed after the end of the contract with consultant as it was not maintained.

Livestock data:

This data is provided by the county MoALF to the KNBS at the county level. Veterinary officers at the sub county level collect data on the number of livestock slaughtered as well as the quantities of hides and skins produced. The KNBS developed the format for reporting by the veterinary services with data being provided on a quarterly basis. The KNBS county officer sends a hard copy of the report to KNBS HQ. As this is a secondary data source KNBS does not undertake and data quality assurance and the county staff do not have information regarding the methodology for data collection.

Challenges:

- The interaction between the KNBS and MoALF is limited to activities around the drafting of the county Statistical Abstract. In addition, it is often difficult for the KNBS to obtain livestock data from the Ministry. Lack of funding prevent the KNBS from providing quality assurance of the MoALF data collection activities.
- A steering committee on county statistical data exists during which various stakeholders interact.
- In the past an Agricultural production survey was conducted which collected data on area ploughed and planted, but funding constraints resulted in abrupt ending of the project.
- Transport comprises of 1 vehicle for all data collection, while 2 computers are shared amongst 6 staff members.
- Funding for county level activities is through National KNBS. Funding is often lacking and the KNBS requires assistance from MoALF to fund data collection activities. For national surveys additional funding is allocated by National KNBS.

Survey programme

- Planned activities include the Seasonal Agricultural survey in 2018 and the Census of Population in 2019.

Ministry of Agriculture, Livestock and Fisheries (MoALF): Bungoma

Following the devolution process, all MoALF functions were devolved to the county level. At the county level the Chief Officer reports to the county Executive Member (CEM) while the various section Directors report to the Chief Officer. The county has established an M&E section for tracking project implementation and co-ordinating data from the various directorates. The data collected by the various directorates are as follows:

Directorate of Fishing:

- Fish production by type of fish.
- Stocking of fish, kilograms of fish stocked and inputs used in fish production.
- Harvesting, value add and market demand.
- Data for fish from lakes (Victoria and Tukana) by area, type, quantity, which feeds into market in Bungoma.
- The Directorate of Fishing also provides training to farmers and other players in fishing industry in the county. There is a farming training centre in county and the directorate identifies the areas of training.

Directorate of Co-operatives: (This directorate does not exist in all counties and in some transferred to other departments):

- Types of co-operatives, status of membership (active dormant and reason), capital share, deposits, and resources mobilised
- Information on Agricultural credit programmes
- Key area of data collection include the accounts and management information, financial accounts, ledgers and bank recons, institutional and corporate controls.
- Co-operative payment systems, total assets and liabilities, external loans, audit position and fees.
- Employees of co-operatives (total and gender).
- Detail on loans granted and repaid.
- Marketing: Product intake, e.g. milk/coffee received, sales and payments classifications and grades e.g. in coffee.
- Information on training conducted for the members of co-operatives.

Directorate of Livestock

- Data collected on the population of livestock, e.g. cattle poultry, sheep beehives etc.
- Production levels of milk, egg, honey, meat and animal products
- Extension activities in the field: farmer training, tours, shows and exhibitions.
- Processing and value add for milk, eggs and honey

Directorate of Veterinary services

- The directorate is a service department and data is collect in the performing of duties by staff e.g.. when surveying farmers or diseased animals.
- Data collected on the health and disease, hides and skin are collected by directorate. Activities around breeding (Artificial insemination) and clinical services have been privatized. This presents a challenge as service providers are not willing to provide data to the department.

- Data on disease control, vaccinations data when doing routine vaccinations, and disease outbreaks are collected
- Livestock markets in the county: disease surveillance, detect diseases and then implement any necessary actions for control.
- Veterinary Public health: Inspect meat on daily basis, types of animals slaughtered complied on a monthly basis. Number of hides and skins produced. This data is provided to the KNBS.
- Slaughterhouses, inspecting fee is charged which provides revenue for department.
- No of carriers who transport between slaughterhouses and butchers, can identify where meat comes from.
- Dispatch fee: Tracks movement of animals between counties.
- Tick and Tsetse fly: Number of animals who have gone through dips, or where farmers spray animals. This is a privatised activity done by farmers.

Directorate of Irrigation services

- Activities of the directorate are undertaken by engineers with the majority of the information collected relate to Engineering projects as well as areas irrigated, water quantities, rivers, dams, pipelines.
- For irrigation projects have length of pipelines.
- Data collected on the number of Smallholder pumps
- Collect rainfall data and also number of water users for example water use amongst co-operatives

Directorate of Extension services

- Collect data on farmer training undertaken, number of exhibitions and shows, and number beneficiaries, for example number of farmers reached by the service.
- Agricultural engineering: Technologies, artisans trained, equipment fabricated,
- Agricultural businesses, type of inputs, availability and cost of inputs. Data used to inform farmers but also shared with county stakeholders.
- National fertilizer scheme: Records information on the amount of fertilizer used and land area on which fertilizer used on.
- Agricultural marketing for every product (crops and livestock).
- Value add and agro-processing.
- Cross border trade: Bungoma boarders Uganda. Use customs data and partners who collect information. Currently no data on informal trade is captured.
- Agricultural credit, amount of credit extended
- Enterprise profitability, gross margins and cash flow.
- Provide information for food security report submitted to National department.
- Data also collected on the pilot Crop Insurance project.

Challenges:

Data gaps:
- The lack of resources across directorates including staff shortages, lack of training in specialised data collection, results in a number of data gaps.

- For example in the livestock directorates there is no information collected on feed for livestock while in fisheries, the lack of water testing kits results in the inability to test water quality. In the veterinary services directorate, no information is collected on slaughtering activities at the household level.

Institutional arrangements:
- Following devolution, many national functions now have to be performed at county level e.g. licensing of cross boarder fishing, now counties responsible for developing own licensing system, without the necessary resources.

Financial resources:
- At the county level, few resources, including financial, have been allocated for data collection.
- For some directorates e.g. irrigation, there is very limited funding from the county and partners provide funding.

Physical infrastructure and equipment:
- Lack of equipment e.g. crop dryers

Human resources: Staff
- Statistician are needed at the county level
- No active programme to employ technical staff
- Number of data collectors have declined
- Lack of capacity of data collectors in the field to obtain data from "Beneficiaries".
- Aging staff with no replacements or succession planning

Human resources: Training
- Technical officer need to be trained to collect accurate information.

Data collection methodology:
- Estimation is used rather than physical observation or the use of surveys.
- Data often not received from wards impacts ability of sub-counties and counties to compile reports
- Lack of standardised templates for data collection
- Data collection mainly done through paper based tools, however most directorates expressed a desire to use technology.

Data management and quality assurance:
- Data management systems and procedures lacking
- Quality assurance is limited to comparisons based on previous month's data collection
- Staff cannot retrieve data as data stored on personal laptops, can only access via email if person not around (try and keep the data via email (back-ups are email, no system of back-ups).
- Paper records are filed and kept in a room, each Department has own filling system.
- Previously data at Sub-county level was kept at the provincial level, the devolution meant that a county level system had to be created.
- Archiving of data problematic

- No metadata exists detailing data collection methodology nor of definitions and concepts used.

Innovative projects undertaken in the county

- The National MoALF is piloting a national farmer registration programme in selected county wards, administered through the ward extension officers. The information will be collected through tablets. The main challenge for implementation relates to obtaining buy-in and support from the county governments.

- The county is conducting a Census of Agricultural activity in the county which is funded and supported by governor. The Census will capture data on fisheries, crops and livestock with the aim of improving the quality of data and reducing the reliance on estimates. The department developed a questionnaire independently from KNBS. However for the crops section, the county statistical officer from KNBS was involved in the questionnaire design.

- Crop insurance pilot project: This is a project piloted across a number of selected counties. Crop cuttings were collected and yield per hectare calculated.

- CABI Plantwise project[15]: Is a donor funded project which used tablets for data collection. Farmers would bring a sample of diseased plant to the Plant clinics for diagnoses. Details of the farmer are recorded and a photo of the plant is taken. Plant health extension officers can share details with network of other practitioners across the pilot counties and request assistance. All information also uploaded to the Plantwise Knowledge Bank. The diagnoses and instructions for treatment as sent to the farmer via sms.

Source: CABI, Plantwise

- E-extension platform: Started development of the system in the last financial year, and currently in the development phase. The platform is a service delivery tool. It is envisaged that the platform will provide the following information:
  - o Services which are being requested by farmers, as well as how extension officers are responding to the requests
  - o Will also provide data on training provided to farmers in real time

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[15] http://www.plantwise.org/

- o Production data e.g. milk produced
- o The farmer will complete the information on a paper-based questionnaire and the extension officer will complete via a tablet which is loaded with the developed software.

Annex I: Key Agricultural Statistics Stakeholders and Types of Data Required

Crops sub-sector: The key stakeholders include: AFA State corporations/departments; KNBS, Ministry of Health (MoH), Ministry of Environment, Water, and Natural Resources (MEWNR), Department of Resource Surveys and Remote Sensing (DRSRS), Ministry of Co-operative Development and Marketing (MCDM), Cereal Millers Association; Cereal Growers Association; Green Dreams Tech Ltd., Eastern Africa Grain Council, Equity Bank, Ivory Consult Ltd., Progeny International, Pyrethrum Growers, Syngenta Foundation, M-farm, Amalgamated Chama Limited (ACL), Green Dreams, FAO, JICA, GIZ, USAID, WFP, EAC, African Union, Universities, among others.

Fisheries sub-sector: Marine fisheries, Inland fisheries, Aquaculture, Kenya Marine Fisheries and Research Institute (KEMFRI), and The University of Eldoret.

Forestry and Environment sub-sector: the key stakeholder institutions included: National Environmental Management Authority (NEMA), Water Resources Management Authority (WRMA), Kenya Forests Service (KFS), Kenya Wildlife Service (KWS) and Ministry of Mining (MoM).

Livestock sub-sector: State Department of Livestock (SDL), Kenya Dairy Board, Ministry of Industrialization and Enterprise Development (MOI&ED), Cooperative Directorate, MoALF - Veterinary services, Kenya Meat Commission (KMC), Kenya Agriculture and Livestock Organisation (KALRO), Tegemeo Institute, International Livestock Research Institute (ILRI), Egerton, KNBS – National Accounts.

County and Cross-cutting areas: the 47 County Governments, KNBS, KALRO, Agricultural Research Institutes; Development Partners.

Types of data required: production, yields, prices (wholesale, retail, farm-gate); commodity trade prices; cross border prices; regional prices; commodity consumption levels; postharvest losses; cost of production; subsidy prices; stock available food balance sheet.