Ethiopia Socioeconomic Survey (ESS)
ESS Panel II
2018/2019
Refreshed Sample: Baseline

Basic Information Document

Central Statistical Agency

&

Living Standards Measurement Study (LSMS), World Bank

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ACRONYMS

AgSS	Annual Agricultural Sample Survey
BMGF	Bill and Melinda Gates Foundation
CSA	Central Statistical Agency (Ethiopia)
DFID	Department for International Development, UK
DHS	Demographic and Health Survey
EA	Enumeration Area
EIAR	Ethiopia Institute of Agricultural Research
ERSS	Ethiopia Rural Socioeconomic Survey
ESS	Ethiopia Socioeconomic Survey
HCES	Household Consumption and Expenditure Survey
IFPRI	International Food Policy Research Institute
IFS	Institute of Fiscal Studies
LSMS-ISA	Living Standards Measurement Study – Integrated Surveys on Agriculture
MOA	Ministry of Agriculture
MOF	Ministry of Finance
MOWIE	Ministry of Water, Irrigation and Electricity
NBE	National Bank of Ethiopia
NPC	National Planning Commission
NSDS	National Strategy for the Development of Statistics
PH	Post - Harvest
PP	Post - Planting
SDG	Sustainable Development Goals
WASH	Water Sanitation and Hygiene
WFP	World Food Program

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1. Introduction

The Ethiopian Socioeconomic Survey (ESS) is a collaboration between the Central Statistics Agency of Ethiopia (CSA) and the World Bank Living Standards Measurement Study- Integrated Surveys of Agriculture (LSMS-ISA) project.[1] The objective is to collect multitopic panel household data with a special focus on improving agricultural statistics and better understanding of the link between agriculture and other household income activities. The ESS is rooted in the need to formulate and conduct a survey that meets Ethiopia's data demands and fills gap; and is of high quality, accessible to the public, and aligned with the National Strategy for the Development of Statistics (NSDS). The project is also designed to build capacity, share knowledge with other countries, and improve survey methodologies and technology. With the ESS, the CSA has established a guide for consulting with national and international organizations that could provide technical guidance and for collecting data to inform policy decisions and research. National institutions with which the ESS is collaborating are the Ministry of Agriculture (MOA), Ministry of Finance (MOF), National Planning Commission (NPC), Agricultural Transformation Agency (ATA), Ethiopia Institute of Agricultural Research (EIAR), National Bank of Ethiopia (NBE), and Ministry of Water, Irrigation and Electricity (MOWIE). International institutions that the project is collaborating include United Nations Food and Agriculture Organization (FAO), the Institute for Fiscal Studies (IFS), London, World Food Program (WFP), and International Food Policy Research Institute (IFPRI).

Ethiopia is one of seven countries being supported by the World Bank, with funding from the Bill and Melinda Gates Foundation (BMGF), to produce more reliable data on agricultural households. The main objective of the LSMS-ISA is to better understand the role of agriculture in Sub-Saharan Africa in relation to household welfare and poverty reduction. The project will boost the data collection capacity of the national statistical organizations and the quality of household-level agriculture statistics, and the data will be analyzed for insights into ways to foster innovation and efficiency in agriculture.

ESS began as ERSS, the Ethiopia Rural Socioeconomic Survey, in 2011/12. The first wave of data collection covered only rural areas and small towns. The word "Rural" was dropped from the name in the second wave of data collection when the sample was expanded to urban areas. The urban supplement was designed to ensure that the ESS data can provide nationally representative estimates. Accordingly, the number of survey enumeration areas (EAs) went up from 333 (3,776 households) to 433 (5,262 households). ESS refers to the survey in general, ESS1 to the first wave carried out in 2011/12[2]; ESS2 to the second wave of the ESS in 2013/14; and ESS3 to the third wave carried out in 2015/2016. The three waves together create a panel data set of households from rural and small-town areas because the households interviewed in ESS1 were re-interviewed in ESS2 and ESS3. ESS2 and ESS3 together constitute a panel of households and individuals for all areas, urban and rural, and towns of all sizes.

The 2018/19 ESS (ESS4) is a new panel, not a follow-up to previous ESS waves. A baseline survey for the waves to follow, it covers all nine states and two cities, Addis Ababa and Dire Dawa. ESS4 was conducted in 565 EAs, of which 316 are rural and 219 are urban. Unlike previous ESS waves,

[1] For more information on the LSMS and LSMS-ISA go to http://surveys.worldbank.org/lsms
[2] In fact, ESS1 is the term now used to refer to the ERSS.

ESS4 is also representative of regions as well as rural and urban areas. For ESS4, the previous survey instruments were revised in collaboration with data users and development partners. The revisions concentrated on updating modules, ensuring that the survey data produced would be consistent with (1) Ethiopian policy and government proclamations (e.g.. tax and transfer laws, land policy, and financial sector proclamations); (2) international development indicators like the **Sustainable Development Goal** (SDGs), new economic concepts (e.g., the new definition of Labor statistics and SDG water, sanitation, and hygiene [WASH] targets); and (3) current official government surveys, such as the Household Consumption Expenditure Survey (HCES). Moreover, the ESS4 in partnership with the LSMS+ (plus) project to add modules to improve the availability and quality of individual-disaggregated household data and thus track progress of SDG indicators on ownership, use rights, and decisions of selected physical and financial assets (Box A).

Box A

Major Content Changes in the 2018/19 Ethiopian Socioeconomic Survey, Panel II

The new panel presented an opportunity to revise the questionnaire based on lessons learned in previous waves and demand for additional information:

Individual-Level Disaggregated Household Modules: The 2018/19 ESS in collaboration with Living Standard Measurement Study-Plus (LSMS+) project collected information from all household members aged 18 and older (a) ownership and right to selected physical and financial assets, and(b) education, health, and labor and financial inclusion status. For instance, ESS4 asked each adult member whether he or she exclusively or jointly owns or has user right to specified assets. For the land module, all adult members were asked to report on their reported personal, economic, and documented ownership of and user rights in each land parcel level land listed by the household as owned or accessed via use right, and in other modules they were asked the same questions about their rights in dwellings, livestock, financial accounts, and mobile phones.

One goal was to minimize proxy responses when personal information is collected in household surveys. The ESS4 modules on education, health, and labor are therefore designed so that adults are asked personally whenever it is possible and feasible.

The labor module has been updated to reflect the concepts and definitions as endorsed by the 19th International Conference of Labor Statistics in 2013. Employment is defined as work for pay or profit, work as all activities to produce goods and services. Thus, it covers employment, volunteering, own-use production, unpaid training, among other forms of work.

Taxes: Previous ESS waves sought some information on formal and informal taxes; ESS4 added more questions, on paid formal taxes (direct tax only) and informal taxes paid by households. Income taxes (e.g., salary, rent, and agricultural income tax) and land use as well as housing tax are some of the information. On informal tax, it asks about household cash and in-kind contributions for such purposes as community development and religious and socio-political commitments. Further, it asked business owners and managers to report on business *direct tax* and business-related formal fees. The tax questions are distributed among modules.

The consumption module has been revised to reflect the contemporary consumption patterns of Ethiopian households. ESS4 specified several new consumption items, based on detailed results of the recent national Household Consumption and Expenditure Survey (HCES) and the consumption module of ESS Fixed Panel I. Some items were dropped in this round because they were not reported by households in previous rounds.

ESS responds to Ethiopia's needs for individual, household, and community data. The questionnaire incorporates modules that collect data on a wide range of demographic and socioeconomic variables. Because most Ethiopians depend on agriculture, the rural sample has an extensive agriculture module.

The ability to follow the same households over time makes the ESS a powerful tool for studying the role of agriculture in household welfare over time because it supports analyses of how, households add to their human and physical capital, how education affects earnings, and how government policies and programs affect poverty. The ESS is the first panel survey carried out by the CSA that links a multitopic household questionnaire with detailed questions about agriculture; the CSA has also introduced innovative survey approaches and technologies over time (Box B).

The purpose of this Basic Information Document (BID) is to provide detailed information about how the 2018/19 round was carried out.

Box B **Innovations in the ESS Approach and Methodology**

The ESS incorporates several innovative approaches:

- Integration of household welfare data with agricultural data.
- Creation of a panel dataset that can be used to study poverty dynamics, the role agriculture plays in development and changes over time in, e.g., health, education, labor activities and financial inclusion.
- Collection of information on the network of buyers and sellers of goods with which a household interacts.
- Collection of intra-household and sex-disaggregated household data.
- Expanding the use of GPS units to measure agricultural land areas and learn more about locations.
- Using *Survey Solutions* CAPI (Computer Assisted Personal Interview) to collect data.
- Involving numerous actors in government, academia, and the donor community in drawing up, conducting, and analyzing the results of the survey.
- Tracking households who have moved with the country.
- Active disseminating agriculture, poverty, and other welfare statistics.

2. The Survey Instruments[3]

The ESS4 survey consisted of five questionnaires, similar with those used in previous rounds but revised based on the results of the previous rounds and on need identified for new data. The ***household questionnaire*** was administered to all households in the sample; several modules were administered to each eligible ***household*** member. The ***community questionnaire*** was administered to a group of community members to collect information on the socioeconomic indicators of the EAs where sample households reside.[4] The three ***agriculture questionnaires,*** consisting of ***post-planting and post-harvest questionnaires*** and a ***livestock questionnaire,*** were administered to all members of households engaged in agricultural activities. An agricultural ***holder*** is a person who exercises management control over the operations of the holdings and makes the major decisions about use of available resources. Holders have technical and economic responsibility for the holding, which they may operate as an owner or as a manager. Thus, it is

[3] In this round we have used the latest codes for nonstandard units for all sections of this questionnaire.

[4] The community questionnaire does not collect sociological information about communities so the data cannot be used to represent Ethiopian communities in Ethiopia. It simply collects information that is common to the households selected for inclusion in the EAs.

possible to have more than one holder in a single household, in which case the agriculture questionnaire is administered to each holder.

The *household questionnaire* elicits information on education; health (including anthropometric measurement for children); labor and time use; financial inclusion; ownership of and user rights in assets; food and nonfood expenditures; household nonfarm activities and entrepreneurship; food security and shocks; safety nets; housing conditions; physical and financial assets; credit; tax and transfer; and other sources of household income (Table 2.1). Household location is geo-referenced in order to later link ESS data to other geographic data sets (see Appendix 1 for discussion of the geospatial data provided with the ESS).

The *community questionnaire* elicits information on infrastructure; community organizations; resource management; changes in the community; key events; community needs, actions and achievements; and local retail prices (Table 2.2).

The *post-planting and post-harvest agriculture questionnaires* for crop farmers elicit information on land ownership and use; land use and agriculture income tax; farm labor; use of inputs; GPS land area measurement and coordinates of household fields; agricultural capital; irrigation; and crop harvest and utilization (Table 2.3 and 2.5). The *livestock questionnaire* collects information on animal holdings and costs, production, and costs and sales of livestock by products (Table 2.4).

Table 2.1: Household Questionnaire

Section	Topic	Respondent	Description
		Field staff	Household location, household size, head's name, and field staff identification
1	Roster	Household head or spouse	List of individuals living in the household and basic demographics; for members younger than 18, parental education and occupation.
2	Education	Household members 4 years and older. For children 4–12 years, caregivers were asked.	Educational attainment, enrollment, attendance, school characteristics, and expenditures for the 2018–19 academic year[5]
3	Health	Household members. For children up to 12, caregivers were asked.	Health problems, types of injury/illness, medical assistance/consultation, health insurance, disabilities, vital registration (birth certificate), breast feeding, and anthropometrics (children 6-59 months)
4	Labor and time use	Household members 7 years and older. For children 7–12 years, caregivers were asked.	Time use, labor market participation in the last 7 days and the last 12 months, unpaid apprenticeship, temporary absence, job search, casual or temporary work participation, participation in food for work/ public works programs, and contribution of free labor to community activities
5A	Banking and financial inclusion	Household members 18 years and older	Saving, financial literacy, insurance, and financial practices
5B	Financial assets	Household members 18 years and older	Individual disaggregated financial asset module: Ownership of financial asset accounts

[5] The school year started in September 2018 and ended in July 2019.

Section	Topic	Respondent	Description
			(exclusively and jointly), and value of financial assets owned privately or jointly.
6A	Food consumption, last 7 days	Person responsible for food purchases and preparation	Household food consumption (quantity and value) in the last 7 days and source of foods consumed by the household from a subset list of food items.
6B1	Food aggregate, last 7 days	Person responsible for food purchases and preparation	Summary on consumption of food in the last 7 days. Dietary diversification.
6B2	Meals Shared with non-household members, last 7 days	Person responsible for food purchases and preparation	Meal sharing with non-household members (number of persons and meals shared).
6B3	Food consumed away from home, last 7 days	Person responsible for food purchases and preparation	Type and value of meals consumed away from home om the last 7 days.
7	Nonfood expenditure[6]	Person responsible for food purchases and preparation	Household expenditures, previous month and 12 months, on nonfood items.
7	Land and livestock tax	Household head or eligible adult	Last 12 months household expenditures on land or livestock-related taxes. Only rural households asked.
8	Food security	Household head or eligible adult	Food Insecurity Experience Scale (FIES) for the last 7 days and food shortage experience for the last 12 months, and in which months food shortage experience happened.
9	Shocks	Household head or eligible adult	Shocks during the last 12 months and their impact on income, assets, food production, shock and purchase. Strategies the household used to cope with the three worst shocks faced.
10A	Housing	Household head or eligible adult	Dwelling ownership and property tax, characteristics of the dwelling and utilities, including WASH indicators, water and energy source, cooking facilities, sewerage and solid waste management,
10B	Land parcel roster	Household head or eligible adult	Individual disaggregated land roster module: Roster of land parcels owned or used by the household. For rural households. parcels are prefilled from post planting (PP) and any new parcel acquired added. For urban households a new listing of parcel is prepared. For the new parcel location, area and purpose are also collected. For prefilled parcels, prefilled from PP the information is already available in the PP section 2.
10C	Land and dwelling assets	Spouse and household members 18 years and older	Individual disaggregated land ownership and right modules: Reported personal, economic, and documented ownership and rights questions (right to sell, bequeath, rent out, use as collateral, make improvement) on listed lands and dwelling (exclusively or jointly).

[6] This section of the household questionnaire asks rural households about land use and agricultural income tax (including livestock tax, if any).

Section	Topic	Respondent	Description
10D1	Livestock roster	Household head or eligible adult	Individual disaggregated livestock roster module: Household ownership of different livestock by type and number
10D2	Livestock assets	Spouse and household members 18 years and members	Individual disaggregated livestock ownership and rights module: Reported personal and economic ownership and user rights of all livestock owned by the household (exclusively or jointly).
11A	Assets	Household head or eligible adult	Ownership and number of listed assets.
11B	Mobile phones	Spouse and household members 18 years and older	Individual disaggregated mobile phone ownership roster module: Mobile ownership and total number of phones owned.
11B2	Mobile phones	Spouse and household members 18 years and older	Disaggregated Individual-level and Mobile Phone Ownership Right and operation Module: Mobile ownership right and status.
12 (A &B)	Nonfarm enterprises	Owner or manager of enterprise	Characteristics of enterprises owned by the household: sector, employment, revenue, expenses and tax and fees related to the business. Business operation and start-up challenges.
13	Other income sources	Household head or eligible adult	Other sources of household income in the last 12 months, and any taxes related to the income.
14	Assistance	Household head or eligible adult	Assistance provided to the household by governmental and nongovernmental agencies
15	Credit	Household head or eligible adult	Loans or credit received by the household: source, repayment, collateral and challenges in accessing credit
16	Contact information	Household head or eligible adult	Contact information. (Confidential- not included in the public data)

Table 2.2: Community Questionnaire

Section	Topic	Respondent	Description
Cover (1.1&1.2)	Cover	Field staff	Community location identified, field staff identified; date and time of interviews
Cover (1.3)	Cover	Direct observation by field staff	Community characteristics
2	Roster of Informants	Informants	Respondent characteristics
3	Community Basic Information	Informants	Mobility, population, religion, marriage types, common land use
4	Access to Basic Services	Informants	Transportation, markets, proximity to the nearest town and major urban centers, electrification, bank and microfinance institutions, piped water
5	Economic Activities	Informants	Main sources of employment, migration to and from the locality for work, cooperatives and microenterprises
6	Agriculture	Informants	Agricultural activities, including major crops, main planting and harvesting seasons, rain seasons, input use, agricultural extension, and irrigation
7	Changes	Informants	Important events in the community in the last five years

8	Community Needs and Actions	Informants	Initiation, participation and mobilization of resources for community projects including roads, school, health facility, water, natural resource management, public transport, agriculture, law enforcement, etc.
9	Productive Safety nets Program	Informants	Participation in the productive safety nets program; management and performance of the program in the community
10A	Market Prices	Sellers in nearby Market center 1	Market prices in the first closest market center.

Table 2.3: Post-Planting Questionnaire[7]

Section	Topic	Respondent	Description
Cover	Cover	Fields staff	Holder[8] location identification; name of household head, name of holder, household size, type of agriculture holding type: farming, livestock, or both; field staff identification
1	Household Roster	Household head or eligible adult	Name, age, and gender of each household member, and holding type: farming, livestock, or both
2	Parcel Roster	Owner or manager of the parcel	Information on all parcels owned or managed by the holder
3	Field Roster	Field staff for field measurements using GPS and compass; field manager of field for other questions.	Information on all fields (sub-parcels) owned and managed, including holder self-reported area, GPS and compass measured area, labor inputs, and other details about each field
4	Crop Roster	Field manager	Crop planting and management information for each crop on each field
9a. Crop cut	Crop Cut	For the 4mX4m crop cut: field staff and holder	Crop cut information for selected fields including fresh and dry weight (from a 4mX4m crop cut), excluding permanent, tree, and root crops
5	Seeds Roster	Field manager	Seed related information for each crop planted on each field.
7	Miscellaneous	Field manager	Information on holder including use of chemical fertilizer use, and access and use of credit, extension, and other advisory services

[7] There is no Section 6 in the post-planting questionnaire.

[8] A *holder* is a person who exercises management control over the operations of the agricultural holdings and makes the major decisions about utilization of the resources available. Holders have technical and economic responsibility for their holding. They may operate it directly as an owner or as a manager.

Table 2.4: Livestock Questionnaire[9]

Section	Topic	Respondent	Description
1	Household Roster	Household head or eligible adult	Name, age, and gender of each household member, and holding type: farming, livestock, or both).
8_1	Ownership	Holder or manager/owner of livestock	Characteristics of livestock owned and their purpose
8_2	Change in stock	Holder or manager/owner of livestock	Total number of livestock by type, stock changes over the year due to birth, purchase, gifts given or received, sale, loss, slaughter, etc.
8_3	Livestock Breeding, Health, Shelter, Water, and Feed	Holder or manager/owner of livestock	Livestock breeding methods and costs, livestock shelter type and feed type and sources, livestock treatments and expenses.
8_4	Milk and Egg Production, Animal Power, and Dung	Holder or manager/owner of livestock	Quantity of milk and egg production; production, disposition and income from milk and egg production, income for other animal byproducts; Livestock use for transport, crop cultivation and harvesting; disposition of livestock dung

Table 2.5: Post-Harvest Questionnaire

Section	Topic	Respondent	Description
Cover	Cover	Field staff	Holder location identification, names of household and holder, household size, agriculture holding type: farming, livestock, or both, field staff identification.
1	Household Roster	Household head or eligible adult.	Name, age, and gender of each household member and holding type: farming, livestock, or both
9	Crop Harvest by Field	Holder	Harvest information for all crops: crop use, area harvested, amount harvested, and any damage to crops
10	Harvest Labor	Holder	Hired and household member labor used in harvesting each crop on each field, excluding permanent crops, tree, and root crops.
11	Crop Disposition/ Sales	Holder	Information on crop disposition or sale

[9] In ESS 2018/19, because the livestock questionnaire was fielded together with the post-planting questionnaire during the post-planting visit in September-October 2018, there is only one cover page for both modules.

3. Sample Design

3.1. Design and Coverage

Rather than being a continuation of the previous three ESS waves, the 2018/19 ESS is a new panel survey that is slightly different in scope and content from its predecessors. ESS4 is not only nationally representative but also tailored to be representative for each of Ethiopia's 11 regions and by rural and urban areas.

3.2. Sample Size and Allocation

ESS4 interviewed 7,527 households from 565 enumeration areas (EAs). Table 3.1 shows the distribution of sample EAs and households by region and urban and rural strata. From the rural AgSS, 316 EAs are sampled and from urban EAs, 249 are sampled.

Table 3.1: ESS4 Sampled EAs and Households by Region and by Urban and Rural

	Urban		Rural		Total	
Region	**Sample EAs**	**Sample households**	**Sample EAs**	**Sample households**	**Sample EAs**	**Sample households**
Tigray	19	285	35	420	54	705
Afar	15	225	31	372	46	597
Amhara	19	285	43	516	62	801
Oromia	20	300	45	540	65	840
Somali	17	255	36	432	53	687
Benishangul Gumuz	16	240	30	360	46	600
SNNP	18	270	42	504	60	774
Gambela	20	300	22	264	42	564
Hareri	24	360	18	216	42	576
Addis Ababa	53	795	-	-	53	795
Dire Dawa	28	420	14	168	42	588
Ethiopia	**249**	**3,735**	**316**	**3,792**	**565**	**7,527**

3.3. Sample Selection

Sampling for the new ESS4 was based on the updated CSA 2018 pre-census cartographic database of enumeration areas. The ESS4 sample is a two-stage stratified probability sample. Rural ESS4 EAs are the subsample of the AgSS[10] EA sample. Thus, the first stage of sampling in rural areas entailed using simple random sampling (SRS) to select EAs—the primary sampling units—from the sample for the 2018 AgSS EAs. The first stage of sampling for urban areas was selecting EAs directly from the urban EAs within each region using probability proportional to size (PPS) systematically. This is designed to automatically produce a proportional allocation of the urban sample by zone within each region. Once the sample EAs were selected, they are categorized as urban or rural using power allocation. which is closer to proportional allocation.

The second stage of sampling was to use systematic random sampling to select households to be surveyed in each EA. From the rural EAs, 10 agricultural households were selected as a subsample of the households selected for the AgSS[11] and 2 nonagricultural households were selected from the non-agriculture households listed in each EA specified. Note that in ESS4 the total number of agriculture households per EA is 10 even when the non-agriculture households sampled in that EA is only one or none.[12]

For urban areas, a total of 15 households are selected per EA regardless of the households' economic activity. The households are selected using systematic random sampling from the total households listed in that specific EA. A total of 7527 households are sampled for ESS4 based on the above sampling strategy.

Table 3.2 shows the distribution of fielded EAs and households by region and urban and rural strata. A total of 6770 households from 535 EAs were interviewed for both the agriculture and household module. However, there are additional eight EAs and 124 households from rural areas who were only administered during the agriculture survey.

Table 3.2: Distribution of actual EAs and households interviewed during wave 4 for ESS by Region in Rural and Urban areas

Region	Urban		Rural		Total	
	EAs	Households	EAs	Households	EAs	Households
Tigray	19	283	35	398	54	681
Afar	15	225	29	321	44	546
Amhara	18	271	43	487	61	758
Oromia	20	300	45	486	65	786

[10] The AgSS EAs were selected based on probability proportional to the size of population (PPS) from the sample of rural EAs, which is stratified by zone.

[11] For AgSS, 20 agriculture households are selected using random systematic sampling. Agriculture households are those who are involved in farming, livestock activities, or both.

[12] In previous waves, if there are less than two or no non-agriculture households in an EA, more agriculture households were interviewed instead. This means the total number of agriculture households surveyed per EA varies with the number of nonagriculture households in the EAs.

Somali	17	255	35	356	52	611
Benishangul Gumuz	13	195	19	207	32	402
SNNP	18	269	40	423	58	692
Gambela	20	300	19	209	39	509
Hareri	24	360	18	191	42	551
Addis Ababa	52	778			52	778
Dire Dawa	28	419	14	161	42	580
Ethiopia	**244**	**3655**	**297**	**3239**	**541**	**6894**

4. Training, Data Collection and Monitoring

4.1. Training

For the ESS4, seven training sessions were held, three (in July 2018, December 2018. and April 2019) for training of trainers (TOT) and four (in August 2018, October 2018[13], January 2019, and May 2019) for field staff enumerators and supervisors. All seven emphasized not only the content of the questionnaires and *Survey Solutions* CAPI but also their practical applications in data collection and supervision. All had survey and CAPI experience and most had participated in other CSA surveys.

The TOT sessions, held in Addis Ababa, were led by the World Bank LSMS team. Both the first, in July 2018, and the second, in December, took about two weeks, and the third, in April 2019, took about one week.

All field staff training sessions were led by CSA experts as well as the LSMS team. The first field staff training, three weeks in August 2018, was in Hawassa, and the second, in Adama in October 2018, was for Afar and Gambela region enumerators; both discussed post-planting and livestock questionnaires and *Survey Solutions* CAPI. The third field staff training, about two weeks in January 2019 in Adams, discussed post-harvest questionnaires for the entire sample. The fourth in Adama for two weeks in May 2019, discussed the household and community questionnaire and *Survey Solutions* CAPI.

4.2. Field Work Organization and Data Collection

The ESS4 was conducted in three visits, following the AgSS field schedule. For rural households, in the first visits, in September and October 2018,[14] the post-planting agriculture and the livestock questionnaires were administered, with the crop cut questionnaire administered from September to December 2018. In the second visits, in February and March 2019, the post-harvest agriculture

[13] This field staff training was arranged for Afar, Somali and Gambela, areas well known as pastoralist. However, due to security problems, enumerators from Somali could not attended the training and PP and PH information were not collected in that area.

[14] For the Afar and Gambela EAs, the first visit was in November and December 2018.

questionnaires were administered. In the third visits, June through August 2019, enumerators administered the household and community questionnaires.

For urban households, the household questionnaires were administered in single visits from June through August 2019.

Table 4.1: ESS4 Timeline

Questionnaire	2018				2019				
	Sep	Oct	Nov	Dec	Feb	Mar	Jun	Jul	Aug
Post-planting agriculture and livestock	■	■							
Crop cut	■	■	■	■					
Post-harvest agriculture					■	■			
Household and community							■	■	■

In separate visits the post-planting and post-harvest questionnaires collected information on the same fields and crops.[15] The post-planting questionnaire collected field and crop information, such as area planted, inputs, and other farming practices, and the post-harvest questionnaire captured harvest, harvest inputs, crop damage, and end use of crops.

The section on harvest amount, (Section 9) which includes crop cutting (and excludes tree, root, and permanent crops) were fielded with either the post-planting and post-harvest agriculture questionnaire, depending on the timing of the harvest for that crop and field. In some places, because crop cutting started earlier than the date scheduled for the post-harvest round, enumerators captured the crop-cutting data while conducting the post-planting questionnaire because it needed to be done by the time the farmer actually harvests the crop.

Most of the questions in the post-planting, post-harvest, and livestock questionnaires were asked to the holder (Table 2.3-2.5). However, some were answered by the enumerator following specific instructions in the questionnaires and field manuals. In the post-planting questionnaire, the enumerator measured all the fields (sub parcels) managed by the holder using GPS or, if the field was small (40 square meter or less), it was measured using a compass as well as GPS.[16]

The enumerator also was the respondent for the crop cutting questionnaire, which was applied for all cereal, pulse, and oilseed crops. In each EA, field workers carried out a 4 x 4-meter crop cut on 10 fields of eligible crops. The detailed procedure can be found in the crop cut manual.

[15]Some households that were available during the PP visit were not available during the PH visit or the security situation did not allow to conduct the follow up PH visit. Therefore, for these households there is only PP agriculture data.

[16] GPS estimates are less accurate for smaller fields; in these cases, enumerators were instructed to use rope and compass to measure the area.

Similarly, household questions were collected from the most knowledgeable person, usually adult; for children, that was a parent or another knowledgeable adult in the household (Table 2.1). The enumerator carried out the anthropometric measurements for children aged 6–59 months.

The community questionnaire was collected from both local focus groups and through direct observation (Table 2.2). It was administered by field supervisors, rather than enumerators. The community informants in each EA were chosen based on instructions in the community questionnaire and the manual. The questionnaire also collected commodity price information from one to two nearby markets with the help of sellers in the market centers.

Resident enumerators were used to administer the household, agriculture (post-planting and post-harvest), and livestock questionnaires in rural areas, except for the Afar and Somali regions. For each EA, the CSA assigned a resident enumerator for each EA who lived in the EA for the entire survey period from September 2018 to August 2019. Daily laborers were also hired for a few days as field guides to help the enumerators with measuring parcels and fields and with crop cutting activities. They also helped with child anthropometrics. Temporary mobile enumerator teams were used for all urban areas and for Afar and Somalia rural EAs.

One field supervisor managed the work of enumerators in three EAs as well as administering community questionnaires in the three EAs.

4.3. Fieldwork Monitoring and Evaluation

Routine supervision by CSA field supervisors entailed field-level coordination by CSA branch offices. Branch statisticians and supervisors assigned to this project carried out routine supervision. The branch supervisors made extended visits to the EAs between September 2018 and August 2019. One field supervisor checked the work of enumerators in assigned EAs. The last visit was combined with community interviews conducted by the supervisors. Up to two branch statisticians were also in the field to check the work of supervisors and enumerators.

CSA head office experts and Bank staff and consultants also provided supervision. Their first visits were between September 2018 and March 2019 when interviews with the post-planting, livestock questionnaires, crop-cut and post-harvest were being conducted. The second visit was in June-August 2019 when household and community data were being collected.

5. Data Management and Description of Datasets

5.1. Final Data Cleaning

Final cleaning was carried out on all data files. Only errors that the team could fix clearly and confidently were corrected; errors that had no clear fix were left in the datasets. Cleaning methods for these errors are left up to the data user.

5.2. Data Weighting

The ESS4 data needs to be weighted to represent the national population of rural and urban areas and regional populations. A sample weight with post-stratification adjustments was calculated for the households and this weight variable is included in all the datasets. It reflects the adjusted

probability of selecting the household for the sample. The inverse of this weight can be considered an expansion factor that sums to the total national population of households. When this weight is used in a household file, it sums to the population of households. Used in an individual file, it sums to the population of individuals. If the data user wishes to produce an estimate for the population of individuals in a household file, an approximate expansion factor is the sample weight times the number of people in each household.

In the first stage the ESS4 rural sample EAs were selected with equal probability from the AgSS sample EAs within each zone. At the second stage the 10 sample agricultural households for the ESS4 are selected from the 20 AgSS sample households with equal probability. The weight for the ESS4 sample households is calculated as:

$$W_{Ehi} = W_{Ahi} \times \frac{n_{Ah}}{n_{Eh}} \times \frac{20}{10}$$

where:

n_{Eh} = number of sample rural EAs selected in zone h for the ESS4 subsample

n_{Ah} = number of sample rural EAs selected in zone h for the AgSS

W_{Ehi} = weight of ESS4 sample agricultural households in the i-th sample rural EA of stratum (zone) h

W_{Ahi} = weight of AgSS sample agricultural households in the i-th sample rural EA of stratum h, specified previously in this report.

In addition to the10 sample agricultural households per rural EA selected for the ESS4, 2 non-agricultural households were selected from the all the nonagricultural households identified in each rural EA. These sample nonagricultural households selected for the ESS4 have the following weight:

$$W_{ENhi} = \frac{M_h}{n_{Ah} \times M_{hi}} \times \frac{n_{Ah}}{n_{Eh}} \times \frac{M_{Nhi}}{m_{Nhi}} = \frac{M_h}{n_{Eh} \times M_{hi}} \times \frac{M_{Nhi}}{m_{Nhi}}$$

where:

W_{ENhi} = weight of ESS4 sample nonagricultural households in the i-th sample rural EA of stratum (zone) h

M_{Nhi} = total number of nonagricultural households listed in the i-th sample rural EA of stratum h

m_{Nhi} = number of sample nonagricultural households selected in the i-th sample rural

EA of stratum h (generally equal to 2)

For the ESS4 urban sample, in the first stage a new sample of urban EAs was selected systematically with PPS within each region from the updated pre-census cartographic frame. In the second stage, 15 households are selected from r each sample EA. The basic weight for the ESS4 sample urban households is calculated as:

$$W_{Uhi} = \frac{M_{Uh} \times M'_{Uhi}}{n_{Uh} \times M_{Uhi} \times m_{Uhi}}$$

where:

W_{Uhi} = basic weight for ESS4 urban sample households in the i-th sample urban EA of region h

n_{Uh} = number of sample urban EAs selected in region h for ESS4

M_{Uhi} = number of households in the sampling frame for the i-th sample urban EA of region h

M_{Uh} = total number of households in the sampling frame for the urban stratum of region h

m_{Uhi} = 15 = number of households selected for the ESS4 in the i-th sample urban EA of region h

M'_{Uhi} = total number of households in the i-th sample urban EA of region h

The basic weights for the ESS4 urban and rural sample households were adjusted to consider nonresponse at the EA level. The adjusted weight (W'_{hi}) for the sample households in the i-th sample EA in stratum h is calculated as follows:

$$W'_{hi} = W_{hi} \times \frac{m_{hi}}{m'_{hi}}$$

where:

m'_{hi} = number of sample households with completed interviews in the i-th sample EA in stratum h

5.3. Description of Public Datasets

The electronic datasets are organized by questionnaire with the following file name labels in parentheses: household (*hh*), community (*com*), post-planting agriculture (*pp*), post-harvest agriculture (*ph*), and livestock (*ls*). Data within each questionnaire do not contain any constructed variables. For example, the ESS data provide almost all the variables needed to estimate of total

household consumption, but the data set does not contain an estimated value of total consumption. The only compiled data included with the ESS files are the geospatial variables described below.

Within each questionnaire type, the data file naming scheme is a combination of the prefix '*sect*', followed by section number, and then suffix '*hh_w4*' for household wave 4 data, and '*com_w4*' for community wave 4 data. Similarly, the suffixes for post-planting, post-harvest, and livestock wave 4 data are '*pp_w4*', '*ph_w4*', and '*ls_w4*'.

For example, the data set that corresponds with section 1 of the household questionnaire is in file '*sect1_hh_w4*'. Exceptions to this rule are sections where the files are broken down even further due to different reference periods or different levels of recording the data. An example is section 6 of the household questionnaire on consumption where the section is split into 5 files with each file corresponding to the reference period collected in it. In this case, the corresponding files will be named '*sect6a_hh_w4*', '*sect6b1_hh_w4*', *sect6b2_hh_w4*', *sect6b3_hh_w4*', and *sect6b4_hh_w4*'.

Each dataset has identification variables, a rural and urban indicator variable (*saq14*), and sampling weight (*pw_w4*).

For purposes of keeping all names and addresses confidential, in the post-planting questionnaire contact addresses, field descriptions, and names of field and data entry staff have been removed from the datasets GPS coordinates have also been removed because they could be used to accurately locate households and fields. However, as a courtesy to users, geospatial variables are provided with the data described in Appendix 1.

Household data are organized in 35 data files (Table 5.1).

Table 5.1: Household Data Files

Section	Topic	Dataset Filename	Unique identification variables
Cover	Cover	*sect_cover_hh_w4*	*household_id*
1	Roster	*sect1_hh_w4*	*household_id individual_id*
2	Education	*sect2_hh_w4*	*household_id individual_id*
3	Health	*sect3_hh_w4*	*household_id individual_id*
4	Labor and time Use	*sect4_hh_w4*	*household_id individual_id*
5A	Banking and financial inclusion	*Sect5a_hh_w4*	*household_id individual_id*
5B	Financial assets	*sect5b1_hh_w4*	*household_id household_id asset_type*
5B	Financial assets	*sect5b2_hh_w4*	*household_id household_id asset_type asset_id*
6A	Food consumption last 7 days	*Sect6a_hh_w4*	*household_id item_cd*
6B	Food aggregate last 7 days	*Sect6b1_hh_w4*	*household_id food_id*
6B	Food Shared by non-household members (Filter)	*Sect6b2_hh_w4*	*household_id*
6B	Food shared by non-household members	*Sect6b3_hh_w4*	*household_id Age_Group*
6B	Food consumed outside home	*Sect6b4_hh_w4*	*household_id meal_id*

Section	Topic	Dataset Filename	Unique identification variables
7	Nonfood expenditure, one month	*Sect7a_hh_w4*	*household_id item_cd_30day*
7	Nonfood expenditure, 12 months	*Sect7b_hh_w4*	*household_id item_cd_12months*
7	Livestock and land tax	*Sect7c_hh_w4*	*household_id*
8	Food security	*Sect8_hh_w4*	*household_id*
9	Shocks	*Sect9_hh_w4*	*household_id shock_type*
10A	Housing	*Sect10a_hh_w4*	*household_id*
10B	Land parcel roster	*Sect10b_hh_w4*	*household_id parcel_id*
10C	Land and dwelling ownership and rights	*Sect10c_hh_w4*	*household_id individual_id parcel_id*
10D1	Livestock roster	*Sect10d1_hh_w4*	*household_id livestock_cd*
10D2	Livestock ownership and rights	*Sect10d2_hh_w4*	*household_id individual_id livestock_cd*
11	Assets	*sect11_hh_w4*	*household_id asset_cd*
11B	Mobiles roster	*sect11b1_hh_w4*	*household_id individual_id*
11B	Mobiles ownership and operation	*sect11b2_hh_w4*	*household_id individual_id phone_id*
12	Nonfarm enterprises participation filter	*sect12a_hh_w4*	*household_id*
12	Nonfarm enterprises roster	*sect12b1_hh_w4*	*household_id enterprise_id*
12	Nonfarm enterprises start-up barriers	*sect12b2_hh_w4*	*household_id*
13	Other income	*sect13_hh_w4*	*household_id source_cd*
14	assistance	*sect14_hh_w4*	*household_id assistance_cd*
15	Credit access filter and constraints	*sect15a_hh_w4*	*household_id*
15	Credit details	*sect15b_hh_w4*	*household_id loan_id*
16	Contact information (not public)	*Sect16_hh_w4*	*household_id*
Consumption aggregate	Consumption aggregate	*Cons_agg_w4*	*household_id*

Community data are organized in 12 data files (Table 5.2).

Table 5.2: Community Data Files

Section	Topic	Dataset Filename	Unique identification variables
1A	Cover/ identification	*Sect01a_com_w4*	*ea_id*
1B	Cover/ community overview/ observation	*Sect01b_com_w4*	*ea_id*
2	Roster of informants	*Sect02_com_w4*	*ea_id ROSTER_OF_INFORMANTS__id*
3	Community basic information/ demographics	*Sect03_com_w4*	*ea_id*
4	Access to basic services/ infrastructure	*Sect04_com_w4*	*ea_id*
5	Economic activities/ employment	*Sect05_com_w4*	*ea_id*
6	Agriculture	*Sect06_com_w4*	*ea_id*
7	Changes/events	*Sect07_com_w4*	*ea_id2 event_id*
8	Community needs	*Sect08_com_w4*	*ea_id cs8q00*
9	Productive safety net program	*Sect09_com_w4*	*ea_id*
10A	Market prices: market location	*sect10a_com_w4*	*ea_id*
10B	Market prices in market	*sect10b_com_w4*	*ea_id cs10bq02*

Agriculture data is in three folders: post-planting, post-harvest and livestock. The sections and the file names are presented in Tables 5.3, 5.4, and 5.5 below.

Table 5.3: Post-planting Agriculture Data Files

Section	Section Name	Dataset Filename	Unique Identification Variables
Cover	Cover	*sect_cover_pp_w4*	*holder_id*
1	Household roster	*sect1_pp_w4*	*holder_id s1q00*
2	Parcel roster	*sect2_pp_w4*	*holder_id parcel_id*
3	Field roster	*sect3_pp_w4*	*holder_id parcel_id field_id*
4	Crop field roster	*sect4_pp_w4*	*holder_id parcel_id field_id crop_id*
5	Seed acquisition	*sect5_pp_w4*	*holder_id s5q0B s5q01a*
7	Holder questions	*sect7_pp_w4*	*holder_id*
9a	Crop cut by field (for selected fields and crops only)	*sect9a_pp_w4*	*holder_id parcel_id field_id crop_id*

* For exceptions for this data set, see Section 7.2.

Table 5.4: Post-harvest Agriculture Data Files

Section	Section Name	Dataset Filename	Unique Identification Variables
Cover	Cover	*sect_cover_ph_w4*	*holder_id*
1	Household roster	*sect1_ph_w4*	*holder_id s1q00*
9	Harvest by field	*sect9_ph_w4*	*holder_id parcel_id field_id crop_id*
10	Harvest labor	*sect10_ph_w4*	*holder_id parcel_id field_id crop_code*
11	Crop utilization	*sect11_ph_w4*	*holder_id harvestedcrop_id s11q01*

* For exceptions for this data set, see Section 7.2.

Table 5.5: Livestock Data Files

Section	Section Name	Dataset Filename	Unique Identification Variables
Cover	Cover	*sect_cover_ls_w4*	*holder_id*
1	Household roster	*sect1_ls_w4*	*holder_id s1q00*
8.1	Livestock inventory/ ownership	*sect8_1_ls_w4*	*holder_id ls_code*
8.2	Livestock change	*sect8_2_ls_w4*	*holder_id ls_code*
8.3	Livestock breeding, health, shelter, water, and feed	*sect8_3_ls_w4*	*holder_id ls_type*
8.4	Milk and egg production, animal power, and dung	*sect8_4_ls_w4*	*holder_id ls_code*

5.4. Geospatial Data

The ESS data files also include additional geospatial data computed for data users. The geo-variables are stored in two files: field-level data (Pub_ETH_PlotGeovariables_Y4), and household-level data (Pub_ETH_HouseholdGeovariables_Y4). Appendix 1 gives information on the ESS geospatial data.

5.5. Conversion Factors for Food and Crop Local units

The list of quantities of both food consumption and crop production was greatly expanded in ESS4 because often some food and crop quantities are reported in nonstandard units. To convert from nonstandard to the better-known standard units (kilograms and liters), the data include two sets of conversion factor files: *Food_CF_Wave4.dta* ,which contains the conversion factors for quantities in the food consumption file; and *Crop_CF_Wave4.dta,* which contains crop conversion factors to be used with the agricultural module. For more information on these files and how to use them with the data, see Section 6.3.

6. Using ESS public Data

6.1. File Structure

The data should always be used in conjunction with the questionnaire and the interviewer's instruction manuals. Files organization follows the questionnaire structure: A file is a questionnaire section or subsection in the questionnaire. In addition, there are three files: two for geospatial

variables and a third for quantity (consumption and production) conversion factors. All the variables in the geospatial variable files are constructed based on GPS coordinates collected at homesteads and plots.

6.2. Merging Datasets[17]

For wave 4**,** in household and agriculture data, all households are uniquely identified by the variable *household_id*. This variable is used as the unique key variable in the merging of all household-level data files. In some datasets, where there is more than one observation per household, additional key variables may be required. With individual-level files, the variable that uniquely identifies the individual within the household is *individual_id*. In order to merge any two individual files, the variable *individual_id* would be used. In the agriculture datasets, parcel files are merged using *holder_id* and *parcel_id* and crop files by using *holder_id, parcel_id, field_id,* and *crop_code*.

The community questionnaire is administered at the EA level. A, unique EA identifier, *ea_id,* is in every data file. This variable is the concatenation of the *region, zone, wereda, town, subcity, kebele* and *EA*, and is used as the unique key variable in merging of all community-level data files. For some community datasets, additional key variables may be needed.

Due to the sequence in which the ESS visits occur (see Table 4.1), 168 households were available for post-planting and/or livestock visits but not for household and post-harvest visits. For these households, the post-planting agriculture data is included in the sample even though these households have missing post-harvest and household questionnaires.

6.3. Unit Conversion Factors

To collect the item unit weights required to calculate conversion factors, in 2014 a specialized market survey was conducted. Reference photographs were also taken for all item unit weights collected. The market survey was conducted throughout Ethiopia in an effort to capture variations in conversion factors.

The 2014 survey collected a wide array of item unit weights that were then used to calculate conversion factors. Those conversion factors for ESS4 data can be found in *Food_CF_Wave4.dta* and *Crop_CF_Wave4.dta*. In both files, separate variables have region-specific conversion factors (e.g., *mean_cf1* for Tigray). There is also a national conversion factor (*mean_cf_nat*). Where conversion factors were calculated for a particular region, the average conversion was included for the region. However, if there was no conversion found for a region, the national average was used for the region-specific conversion variables. Although these conversion factors cover a majority of the item/crop-unit combinations in the data set, there are still gaps where conversion factors are not available. There is an ongoing effort to fill these gaps and updated conversion factors will be released as they become available.

To use the conversion factors, one has to multiply a crop or food item quantity with a conversion factor. In order to do this, it is necessary to merge the relevant data set with the conversion factors data set. For example, the dataset *sect6a_hh_w4.dta* features question 2, which asks how much the

[17] Wave 4 is a baseline survey for the new ESS fixed panel and merging is only within sections in this wave.

household consumed of each food item. One household is said to have consumed 1.5 *large medeb* of onions. To convert "*large medeb*" to kg, the dataset *Food_CF_Wave4.dta* has to be merged on the item code (*item_cd_cf*[18]) and unit code (here, *s6aq03_b*), and then the quantity (here, 1.5) is multiplied with the relevant conversion factor. This could either be the conversion factor for that household's particular region/strata (variable *mean_cf4* for Oromia) or the national conversion factor (variable *mean_cf_nat)*. The same procedure can be followed to convert crop quantities using *Crop_CF_Wave4.dta* by merging crop code (*crop_code*) and unit code (*s9q05_b* in ***sect9_ph_w4.dta,*** for example)**.**

6.4. Reference Photo Album

In ESS, reference photographs have been used in collecting food consumption and crop production quantities reported in nonstandard units. The photographs depict food items or crops in nonstandard units (and, where applicable, different sizes) and were meant to ensure uniformity in the nonstandard unit amounts reported. The photos were collected systematically during the market survey when item unit weights were collected. Interviewers taking photographs were instructed to follow strict protocols, such as including a reference object (typically a standard sized bottle of water) to provide a frame of reference for the size of the unit. For units with multiple sizes, all photographs used the same reference object to make comparison easier for the respondent. The reference photos taken during the market survey were compiled into an album that was uploaded in CAPI. Item-specific photos were included for non-container units (e.g., piece, medeb, and bunch) but only one photo of containers (e.g., tassa, kunna, and jog) was included. The reference photo album used by interviewers is included with additional documentation on the website (see "Photo Aids") The procedures used for collecting reference photos and the conversion factors followed the guidelines laid out in a forthcoming guidebook being produced by the LSMS team, *The Use of Non-Standard Units for the Collection of Food Quantity: A Guidebook for Improving the Measurement of Food Consumption and Agricultural Production in Living Standards Surveys*.

[18] This variable (*item_cd_cf*) was specifically created to merge with the conversion factor files. This was necessary to account for the "other" categories where specific items were listed. For example, a common "other vegetable" reported was carrot. There is no code for carrot in *item_cd* but a code was assigned in *item_cd_cf* specifically for merging with *Food_CF_Wave4*. Codes for these "other" items are not listed on the questionnaire.

7. Problems and Challenges Faced During the fourth Wave and Recommendations for the Fifth Wave of the Survey

Designing and implementing a complex survey such as the ESS presents various challenges. In this section we outline some key issues that arose, lessons learned and make recommendations for the next wave of the survey.

7.1. Survey Instruments

The preparation of the ESS panel II was started by revising existing modules based on feedbacks from data users and policy makers in the government body and development partners. The main feedback was on updating questions based on contemporary socioeconomic definitions, status and concepts. Most of the inputs were incorporated and reflected in the questionnaires.[19]. The first stage of the preparation has also included designing and testing new modules/topics that are suggested by stakeholders (e.g. individual level disaggregated module and Tax module). The new panel, therefore, required re-write the entire format of the modules as well as the Computer Assisted Personal Interview (CAPI) program.

7.2. Fieldwork

The 2018/19 local conflicts and internal displacements happened in the country disturbed the entire fieldwork plan. In some EAs, enumerators have forced to discontinue the survey and such issues agitated the intended data collection process. There are EAs and households which are not visited for all modules due to the mentioned problem (see below). Moreover, it is significantly contributed to the delay of the fieldwork.

ESS enumerators in rural areas were also responsible for conducting AgSS interviews in their respective EAs. This was an added burden as the enumerators had to measure fields, conduct crop cuts and carryout interviews. This also plays a role to the delay of the fieldwork in these areas.

Overall, due to the large-scale nature of this survey and the 2018/19 local conflicts, not all our sampled households and EAs are covered in this round. Below is a summary of sampled EAs with partial modules completed or the whole modules missing due to security problems or natural disasters.

1. We were unable to administer any of our questionnaires in 24 EAs (4 Urban and 20 Rural). The majority of these EAs are from Benishangul Gumuz. Hence for these EAs no data is available for this round.

[19] the Labor module was revised based on concepts and definitions as endorsed by the 19th International Conference of Labor Statistics. The WASH questions were updated based on the SDG WASH targets. Items in the consumption module were revised based on patterns in the recent national Household Consumption and Expenditure Survey (HCES).

2. Five sampled EAs have all agriculture modules but household questionnaire is not administered due to ethnic or political unrest. Therefore, for the households in these EAs household data is missing and we have only agriculture data.

3. We were unable to visit and collect data in 2 sampled EAs during HH and PH visits. On modulus during the PP visit is completed for these EAs. Hence for the households in these EAs we have only PP and Livestock data and the rest is missing.

4. We were unable to visit and collect data in 7 sampled EAs during PH visits. All other modules are collected. Hence, for these households we have all the data except PH data.

5. We were unable to visit and collect all agriculture modules for 3 sampled EAs but we have collected only household questionnaire data.

6. About 62 households have moved out from their original EA between PP and HH visit. Hence for these households we have only Agriculture questionnaires, and their household questionnaire data is missing.

Appendix 1: Geospatial Data with the ESS

The ESS collects confidential information on respondents. The confidential variables pertain to (i) names of the respondents to the household and community questionnaires, (ii) village and constituency names, (iii) descriptions of household dwelling and agricultural field locations, (iv) phone numbers of household members and their reference contacts, (v) GPS-based dwelling and agricultural field locations, (vi) names of the children of the head/spouse living elsewhere, (vii) names of the deceased household members, (viii) names of individuals listed in the network roster, and (ix) names of field staff. To maintain confidentiality, this information is not included in the ESS public use data.

To increase the use of the ESS data, a set of geospatial variables has been provided by using the geo-referenced field and dwelling locations in conjunction with various spatial databases that were available to the survey team. These include measures of distance, climatology, soil and terrain, and other environmental factors. Time-series on rainfall and vegetation have also been used to describe the survey agricultural season relative to normal conditions. These variables are intended to provide some understanding of how geophysical characteristics vary at the landscape level. The two tables below provide the name, type, source, reference period, resolution, description, and source of each variable. All geospatial variables have been produced using the unmodified GPS data.

Pub_ETH_PlotGeovariables_Y4

The field-level geo file Pub_ETH_PlotGeovariables_Y4 contains four geospatial variables measuring field distance to household, slope, elevation and potential wetness index for field locations. The observations are uniquely identified by the combination *of holder_id, household_id, parcel_id* and *field_id*. The observations included in this file are fields that are owned and/or cultivated by the household and that have been visited for GPS-based land-area measurement.

Pub_ETH_HouseholdGeovariables_Y4

The household-level geo file Pub_ETH_HouseholdGeovariables_Y4 contains a range of variables measuring (on the basis of the household dwelling) distance to main points, climatology, landscape typology, soil and terrain, and crop season parameters. The observations are uniquely identified by the ESS household id.

To partially satisfy user interest in geo-referenced location, while preserving the confidentiality of sample household and communities, modified EA-level coordinates are provided as part of the household geospatial variable table. Modified coordinates are generated by applying a random offset within a specified range to the average EA value (following the Measure-DHS approach).

More specifically, the coordinate modification strategy relies on random offset of EA center-point coordinates (or average of household GPS locations by EA in ESS) within a specified range determined by the urban and rural classification. For urban areas, an offset range of 0-2 km is used. In rural areas, where communities are more dispersed and risk of disclosure may be higher, a range of 0-5 km offset is used. Additionally, an offset range of 0-10 km is applied to 1% of EAs, effectively increasing the known range for all points to 10 km while introducing only a small

amount of noise. Offset points are constrained at the zone level, so that they still fall within the correct zone for spatial joins, or point-in-polygon overlays. The result is a set of coordinates, representative at the EA level, that fall within known limits of accuracy. Users should take into account the offset range when considering different types of spatial analysis or queries with the data. Analysis of the spatial relationships between locations in close proximity would not be reliable. However, spatial queries using medium or low resolution datasets should be minimally affected by the offsets.

Appendix 2: How to Obtain Copies of the Data

The data are available through the CSA web site:

http://www.csa.gov.et/ or http://www.statsethiopia.gov.et/

or through the World bank micro data library website:

https://microdata.worldbank.org/

Users do not need to obtain the permission of the CSA to receive a copy of the data but will be asked to fill in a data access agreement. In this agreement, users agree to: (a) cite the Central Statistical Agency of Ethiopia as the collector of the data in all reports, publications and presentations; (b) provide copies of all reports publications and presentation to the Central Statistical Agency (see address below) and the Development Data Group Division of the World Bank (see address below); and (c) not pass the data to any third parties for any reasons.

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