LIBERIA INSTITUTE OF STATISTICS AND GEO-INFORMATION SERVICES

HOUSEHOLD INCOME AND EXPENDITURE SURVEY (HIES 2016)

BASIC INFORMATION DOCUMENT

September 2017

ACRONYMS

AfDB	African Development Bank
CV	Coefficient of Variation
CWIQ	Core Welfare Indicator Questionnaire
EA	Enumeration Area
EU	European Union
GoL	Government of Liberia
GIS	Geographic Information System
GPS	Global Positioning System
HIES	Household Income and Expenditure Survey
LISGIS	Liberia Institute of Statistics and Geo-Information Services
NGO	Non-governmental Organization
PSU	Primary Statistical Unit
SIDA	Swedish International Development Agency
UNMIL	United Nations Mission in Liberia
USAID	United States Agency for International Development
WB	World Bank

Table of Contents

INTRODUCTION

The purpose of this document is to provide detailed information on the 2016 Liberia Household Income and Expenditure Survey (HIES). The main objectives of the 2016 HIES include the following: to capture impacts of seasonality on consumption data; to construct the CPI basket and weights and calculation of poverty numbers; to allow for county level estimates to be obtained for key indicators including poverty; and for the collection of comprehensive nationally representative agricultural statistics. The project was implemented by the Liberia Institute of Statistics and Geo-Information Services (LISGIS), with support from the Government of Liberia (GoL), the World Bank (WB), the European Union (EU), the Swedish International Development Corporation Agency (Sida), the United States Agency for International Development (USAID) and the African Development Bank (AfDB).

Data collection activity began in January 2016 and was completed in January 2017.

Rerun of Household Income & Expenditure Survey 2016

Following the early halt of the HIES 2014, after deliberations between LISGIS, the GoL, and the development partners, it was agreed that a full 12-month rerun of the HIES would be required to meet the objectives originally set out for the survey. As such, the government and donors pooled resources to provide supplementary funding for the rerun of the HIES, which began in January 2016. The re-run uses the same sample methodology and design as the 2014 survey, which allows for nationally representative data to be collected each quarter, and inclusive of all twelve months, enough observations for key indicators to be estimated at the county level.

A new addition to the 2016 HIES is the Agriculture Recall questionnaire. The Agriculture module of the HIES encompasses the use of two methods, the crop-cutting method and the farmer recall method. Allowing for comparison between the two methods and for results to inform future best practices in agricultural data collection in Liberia. The Agriculture Recall questionnaire is administered alongside the Household questionnaire to reduce the number of visitations to a household, reduce attrition, and to take advantage of cost sharing through implementation of two questionnaires in the same set of logistics, to this end, the number of field teams were increased from 12 to 14.

CHARACTERISTICS OF THE SURVEY

The field work for the HIES was designed to be implemented throughout a twelve-month period in order to reflect seasonality in expenditures and income throughout a full calendar year. The household questionnaire has twenty thematic sections, described in Table 1; while the agriculture recall questionnaire has twelve thematic sections as described in Table 2.

Household Questionnaire

Table 1: Household Questionnaire Structure

Section	Name	Level of Observation	Description
A-1	Household Identification	Household	Cover page, identification information on location of the household
A-2	Survey Staff Details	Household	Details on survey staff including who implemented the questionnaire and supervised the work, and completed data entry, date and time of interview, and observation notes by enumerator regarding the interview
B	Household Member Roster	Individual	Socio-demographic characteristics of household members (gender, age, relationship with household head, etc.)
C	Education	Individual	Highest education level achieved for those no longer attending school, and the enrolment status and education level of those still attending school, and education expenditures
D	Health	Individual	Recent use of health services, use of mosquito nets, reproductive health for women 12 to 49 years of age, incidence of diarrhea for children under 5 years of age, and health expenditures
E	Labour	Individual	Employment status, economic activity, occupation, and earnings
F	Food Consumption Outside the Household	Individual	Expenditures on meals, snacks and drinks consumed outside of the household
G	Subjective Welfare	Individual	Respondents' opinions of their welfare situation, for those respondents 15 years and above
H	Family/Household Non-Farm Enterprises	Household	Non-agricultural income generating enterprises which produce goods or services operated by the household
I	Food Security	Household	Assesses the household's ability to provide sufficient food for its members during the past seven days, and what was done to alleviate any problems
J	Housing, Water & Sanitation	Household	Information about the dwelling and its access to water, electricity, fuel and expenditures on services
K	Food Consumption	Household	Household's consumption of food within the household during the last seven days and the amount spent on the food that was consumed
L1	Non-Food Expenditures (past 7 days, past 30 days)	Household	Non-food items that are purchased on a regular basis and the expenditures on those items
L2	Non-Food Expenditures (past 12 months)	Household	Non-food items that are purchased infrequently and the expenditures on those items
M	Household Assets	Household	Assets owned by the household and their values
N	Assistance, Groups and Other Sources of Income	Household	Assistance in the form of cash or in-kind that has been received in the past 12 months
O	Credit	Household	Funds borrowed from someone outside of the household or from an institution in the form of cash

			goods or services
P	Cash and Gift Transfers	Household	Cash or goods received from other households and cash or goods sent to other households (nationally and internationally)
Q	Recent Shocks to Household Welfare	Household	Shocks that may have been felt by the household and how that shock affected income and/or assets
R	Agric. Crop Production	Household	Production of agricultural crops during the last twelve months
S	Household Re-contact Information	Household	GPS location of the dwelling and how to re-contact the household in the future if needed

Agriculture Recall Questionnaire

Table 2: Agriculture Recall Questionnaire Structure

Section	Name	Level of Observation	Description
1	Household Identification	Household	Cover page, identification information on location of the household
1.a	Instructions	Household	Details on survey staff including who implemented the questionnaire and supervised the work, and completed data entry, date and time of interview, and observation notes by enumerator regarding the interview
2	Household Member Roster	Individual	Socio-demographic characteristics of household members (gender, age, relationship with household head, etc.)
3	Farm Roster	Household	List of all farmland cultivated by any member of the household during the last completed farming season
4	Farm Details	Household	Ownership/ management status of the farm and all other relevant details of the farm
5A	Kuu/Hired Labour on Farm	Household	Information on household's use of kuu or hired labour for land clearing (brushing, burning, etc.) for any of your household's farms in the last completed farming season
5B	Household Labour on Farm	Household	Farm management (weeding, fertilizing, fencing, other activities)
6	Annual Crops by Farm	Household	Considers the list all farms from section 4 which have annual crops in this section and does not include cassava or permanent / tree crops in this section
7	Cassava by Farm	Household	List of only farms with cassava planted on them in this section.
8	Tree/Permanent Crops by Farm	Household	List of all farms with tree/permanent crops on them in this section
9	Crops-Sales/Storage	Household	Provides details on the total sales and storage
10A	Livestock	Household	Ownership of livestock by the household
10B	Livestock Products	Household	Production of livestock products by the household (Eggs, meat, honey, etc.)
11	Farm Implements and Machinery	Household	Provides details of farm implements used or owned by the household in the last 12 months
12	Effects of Ebola Crisis	Household	Available information of the EVD on farming activities of the household

Alongside the household and agriculture questionnaires, a Market Price Questionnaire was implemented at the market level (Table 3)[1]. Each field team completed a total of two market price questionnaires each month. The objective of the Price Questionnaire is to collect price data for use by the Government of Liberia in determining the level of prices for various items in local markets in the country. This price questionnaire allows for data to be captured to reflect regional and temporal price variations. Furthermore, market price data could feed into calculations for baseline Consumer Price Indices (CPI) that may be developed for each region of the country. Table 3 outlines the structure of the Market Price Questionnaire. The first page is the cover page and collects data on the geographical location (codes) in which the market is, as well as the date of interview and the GPS coordinates. The following pages aim to collect price and quantity data on all food items listed in Section K of the household questionnaire.

Table 3: Market Price Questionnaire

Section Name	Level of Observation	Description
Market Identification	Market	Cover page, identification information on location of the market and date of data collection
Market Prices (Vendor 1)	Market	Price and quantity data from first vendor
Market Prices (Vendor 2)	Market	Price and quantity data from second vendor
Market Prices (Vendor 3)	Market	Price and quantity data from third vendor

The questionnaires and survey tools were prepared by LISGIS through a process of extensive consultations with various stakeholders such as line ministries and agencies, donor organizations, and NGOs.

SAMPLING FRAME FOR THE 2016 HIES

The sampling frame for the 2016 HIES follows the same structure as the 2014 HIES, which was based on the data and cartography from the 2008 Liberia Population and Housing Census. Liberia is divided administratively into 15 counties, with a total household population of 3.4 million (Table 4). This figure excludes the population living in institutions such as hospitals, schools and other public institutions. Each county is divided into districts, which are further subdivided into clans, and eventually into small operational areas, known as Enumeration Areas (EAs). The EAs have an average of 96 households each (103 for urban EAs and 88 for rural EAs). There are a total of 7,012 EAs in the 2008 Liberia Census frame (3,655 urban EAs and 3,357 rural EAs). Localities having a population of less than 2,000 are classified as rural, while those having 2,000 or more are classified as urban areas. However, regardless of population

---

[1] In the HIES 2014 this questionnaire was called the 'Community Price Questionnaire', the format and question remain the same.

size, localities are classified as urban if they are county capitals or other important towns.

Table 4: Distribution of Total Household-Based Population by County and Urban/Rural Stratum Based on 2008 Liberia Census

County	Total		Urban		Rural
	Population	% Total Population	Population	% Urban Population in country	Population
Bomi	83,033	2.4	14,314	17.2	68,719
Bong	328,668	9.6	127,572	38.8	201,096
Gbarpolu	80,186	2.3	11,950	14.9	68,236
Grand Bassa	217,230	6.3	69,711	32.1	147,519
Grand Cape Mount	125,329	3.7	9,176	7.3	116,153
Grand Gedeh	122,913	3.6	51,120	41.6	71,793
Grand Kru	57,650	1.7	3,073	5.3	54,577
Lofa	273,990	8.0	98,384	35.9	175,606
Margibi	207,146	6.0	102,998	49.7	104,148
Maryland	134,279	3.9	61,323	45.7	72,956
Montserrado	1,105,966	32.3	1,042,682	94.3	63,284
Nimba	454,881	13.3	272,376	59.9	182,505
River Gee	64,330	1.9	19,457	30.2	44,873
Rivercess	69,844	2.0	2,212	3.2	67,632
Sinoe	101,068	2.69	13,229	13.1	87,839
Total	3,426,513	100	1,899,577	100	1,526,936

Stratification of the Sampling Frame for the 2016 HIES

To increase the efficiency of the sample design for the 2016 HIES, the sampling frame of EAs was divided into strata that are as homogeneous as possible. The first level of stratification corresponds to the geographic domains of analysis defined for the 2016 HIES, which are the counties. The urban and rural areas are also considered domains at the national level. Therefore, the sampling frame of EAs was stratified by county, and urban and rural areas. In this case, the urban and rural stratum within each county is treated as a sampling stratum but is not a domain of analysis. Within the urban and rural part of each county, the EAs were further sorted by district, clan and EA codes to ensure that the sample is geographically representative. This provides additional implicit geographic stratification.

Sample Size and Allocation for 2016 HIES

For the HIES, the number of geographic domains of analysis is the main determinant of the sample size and allocation, since a minimum level of precision is needed in each county. First, the results of the Coefficients of Variation (CVs) for the estimates of average annual household consumption from the 2007 CWIQ Survey were examined. It was determined that a minimum sample of 500 households should be selected for each county to ensure that the estimate of the average annual household consumption

would have a CV within 10 percent at the county level. For Greater Monrovia, the sample size was increased to 1,000 households given the higher CV and design effect for this domain. At the same time, the resource constraints and considerations for data quality limited the overall sample size to under 8,500 households.

An important aspect of the sample design is to determine the optimum number of sample households to select in each sample EA. This affects both the sampling efficiency as well as the cost of the fieldwork because a lower number of households per Primary Statistical Unit (EA) imply that more sample PSUs need to be enumerated. It is also important to consider the allocation of the sample over the four quarters of the year in order to have a nationally representative subsample of EAs assigned each quarter. This will ensure that the sample represents seasonality and will make it possible to produce quarterly estimates for key indicators.

Taking into consideration all of these factors, a sample of 52 EAs and 520 households were allocated to each county except for Montserrado in which a sample of 100 EAs and 1,000 households was allocated for Greater Monrovia and a proportional sample of 8 EAs and 80 households was assigned to the remainder of Montserrado. In this case Greater Monrovia and the entire county of Montserrado represent overlapping domains, where Greater Monrovia is one of the regional domains and Montserrado is one of the county domains. Therefore, the total sample size for the 2016 HIES is 8,360 sample households in 836 sample EAs.

The next step is to allocate the sample to the urban and rural strata within each county. Based on the distribution of the frame, an effective determination was to allocate the sample EAs within each county approximately in proportion to the number of sample households. This would provide sampling efficiency for both the national and county level estimates. Although some counties have a small proportion of urban households, the urban and rural estimates will only be tabulated at the national level. It was also practical to ensure that the number of EAs allocated to each stratum is a multiple of 4 in order to define a nationally representative subsample of EAs each quarter across all strata in the sampling frame. This sample allocation made it possible to obtain reliable results from the 2016 HIES data for the six regions of Liberia, so that they will be directly comparable to the corresponding results from the 2007 CWIQ Survey. The region of Greater Monrovia is treated as a separate stratum within Montserrado County, and the remaining regions are combinations of the county strata.

Table 5: Allocation of Sample EAs and Households for 2016 HIES by County and Urban/Rural Stratum

County	Total		Urban		Rural	
	Sample EAs	Sample Households	Sample EAs	Sample Households	Sample EAs	Sample Households
Bomi	52	520	8	80	44	440
Bong	52	520	20	200	32	320
Gbarpolu	52	520	8	80	44	440
Grand Bassa	52	520	16	160	36	360

Grand Cape Mount	52	520	4	40	48	480
Grand Gedeh	52	520	24	240	28	280
Grand Kru	52	520	4	40	48	480
Lofa	52	520	20	200	32	320
Margibi	52	520	24	240	28	280
Maryland	52	520	24	240	28	280
Greater Monrovia	100	1,000	100	1,000	-	-
Montserrado w/o Monrovia	8	80	4	40	4	40
Nimba	52	520	32	320	20	200
River Gee	52	520	16	160	36	360
Rivercess	52	520	4	40	48	480
Sinoe	52	520	8	80	44	440
Total	836	8,360	316	3,160	520	5,200

In order to determine the level of precision that can be expected for the estimate of average annual household consumption by domain based on the proposed sample size and allocation for the 2016 HIES, a simulation study was conducted using the data from the 2007 CWIQ Survey to estimate the intra-class correlation coefficients, in order to calculate the approximate design effects based on the 2016 HIES sample design. The formula used for a simulation study to estimate the approximate standard errors, CVs and 95 percent confidence intervals for the estimates of the average annual household consumption by county based on the proposed sample design for the 2016 HIES reveals that the approximate CVs are within 12 percent for all counties, and are less than 10 percent for most counties. The updated sampling frame for the 2016 HIES may result in slightly lower design effects, so the CVS for the survey estimates for some counties may actually be lower than 10-12 percent. Therefore, this simulation study validates the proposed sample design for providing reliable county-level results for the 2016 HIES.

Similar estimates are expected for the level of precision for the estimates at the national, urban/rural and regional levels (Table 6). The approximate CVs for all regions except for Greater Monrovia are less than 6 percent, given that these regions are combinations of counties. In the case of Greater Monrovia, the expected CV is approximately 12.5 percent, which is a considerable improvement compared to the CV of 15 percent for this domain from the 2007 CWIQ Survey. Given the updated sampling frame based on the 2008 Liberia Census and a higher level of quality control to reduce non-sampling errors, the actual CV for Greater Monrovia from the 2016 HIES data may be lower than 12 percent.

Table 6: Regional definitions by County

Region	Counties
North Western	Bomi, Grand Cape Mount, Gbarpolu
South Central	Rural Montserrado (excluding Greater Monrovia), Margibi, Grand Bassa
South Eastern A	River Cess, Sinoe, Grand Gedeh
South Eastern B	Rivergee, Grand Kru, Maryland

North Central	Bong, Nimba, Lofa
Montserrado	Montserrado

Sample selection procedures

The sample selection methodology for the 2016 HIES is based on a stratified two-stage sample design. The procedures used for each sampling stage are as follows:

i. First stage

Selection of sample EAs. The sample EAs for the 2016 HIES were selected within each stratum systematically with Probability Proportional to Size from the ordered list of EAs in the sampling frame. They are selected separately for each county by urban/rural stratum. The measure of size for each EA was based on the number of households from the sampling frame of EAs based on the 2008 Liberia Census. Within each stratum the EAs were ordered geographically by district, clan and EA codes. This provided implicit geographic stratification of the sampling frame.

Listing of households in sample EAs. A household refers to people who live together and share income and basic needs, or share the same center of production and consumption. This can refer to people who live together in one dwelling, or in multiple dwellings within a compound, who share income and basic resources. A listing of dwellings, and households within each dwelling, was conducted in each sample EA prior to the 2016 HIES data collection in order to select the sample households. The supervisor alongside the GIS specialist verified the boundaries of the sample EA in order to ensure accurate coverage of the listed households. The number of households listed in each sample EA was compared to the corresponding number from the frame, and any large differences were investigated.

ii. Second stage

Selection of sample households within a sample EA. A random systematic sample of 10 households were selected from the listing for each sample EA. Using this type of table the supervisor only has to look up the total number of households listed, and a specific systematic sample of households is identified in the corresponding row of the table.

Selection of households for replacement. For the 2016 HIES there were plans to replace any sample household that could not be interviewed. A strong attempt was made to interview the original sample households, and any replacement was controlled by the supervisors and the HIES project management team based in LISGIS headquarters. A reserve of random households that was used for possible replacement was selected for each sample EA prior to the survey, at the same time as the selection of the original sample of households.

Distribution of the sample EAs over the 12 months. The HIES was designed to be representative over space and time to account for seasonality in income and consumption. Therefore, it is important to have a representative sample of EAs and households at the national level each quarter. The number of sample EAs allocated to each stratum is a multiple of 4 so that it will be possible to assign a nationally representative replicate of sample EAs to each quarter for the data collection. Each sample EA was systematically assigned replicate codes from 1 to 4 in each stratum in the same order in which they were selected. One replicate was randomly assigned to each quarter. Four nationally representative replicates of 209 sample EAs each were defined in an Excel file with the sampling frame information for all 836 sample EAs. Within each quarter, the schedule of EA visits was randomized over the three-month period.

PILOT TEST

The Household and Market Price questionnaires had been extensively piloted during the 2014 HIES. For the 2016 HIES rerun, revision of the Household and Price questionnaires were adapted from the feedback received during the 6 months 2014 HIES. The newly designed Agriculture Recall survey was piloted September 2015, as this was an additional questionnaire added during the 2016 HIES rerun.

Please see Appendix 2 for further detail on Questionnaire Design and Piloting.

FIELD STAFF RECRUITMENT AND TRAINING ACTIVITIES.

Recruitment Process for the Field Teams

The recruitment process for the HIES involved the participation of LISGIS HIES Technical Committee, LISGIS Management, LISGIS County Offices and the United Nations Mission in Liberia (UNMIL). The recruitment for the HIES was a rigorous and transparent process, involving many stages and types of evaluation, which aimed to narrow down the pool of potential candidates, and select the most qualified for the vacancies of Supervisors, Enumerators, GIS Staff and Data Entry Clerks.

The following staff needed to be recruited in order to complete data collection for the HIES:
- 14 Supervisors
- 14 GIS Staff / Enumerators
- 56 Enumerators
- 14 Field Data Entry Clerks
- 14 Drivers

This would make up 14 teams, each consisting of 1 Supervisor, 5 Enumerators (including 1 GIS Staff), 1 Data Entry Clerk and 1 Driver.

Call for Applications

The Liberia Institute of Statistics & Geo-Information Services (LISGIS) began the recruitment of field staff for the 2016 HIES on Thursday, October 15, 2015 by publishing Requests for Expression of Interest (REOI) in two local widely read daily newspapers, The Informer Newspaper and the Inquirer Newspaper. The REOI was published in each newspaper on three different days each. Interested applicants had to submit their Expressions of Interest (EOI) by the October 22nd to LISGIS Personnel division. It was agreed with the World Bank Task Team Leader on the project that the period for receipt of applications could be reduced to a one-week period as opposed to the usual period required by World Bank procurement rules. This was the case to allow for a timelier recruitment process.

Based on experience of incredibly large numbers of applicants (approximately 2,000) in 2013 during the recruitment for the HIES 2014, in order to maintain timely completion of the recruitment process and a high caliber of applicant, HIES Project secretariat formed the REOI to specify that applicants MUST be college graduates and have had experience in data collection, preferably with LISGIS. In addition, applicants were asked to submit an essay (minimum one page long) on the "Importance of Statistics in the Development of Post-war Liberia". Therefore, at the close of business on October 22, LISGIS through her personnel division had received a total of 115 applicants through hard and soft copies.

The very first step in the recruitment process which must be stated here due to its importance was calling of ALL 2013/2014 field staff to allow the secretariat understand how many were available to work in the re-run and how many new staff they would be hiring. After the Ebola Virus Outbreak, the 2014 field staff were given the assurance through a written letter that they would be contacted in case there was a re-run. Therefore, they were all called and given the chance to state whether they would be available for training and placement after the training. However, it was made clear to ALL old staff that coming to the training was not a guarantee for the job, but rather they had to work hard and pass in all exams and practical works.

In order to promote transparency in the recruitment process, the reviewing of applications and shortlisting of candidates for the training was carried out by the HIES secretariat led by the Resident Advisor and the ODI fellow at LISGIS. This allowed for high level of transparency in the process. A total of 38 highly qualified applicants (according to CVs and essay) were selected to form part of the training together with the old HIES field staff who were available to partake in the re-run. The total participants for the training therefore totaled 130. This number included 16 GIS staff, 28 Data entry staff and 88 field staff that will serve as Enumerators and Supervisors.

Classroom Training (December 1-22, 2015)

The Classroom training began on Tuesday, December 1, 2015 in Kakata, Margibi County with a formal opening ceremony which also commemorates the African Statistics Day Celebration. Donor partners, stakeholders, County officials, Government Ministries and Agencies, student groups and the media graced the opening ceremony and immediately following the opening, the training sessions began.

Overall, due to the bulkiness of the household questionnaire and the inclusion of the Agriculture Recall questionnaire coupled with the Price questionnaire, the total facilitators were 16 (all facilitators were part of the TOT that took place at LISGIS during the first & second weeks of November), being led by the Resident Advisor Sehr Syed. A total of 3 Evaluators were also in attendance, and the presence of the Ag Recall Expert Lena Nguyan give a boost to the agriculture portion of the training (please see attached list of facilitators). The World Bank Poverty Expert Kristen Himelein also visited Liberia during the training and attended for two days giving clarification on some issues and also commended the field staff for the 2014 data collection. The classroom training lasted for Three (3) weeks, Dec. 1-22, while the Field training lasted for Six (6) days, Dec. 26-31.

The training started off with the household questionnaire which took the first 10 days after which the recall questionnaire was next. During training days, according to schedule, exams were given on various sections taught in order to test the participants' and ranking was done on a daily basis and shared with ALL participants (see training schedule). For more transparency, ALL exams were drawn and marked by the Resident Advisor, the ODI fellow and the Ag Recall Specialist. Also, ID numbers were given to all participants and were being used in place of their names during exams. A final ranking of all participants were done on the last day of the classroom training based on all their exams and tests results. Participants were ranked from 1 to 138, with 1 being highest and 138 being the lowest. Also, at the formal closing of the classroom training, participants ranking from 1 to 5 were given gifts as a way of encouraging them.

Rules and regulations were put in place to ensure that ALL participants attended all sessions and signed into attendance. Time was made available each day for re-cap of the previous day and the clarification of past sessions during questions and answers period.

Field Training & Practical exercises

The field training began on December 26, 2015. This was after a brief Christmas break after which time all facilitators and participants met in Kakata on the morning of December 26 for departure to various selected EA with questionnaires for testing. The testing was carried out at all levels: for example, GIS staff were to do canvassing and

selection of EA and listing. Also, they were expected to act as enumerator, a role they played in the field.

Data entry staff were also expected to do entry of the questionnaire to test their speed and accuracy. Enumerators were monitored by their facilitator assigned in order to review and access their interview skills which was the most important aspect of the field practice.

EAs selected for enumeration during the filed testing were the ones not forming part of the HIES main sample.

DATA COLLECTION

The total sample size of 836 EAs for the HIES was evenly divided into four quarters, with the intention to enumerate 209 EAs each quarter. In every EA, the team first found a place to stay, and then contacted the town/village/EA head to explain the purpose of the survey and to seek permission to conduct the interviews. Once the necessary permissions were granted, a listing activity was undertaken. The team identified the boundaries of the EA and then listed every single structure, and every household within each structure, found in the EA. Each structure was marked using a dry permanent marker in order to be identifiable for enumeration. Once all households in an EA were listed, a randomized table was used for selecting the ten households to be interviewed. Section A was filled in by the enumerator and contained identification on the household, then Sections B to G were administered to all household members, with the exceptions of those questions that are targeted at specific age groups or gender. From Section H onwards, the most informed member of the household was interviewed about household related matters.

Fourteen teams were put in place for the collection of data from 209 EAs in each quarter. Each team included one Supervisor, one GIS Expert, one Data Entry Clerk, four Enumerators and one Driver. The total number of field personnel for the fourteen teams was 112.

Each team covered approximately 14-15 EAs. The order of visiting the EAs was randomized for each team in order to minimize any self-selection biases due to locational preferences.

First Quarter

Fourteen field teams, consisting of 112 staff in total, were deployed on Thursday 14th January 2016. Three monitoring teams of LISGIS staff trained in the questionnaires, GIS and data entry were deployed on 15th January to immediately monitor field teams and provide further training in the field.

Data Collection for Quarter 1 was completed as scheduled, i.e. all 209 EAs scheduled for data collection in the first three months of the survey were enumerated in line with the prescribed randomised visitation calendar. In addition, the full number of price questionnaires were administered (84).

Second Quarter

Data collection for the second quarter was scheduled to begin on 15th April 2016, however due to some delays related to late payment from PFMU, vehicle servicing, and slight lags in the completion of data collection from the first quarter, all fourteen field teams began work in the second half of April, some delays occurred because of delays in payment of field staff.

Third Quarter

Data collection for the third quarter was scheduled to begin on 15th July 2016. Since all field teams were complete with their second quarter a few days early, the HIES management team conducted a comprehensive daylong refresher training for all field staff between 2nd and 3rd quarter data collection. During this session feedback was provided on particular team's performances and in some cases particular enumerators performances where performance was noticeably weak. Following this, the field teams left with a little delay due to delayed bank transfer payments.

Fourth Quarter

Data collection for the fourth quarter was scheduled to begin on 15th October 2016, however due to delays in the processing of field staff payments by the MFDP PFMU, field teams left 12 days later than scheduled.

CHANGES TO THE DATA COLLECTION SCHEDULE Q1 TO Q4

During data collection, some teams reported problems with their sample Enumeration Areas. Most of the time, the change was necessitated because the whole EA had been abandoned or destroyed and hence did not have enough inhabitants to conduct the survey. Checks were made to ensure that the team went to the correct EA by asking them to capture and send the GPS coordinates within the EA to HQ, the GIS department then proceeded to check whether the GPS coordinates actually fell within the EA. Furthermore, where possible photographs were taken and sent to HQ, though in some cases this didn't make sense since a high bush had grown all over some of the abandoned EAs. In only one case, the EA was completed wrongly in Q2 instead of Q4.

In all such cases, the HIES team discussed a way forward with the sampling expert, David Megill, and agreed that replacement EAs within the same stratum be selected. All such abandoned EAs are detailed below in Table 7.

Table 7: Replacement EAs in 2016-2017

Qua-rter	Order of EA in Schedule	Original EA	County	District	Clan	Replacement EA	Comments
Q2	EA #6	1210002032	Grand Cape Mount	Tewor	Passawe	1210002182	EA was abandoned
Q2	EA #3	1818003012	Grand Kru	Kpi	Arnaken	1818003012	There were only 7 households left in this EA. The enumerators surveyed all the households
						1814001012	The remaining 3 households were conducted in this EA. Which turned out to be an EA scheduled for completion in Q4. Therefore, it was further replaced (see below)
Q3	EA #7	0604002141	Bong	Jorquelleh	Jorpolu	0604002111	EA was abandoned
Q4	EA #3	2402001101	Margibi	Firestone	Harbel	2402001091	EA was destroyed by the Firestone company
Q4	EA #5	0614002361	Bong	Suakoko	Suakoko	0614002281	EA was abandoned
Q4	EA #1	2712002092	Maryland	Pleebo/ Sodoken	Gedetarbo	2712002022	EA was abandoned
Q2	EA #3	1814001012	Grand Kru	Wlogba	Gballah	1814002012	EA was completed in Q2 by mistake
Q4	EA #3	2402001091	Margibi	Firestone	Harbel	2402001061	This was originally a replacement EA, but this EA was also destroyed by the Firestone company, and hence was further

							replaced.

As is indicated in the table above, there were a total of 8 EAs replaced during the year-long exercise. Four EAs were replaced because no households were living within the area, i.e. abandoned. It seems like the main reason for this is because of the Ebola Virus outbreak.

One EA (1818003012) had only 7 households left and therefore the team interviewed all those households. The team was then instructed to interview three more households from a replacement EA (1814001012). Unfortunately, this EA was wrongly chosen, as it was already slated to be enumerated in Q4. This mistake was not discovered until the EA was completed. Hence, in Q4, the EA was further replaced by another EA (1814002012). This double counting error required one EA dataset to be dropped from the sample. Therefore, the total sample size for the 2016 HIES is 8,350 sample households in 835 sample EAs.

In addition, due to this switch, the team was instructed to conduct a market price questionnaire in the 13th EA in their schedule instead which is also a rural EA in Grand Kru County (EA ID: 1820001032).

In another EA, ID number 2402001101, all the houses were destroyed by the company Firestone, as they had moved the inhabitants to another location so they can rebuild the area. When this was reported, another EA from the same stratum was selected as a replacement (2402001091). This EA, however, also had the same place; it was also destroyed by the Firestone company. Therefore, it was also replaced with a new EA (2402001061). Fortunately, this EA was intact and the team was able to enumerate the area following protocol.

DATA PROCESSING

The Data Entry Clerk for each team, using data entry software called CSPro, entered data for each household in the field. For each household, an error report was generated on-site, which identified key problems with the data collected (outliers, incorrect entries, inconsistencies with skip patterns, basic filters for age and gender specific questions etc.). The Supervisor along with the Data Entry Clerk and the Enumerator that collected the data reviewed these errors. Callbacks were made to households if necessary to verify information and rectify the errors while in that EA.

Once the data were collected in each EA, they were sent to LISGIS headquarters for further processing along with EA reports for each area visited. The HIES Technical committee converted the data into STATA and ran several consistency checks to

manage overall data quality and prepared reports to identify key problems with the data set and called the field teams to update them about the same. Monthly reports were prepared by summarizing observations from data received from the field alongside statistics on data collection status to share with the field teams and LISGIS Management.

A second round of data entry was then conducted in LISGIS Headquarters. The completed questionnaires are received at LISGIS Headquarters on a rolling basis. These were sorted and assigned to a team of 10 data entry clerks who reentered the questionnaires, independently of the first round, using the same CSPro data entry software.

Both first and second data entry of the Market Price Questionnaire were completed in LISGIS Headquarters.

Once all data had been entered twice, first and second data entry were compared observation by observation. Where values that did not match, the original questionnaires were pulled out for a final verification of the correct value, this was then recoded in STATA.

BASIC COUNTS

Table 8: Basic Counts

	Total	Urban	Rural
Total Households	8,350	2,780	5,570
Total Individuals	36,308	11,972	24,336
Male	17,987	5,745	12,242
Female	18,321	6,227	12,094
Individuals by Age			
Less than 5	5,813	1,600	4,213
5 and older	29,273	10,019	19,254
10 and older	23,243	8,158	15,085
Females 12-49	9,214	3,485	5,729
Completed household questionnaire modules (either household or individual level)			
Section B	**36,308**	11,972	**24,336**
Section C	36,308	11,972	24,336
Section D	36,308	11,972	24,336
Section E	36,308	11,972	24,336
Section F	36,308	11,972	24,336
Section G	36,308	11,972	24,336
Section H	5,317	2,127	3,190
Section I1	8,349	2,780	5,570
Section I2	4,598	1,264	3,334
Section J1	8,350	2,780	5,570

Section J2	8,350	2,780	5,570
Section K	8,350	2,780	5,570
Section L1	8,350	2,780	5,570
Section L2	8,350	2,780	5,570
Section M	8,350	2,780	5,570
Section N	8,350	2,780	5,570
Section O	8,350	2,780	5,570
Section P	8,350	2,780	5,570
Section Q	8,350	2,780	5,570
Section R	8,350	2,780	5,570
Section S	8,350	2,780	5,570
Completed price questionnaire modules			
Cover*	930	372	558
Vendor1	310	124	186
Vendor 2	310	124	186
Vendor 3	310	124	186
Completed consumption aggregate calculation			
Consumption**	8,346	2,779	5,567

*There were total of 936 questionnaires administered but only 930 duly merged with the household EA questionnaire.
**Because 4 household reported zero values for total food consumption the total number of household in consumption aggregate file is 8,346. Thus, when obtaining national indicators based on aggregate consumption file, the weights to use are wta_hh_c and wta_pop_c.

DATA CLEANING

The cleaning of the data included the following quality checks:
1. The data that was entered in the first entry (FDE) and the second entry (SDE) were compared against each other. Cases where the data entry did not match across the two entries were physically verified from the paper questionnaire.
2. The confirmed data (after verifying the physical surveys questionnaires for the identified cases from the previous step) was checked for quality on the following parameters:
   a. Range checks without Standard Deviation (SD)
Only those variables where the value required to be in a logical or instructed range were identified and checked.
   b. Range checks with SD
Variables where the value required to be in a logical or instructed range were identified and checked. Additionally, variables where there was no such instructed range, but using the third quartile of SD, we identified those responses which were either too high or too low compared to the other responses received for the same question.
   c. Skip checks:
   d. Consistency checks

3. The cases that were identified from the previous checks were rectified using the paper survey's enumerator instructions and logical consistencies were applied.

For a full report of the data cleaning process by section please refer to the Appendix 4.

ANONYMIZING THE DATASET

As per international standard for sharing household information, it is required to anonymize all personal identification information. Therefore, the 2016 HIES data that is publicly available does not provide any names or locations of respondents and enumerators.

The methodology of anonymizing the household dataset includes dropping the name of household heads, enumerators, field supervisor, data entry clerk and 2nd data entry clerk. For Section N3 (Assistance, groups and other sources of income), the names of the household members who are members of credit or savings groups are dropped. Households members who are involved in these schemes can be identified by the roster ID code (variable hh_n_12_3). In Section O (Credit) the names of the lenders were anonymised, specifically the names of "neighbours/friends", "grocery/local merchant" and "others, specify".

Similarly, in the Agriculture data set the names of the name of household heads, enumerators, field supervisor, data entry clerk and 2nd data entry clerk are anonymized. Moreover, the GPS coordinates of the farms are dropped as this information violates the farmers' privacy rights.

HOW TO USE THE DATA

This section should provide an explanation of how to use the data.

Data from the 19 sections of the household questionnaire is stored in 27 files, in STATA .dta format. The data set names begin with "HH" and then reference the questionnaire section they relate to. For example, data from section C has file name "HH_C". Data from some sections have been stored in more than one data set, in these cases, the datasets are named accordingly, e.g. Section P data is stored in two datasets, these are named "HH_P1" and "HH_P2". Each dataset contains data for the full data collection period (i.e. all twelve months of data). The datafile HH_T.dta containing the re-contact information is not published.

The agriculture data is comprised of 12 sections and is stored in 21 files, in STATA .dta format. The data set names begin with "AG" and then the reference for the section (e.g.

"AG_02"). As in the household data set, some sections are stored in separate files (e.g. "AG_5A_1" and "AG_5A_2").

Data from the market price questionnaire is stored in 4 files, in STATA .dta format. The datasets begin with "COMM" and then take letters A to D to differentiate the four section of the price questionnaire. The first dataset, "COMM_A & FILT", has basic identification data for the 334 enumeration areas for which the data relates to. Each of the remaining three datasets contains data from one of the three vendors, e.g. "COMM_B" contains data from the first vendor, and "COMM_C" contains data from the second vendor, and "COMM_D" from the third vendor.

The consumption aggregate data is named LBR_16_E.dta. The consumption aggregate file contains information on general identification of the households (HH Id, region, etc.) as well as the relevant weights (per household, per capita, per adult equivalent). In addition, the total overall, food, and non-food expenditure of the households and the resulting consumption quintiles are included. The dataset contains 8,346 observations since there were 4 households without any expenditure in the survey. Thus, reweighting was done for consumption files (relevant weight variables are wta_hh_c and wta_pop_c instead of wta_hh and wta_pop used other sections 2016 data). For details of the calculations please see the methodological appendix of the HIES 2016 Statistical Abstract.

A complete list of data files is in Appendix 3.

Unique Identifiers & Merging Data

Sections are either administered at the household level or at the individual level. A complete breakdown of the unique identifiers for each section can be found in the Appendix 3. Sections administered at the household level are Section A, and those inclusive of Section H to Section S. Data from each of these files is saved in (one or more) separate datasets as described in Appendix 3. In order to merge each household level dataset, the unique household identifier that should be used is the variable named "hhid". The unique household identifier (hhid) is a 14 digit number, which is made up of the the county code (2 digits), district code (2 digits), clan code (3 digits), enumeration code (3 digits) and household id code (4 digits).

Sections administered at the individual household member are those inclusive of Section B to Section G. Each one of these is saved as separate data files as described above. In order to merge data at the individual level, the following variables should be used to merge using a unique individual level ID: hhid and ind_id.

WEIGHTING FACTORS[2]

The methodology used for the 2016 HIES weights is based on that used for the 2014 HIES, with a small modification in the post-stratification procedure to account for population movement between the two rounds.

Weighting Procedures for the 2014 HIES

As described in the report on "Recommendations on Sample Design and Estimation Procedures for 2013/14 Liberia Household Income and Expenditure Survey (HIES),"[3] the basic weight for each sample household would be equal to the inverse of its probability of selection (calculated by multiplying the probabilities at each sampling stage). The sampling probabilities at each stage of selection were maintained in an Excel spreadsheet with information from the sampling frame for each sample EA so that the overall probability and corresponding weight could be calculated.

The original sample weight adjusted for nonresponse specified in the sample design report can be simplified as follows:

$$W'_{hi} = \frac{M_h \times M'_{hi}}{n_h \times M_{hi} \times m_{hi}} \times \frac{m_{hi}}{m'_{hi}} = \frac{M_h \times M'_{hi}}{n_h \times M_{hi} \times m'_{hi}},$$

where:

W'_{hi} = original adjusted weight for the sample households in the i-th sample EA in stratum (county, urban/rural) h

M_h = total number of households in the 2008 Census sampling frame of EAs (cumulated measure of size) for stratum h

M'_{hi} = total number of households listed in the i-th sample EA in stratum h

n_h = number of sample EAs originally selected in stratum h for the 2014 HIES

M_{hi} = total number of households in the frame for the i-th sample EA in stratum h

m_{hi} = number of sample households selected in the i-th sample EA in stratum h (that is, 10)

[2] Megill, David. 2015. "Final Weighting Procedures for the 2014 Liberia Household Income and Expenditure Survey."
[3] Megill, David. 2012. "Recommendations on Sample Design and Estimation Procedures for the 2013/14 Liberia Household Income and Expenditure Survey."

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

Table 10 shows the distribution of the weighted total number of households by county, urban and rural strata, using these weights.

Table 10: Distribution of Weighted Total Number of Households by County, Urban and Rural Strata, from Final 2016 HIES Data Using the Design Weights

County Name	Urban	Rural	Total
Bomi	5,517	22,897	28,415
Bong	32,391	59,052	91,443
Gbarpolu	2,299	15,406	17,705
Grand Bassa	22,563	35,289	57,852
Grand Cape Mount	2,440	34,013	36,453
Grand Gedeh	11,884	9,950	21,834
Grand Kru	891	13,571	14,463
Lofa	26,767	31,706	58,473
Margibi	30,940	24,144	55,084
Maryland	10,743	7,505	18,248
Montserrado	309,398	31,803	341,200
Nimba	62,443	50,541	112,984
River Gee	3,652	6,591	10,243
Rivercess	823	11,053	11,876
Sinoe	3,652	16,857	20,509
Liberia	526,405	370,378	896,783

Alternative Adjustment of 2016 HIES Weights Based on Population Projections

Following the post-stratification procedure used in the 2014 HIES to adjust population totals to be closer to the distribution found in the 2008 census, adjustments were again applied to the probability weights. Because of the unique situation of potential movements during and after the Ebola outbreak, the adjustments were calculated in a slightly different manner. In 2014, the adjustment factors were calculated as:

$$W_{chi} = W''_{hi} \times A_c \text{,}$$

where:

$W_{chi} =$ final adjusted weight for the sample households in the i-th sample EA in stratum h

A_c = adjustment factor for the weights of the HIES sample households in county c

See the Basic Information Document for the 2014 HIES for full details on these calculations.

In 2016, the calculations start from the 2014 weighted distribution, then include an additional factor to account for potential population shifts since 2014. As the sample design for the 2016 survey uses the same EAs as the 2014 survey, but re-lists each EA prior to the 2016 fieldwork, it is possible to directly estimate the population change by comparing the two listings. The population change ranges from -314% to +253%, showing that some areas experienced substantial shifts in population.

Figure 1: Population Totals from Listing (2014, 2016)
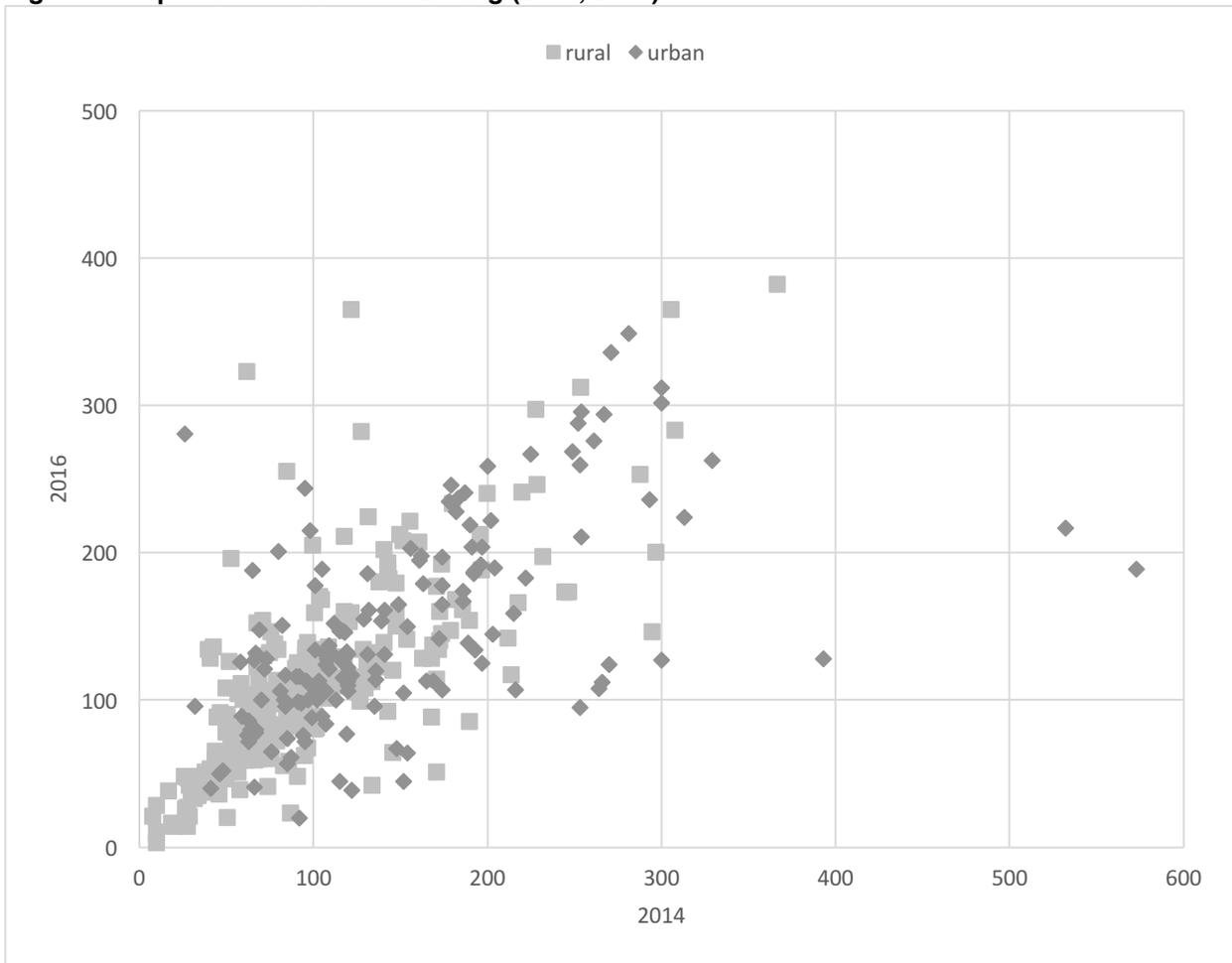
The average changes in population are the county and urban/rural level between the 2014 listing and the 2016 listing are shown below.

County Name	Urban	Rural
Bomi	98.4%	27.4%
Bong	1.3%	-6.8%
Gbarpolu	16.7%	15.6%
Grand Bassa	-46.3%	5.4%
Grand Cape Mount	29.4%	21.2%
Grand Gedeh	1.3%	0.7%
Grand Kru	8.7%	13.8%
Lofa	14.9%	7.0%
Margibi	-59.0%	-2.7%
Maryland	-17.0%	-5.6%
Montserrado	10.0%	58.5%
Nimba	-2.0%	35.0%
River Gee	-22.3%	0.5%
Rivercess	47.6%	11.3%
Sinoe	36.1%	19.8%

The largest changes are found in Bomi county urban (an increase of 98 percent), Margibi county urban (a decrease of 59 percent), Montserrado county rural (an increase of 59 percent), and Rivercess urban (an increase of 48 percent). It should be noted that these are percentage changes but for areas with small populations, the actual movement in terms of number of people is actually quite small. For example, the 48 percent increase in Rivercess urban translates to an increase of less than 700 households.

Another important difference from the procedure used to calculate the 2014 weights is that the 2016 weights were calculated at the stratum level (county-urban/rural) rather than at the country level. The formula used to calculate the stratum-level adjustment factors is:

$$A_h = \left(\frac{\sum_{ij} w_{hij}}{\sum_{ij} w'_{hij}}\right)\left(\frac{\sum_i (l'_{hi} - l_{hi})}{\sum_i l_{hi}}\right)$$

Where

w'_{hij}	=	the weight for household j in EA i in stratum h in 2016
w_{hij}	=	the weight for household j in EA i in stratum h in 2014
l'_{hi}	=	the total households from listing in EA i in stratum h in 2016
l_{hi}	=	the total households from listing in EA i in stratum h in 2014

In other words, the adjustment factor in 2016 for each stratum is equal to the weighted total number of households in that stratum in 2014, divided by the unadjusted weighted total number of households in 2016, multiplied by the aggregate percent change in number of households found in the listing operation between 2014 and 2016.

Using this methodology allows for the new estimates to be both comparable to the 2014 stratum totals and take into account population movements during and after the Ebola outbreak. It assumes that the 2014 weights correctly estimated the population totals at the midpoint of the fieldwork in 2014, and that the 2016 listing totals reflected the actual change since 2014 in population totals. This is only possible because the same EAs were visited in both surveys.

The final weight for the 2016 data is therefore:

$$W_{hi} = W'_{hi} \times A_h$$

Table 11: Population Totals (in Households) under 2014 Adjusted Weights, 2016 Unadjusted Weights, and the 2016 Adjusted Weights

County	2014 Population Projection Adjusted Total Population			2016 Unadjusted Population Totals			2016 Adjusted Population Totals		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Bomi	3,515	19,277	22,792	5,517	22,897	28,415	6,973	24,566	31,539
Bong	32,379	60,583	92,962	32,391	59,052	91,443	32,790	56,450	89,240
Grand Bassa	3,467	20,043	23,510	2,299	15,406	17,705	4,045	23,177	27,222
Grand Cape Mount	26,164	30,525	56,689	22,563	35,289	57,852	14,038	32,167	46,205
Grand Gedeh	2,412	28,308	30,720	2,440	34,013	36,453	3,121	34,300	37,421
Grand Kru	18,449	13,745	32,194	11,884	9,950	21,834	18,686	13,843	32,529
Lofa	1,153	14,057	15,210	891	13,571	14,463	1,253	15,993	17,246
Margibi	39,688	37,327	77,015	26,767	31,706	58,473	45,606	39,935	85,541
Maryland	34,654	16,936	51,590	30,940	24,144	55,084	14,200	16,480	30,680
Montserrado	21,401	12,207	33,608	10,743	7,505	18,248	17,768	11,525	29,293
Nimba	299,651	21,605	321,256	309,398	31,803	341,200	329,595	34,243	363,839
River Cess	72,498	45,629	118,127	62,443	50,541	112,984	71,060	61,590	132,650
Sinoe	6,197	9,886	16,083	3,652	6,591	10,243	4,814	9,940	14,754
River Gee	908	16,976	17,884	823	11,053	11,876	1,340	18,895	20,235
Gbarpolu	4,532	24,236	28,768	3,652	16,857	20,509	6,167	29,032	35,199
Liberia	567,068	371,340	938,408	526,405	370,378	896,783	571,457	422,136	993,593

APPENDIX 1. HOW TO OBTAIN COPIES OF THE DOCUMENTATION AND DATA

Copies of the documentation (Basic Information Document, questionnaires, manuals, etc.) for the 2016 HIES can be obtained from LISGIS website and from the World Bank Central Microdata Catalog.

http://lisgis.net/page.php?&7d5f44532cbfc489b8db9e12e44eb820=NDU%3D
http://microdata.worldbank.org/index.php/catalog

Users should provide a brief description of the research that will be done with the data.

Individuals who receive copies of the data agree to: (a) cite the Liberia Institute of Statistics and Geo-Information Services as the collector and source of the data in all reports, publications and presentations; (b) provide copies of all reports, publications and presentations to the Liberia Institute of Statistics and Geo-Information Services; and (c) not to pass the data to third parties for any reason.

Users who are interested in obtaining copies of the data should contact:

LISGIS Contact Information:

1. Dr. T. Edward Liberty
   Director General
   Email: ted103liberty@yahoo.com
   Tel: (231) 0886519628

2. Hon. Johnson Q. Kei
   Deputy Director General/ Dissemination
   Email: jquaih2002@yahoo.com
   Tel: (231) 0886518885

3. Mr. Boima HM. Sonii
   Project Coordinator/ HIES
   Email: b.sonii@yahoo.com / bhmsonii1975@gmail.com
   Tell: (231) 0886524773

4. Mrs. Mariah Q. Gilayeneh
    Asst. Project Coordinator/ HIES
    Email: mrhluv26@yahoo.com
    Tell: (231) 0886560087

APPENDIX 2. QUESTIONNAIRE AND PILOTING

Agriculture Recall Questionnaire

The Agriculture Recall questionnaire required the main input in terms of questionnaire design, since the recall method is new in Liberia in relation to the collection of national agricultural yield estimates, and forms an opportunity to improve methods and collect far more detailed agricultural data than before.

Between 14th – 26th September, an international agriculture recall expert joint LISGIS during a mission in Liberia to assist with development of the Agriculture Recall questionnaire design. LISGIS, representatives from the MoA, alongside the Resident Advisor and the international expert extensively deliberated over key policy questions to be answered and data gaps to be addressed through the recall questionnaire. After multiple revisions of the questionnaire in office, the questionnaire was piloted in close by Agricultural areas in Bomi and Margibi.

Preparation prior to field piloting

On arrival of the international consultant on mission to Liberia a meeting was set up to discuss the proposed agriculture recall questionnaire and receive local input on specific questions. The meeting took place at LISGIS and was attended by the agriculture team of LISGIS as well as two representatives from the Ministry of Agriculture (MoA). The questionnaire was read through item by item to ensure that all questions are relevant to the Liberian context.

Two other important pivotal issues were discussed in detail, the definition of a farm and the use of non-standard units to measure production and sales. The definition of a farm was agreed to be what the farmer understands as his farm. The technical definition of a continuous plot not divided by a path or creek wider than a meter should only apply if the farmer is unsure how to divide his farmland into different plots. A potential problem identified is the traditional switching of farmland in Liberia. What was a farm last farming season may have been left fallow this year? The second issue relates to the quantity produced or sold. The ideal is to have all the values consistently in kilogram. However, farmers will most certainly not always know this value. Thus efforts were undertaken to use traditional non-standard units (salmon cup, large basket, 25 kg rice bag, …) commonly used and recognised by farmers. These conversions from kilograms were important issue address prior to the analytical stage post-data collection.

In order to allow for a close as possible comparison with the HIES 2016, it was agreed best to keep the household income and expenditure survey questionnaire the same as the previous survey, with necessary improvements allowed.

During working sessions in September and October 2015, LISGIS staff reviewed the questionnaire thoroughly section by section, question by question, to ensure that each question was necessary and posed optimally. Furthermore, responses from the HIES 2014 were reviewed to inform the process, and where there were clear difficulties in responses, questions were revised.

Some of the main changes are described below, the final questionnaire can be distributed upon request:

Section B – Household Roster
• Concept of household members not currently present in the household, but "usually" present, was redefined to include those who have been present for more than six months of the past twelve months to allow for a consistent rule of measure across enumerators.
• Migration and relocation questions are now administered to all household members, where previously they were only administered to those 12 years and above.
• Measurement of Internet as mode to follow current affairs now included.

Section C – Education
• Educational expenditures of those below five years of age are now captured, this specifically aims at capturing pre-school expenditures which were not captured in the HIES 2014.
• A new question using similar methods as the Demographic and Health Survey was introduced to estimate the literacy rate. The new question bases literacy of a respondent upon actual evidence of reading from a reading card, as well as receiving a respondent's own evaluation of their ability, whilst the HIES 2014 took at face value a respondent's own evaluation of their reading and writing ability.
• Identification of students who were repeating a school year because of school closures due to the EVD outbreak was included.

Section E – Labour
• Farm activities and non-farm activities were redefined to avoid double counting of economic activities, to increase inclusion of economic activities (such as fishing, which were previously being excluded), and to accommodate the Agriculture Recall questionnaire which aims to capture income and expenditure related to cultivating a farm or raising livestock. In particular, farm activities are defined specifically as crop production or sales of crops (before any processing of crops), and raising livestock. Fishing and hunting bushmeat are specifically not counted as farm activities, and income generated from such activities would be classified as non-farm income

generation and captured in the household questionnaire. Other forestry related activities, such as collection of firewood and production of charcoal, would be counted as non-farm activities and related incomes and expenditures included in the household questionnaire. Processing of grown crops, such as selling fried plantain chips from a household's own farm, would be captured in the household non-farm enterprise module, whilst the actual harvest of the plantain would be captured in the Agriculture Recall questionnaire.

Section F – Food Consumption outside the Household
• Water was separated out from consumption of other soft drinks to enable poverty analysts to differentiate between the highly differential calorie content of the two categories.
• It was highlighted that food consumed outside the household is defined, for the purpose of the survey, as food prepared physically outside the household, and would not include, a meal prepared at home, and then physically carried outside for consumption (whether in the office, or on a picnic, etc). This avoids further double counting or exclusion of consumption.

Section H – Non-Farm Enterprises
• The major point to notice is the clarity on the definition of what farm and nonfarm enterprises compile – see note under Section E.
• For enterprises classified as Traders/Shopkeepers, the expenditure information is now collected in a more disaggregated fashion, specifically by wages/salary, traded goods for resale, and operational costs, allowing for improved estimates of value added for the compilation of National Accounts
Section K – Food Consumption in the Household
• An enumerator check has been included to encourage checks on the sum of food consumed in the last seven days from purchases, own-production and gifts to be equivalent to the food consumed in the same period.

Section M – Assets
• Its specified now that assets counted should be in working condition.
• Contingency for assets that are own-produced or gifted has been incorporated.

Section R – Crop Production
• Questions on crop sales have been removed from this section, since these are now captured in the Ag Recall questionnaire.
• This section now acts as a roster and a filter for the implementation of the Agriculture Recall questionnaire.

Section S – Recontact Information
• Now includes three filter questions to determine the eligibility of the household for the administration of the agriculture recall questionnaire.

Other
• The section on livestock has now been removed entirely as this will be captured in the Agriculture Recall questionnaire, alongside livestock byproducts.
• Clearer instructions and reminders to enumerators throughout the questionnaire, through wording and formatting changes

Market Price questionnaire
During the HIES 2014 questionnaire; regional price data on consumables was captured in the Community questionnaire. The community questionnaire was intended to be implemented in every single enumeration area that fell in the HIES 2014 sample, to enable analysts to price own-consumed food using prices faced in the local market.

It was determined that the collection and resultant quality of price data could be improved. In particular, the price questionnaire was reduced in bulkiness. The previous community questionnaire in the HIES 2014 required collection of three quotations from three different vendors, for a total of 97 commodities, this required almost 900 price quotations and quantities to be captured in each questionnaire. In reality, many items recorded in the questionnaire are not available in numerous markets around Liberia hence the burden is reduced. Other obstacles to collecting price data were experienced, such as traders requiring the teams to purchase anything they touched, traders asking for money and uncooperative traders. These issues can be addressed through logistical improvements, such as ensuring a letter of intent is available for the superintendent of each market, and using disposable gloves to conduct measurement of food items.

Based on the HIES 2014 price data and feedback from the WB poverty team, LISGIS felt the need to focus further on improving data quality, even if it came at the cost of reducing the quantity. Two steps were taken with this in mind:
1. The price questionnaire was reduced in bulkiness to require three quotations per commodity (as opposed to nine)
2. The price questionnaire would be administered twice a month by each field team, instead of in every single enumeration area (equivalent to five times a month). This reduces the burden drastically, and allows instead for enumerators to carefully measure the commodities, and capture as many as possible items, instead of selecting just a few easy to measure commodities and leaving the market. It also reduces the burden for enumerators in order to allow them more time in administering the Agriculture Recall questionnaire.

APPENDIX 3. LIST OF FILE NAMES

Household Questionnaire

Data File	Description	Unique Identifier
HH_A&FILT.dta	Household Identification & Survey Staff Details (Section A), Region, Filter questions from other sections (Section H q1a-1b; Section K q8-9; Section N q11; Section O q1; Section P1 q1-2; Section P2 q1-2; Section R q2)	hhid
HH_B.dta	Household Member Roster (Section B)	hhid & ind_id
HH_C.dta	Education (Section C)	hhid & ind_id
HH_D.dta	Health (Section D)	hhid & ind_id
HH_E.dta	Labour (Section E)	hhid & ind_id
HH_F.dta	Food Consumption Outside the Household (Section F)	hhid & ind_id
HH_G.dta	Subjective Welfare	hhid & ind_id
HH_H.dta	Household Non-Farm Enterprises (Section H q2-23)	hhid & ent_id (Enterprise ID)
HH_I1.dta	Food Security (Section I q1-8, q10)	hhid
HH_I2.dta	Food Security (Section I q9)	hhid
HH_J1.dta	Housing, Water & Sanitation (Section J q1-26)	hhid
HH_J2.dta	Housing, Water & Sanitation (Section J q27-28)	hhid
HH_K1.dta	Food Consumed in the Household (Section K q1-7)	hhid & hh_k_00_b (Item code)
HH_K2.dta	Food Consumed in the Household (Section K q10-11)	hhid & hh_k_10_1 (Age Group)
HH_L1A.dta	Non-Food Expenditures (past 7) (Section L1)	hhid & hh_l1a_00 (item code)
HH_L1B.dta	Non-Food Expenditures (past 30 days) (Section L1)	hhid & hh_l1b_00 (item code)
HH_L2.dta	Non-Food Expenditures (12 months) (Section L1)	hhid & hh_l2_00 (item code)
HH_M.dta	Household Assets (Section M)	hhid & hh_m_00 (item code)
HH_N1.dta	Assistance, Groups & Other Sources of Income (Section N q1-6)	hhid & type of assistance (hh_n_01_1 A-K)
HH_N2.dta	Assistance, Groups & Other Sources of Income (Section N q7-10)	hhid
HH_N3.dta	Assistance, Groups & Other Sources of Income (Section N q12-19)	ind_id & hh_n_12_1_1 (code A-O)
HH_O.dta	Credit (Section O)	hhid + row number (hh_o_02_1)
HH_P1.dta	Cash & Gift Transfers Received (Section P, Part A q3-9)	hhid + Transfer Collumn (hh_p1_id)
HH_P2.dta	Cash & Gift Transfers Sent (Section P, Part B q3-9)	hhid + Transfer (hh_p2_id)
HH_Q.dta	Shocks (Section Q)	hhid + shock ID (hh_q_00)
HH_R.dta	Production & Sales of Agricultural Crops (past 12 months) (Section R)	hhid + deline number
HH_S.dta	Household Re-contact Information (including GPS Coordinates) (Section S)	hhid

quintile.dta	Consumption aggregates quintile stratas (1-5), 1 being the poorest and 5 being the richest consumption quintile	hhid

Agriculture Questionnaire

Data File	Description	Unique Identifier
2_ALLHH_A_weighted.dta	Contains weight adjustment variables	
AG_01_&_FILT.dta	Household Identification & Survey Staff Details (Section 1), Section 5 filter questions on Kuu labour (ag_5a_1_00, ag_5a_2_00, ag_5a_3_00, ag_5a_4_00)	hhid
AG_02.dta	Household Member Roster (Section B in the HH Questionnaire q1-5)	hhid & ind_id
AG_03.dta	Farm Listing (Section 3)	hhid & farmID
AG_04.dta	Farm Details (Section 4)	hhid
AG_5A_1.dta	Kuu-hired Labour (Section 5A q1)	hhid
AG_5A_2.dta	Kuu-hired Labour (Section 5A q2)	hhid
AG_5A_3.dta	Kuu-hired Labour (Section 5A q3)	hhid
AG_5A_4.dta	Kuu-hired Labour (Section 5A q4)	hhid
AG_5B_1.dta	Household Labour on Farm (Section 5B Land Clearing)	hhid
AG_5B_2.dta	Household Labour on Farm (Section 5B Planting/Scratching)	hhid
AG_5B_3.dta	Household Labour on Farm (Section 5B Farm Management)	hhid
AG_5B_4.dta	Household Labour on Farm (Section 5B Harvesting/Storage Preparation)	hhid
AG_06.dta	Annual Crops by Farm (Section 6)	hhid
AG_07.dta	Cassava by Farm (Section 7)	hhid
AG_08.dta	Tree/Permanent Crop by Farm (Section 8)	hhid
AG_09.dta	Crops Sales/Storage (Section 9)	hhid
AG_10A_1.dta	Livestock (Section 10A q1-22)	hhid
AG_10A_2.dta	Livestock Payment (Section 10A q23-26)	hhid
AG_10B.dta	Livestock Products (Section 10b)	hhid
AG_11.dta	Farm Implements and Machinery (Section 11)	hhid

Community Price Questionnaire

Data File	Description	Unique Identifier
COMM_A & FILT.dta	Community Identification, Date of Enumeration, GPS coordinates (Cover Page)	ea_id
COMM_B.dta	Market Prices from Vendor 1,2 and 3	ea_id

Consumption Aggregate

Data File	Description	Unique Identifier
LBR_16_E.dta	Consumption aggregates of overall, food, and non-food expenditure by household	hh_id

APPENDIX 4. DATA CLEANING

This report summarises the cleaning efforts by going through the procedures used, problems faced, and approaches for solving the problems during the data cleaning of sections 2, 3, 4, E, G, H, N1, N2, N3, R, and S.

1. Comparison between FDE and SDE

The first step in cleaning was the comparison between the First Data Entry (FDE) and Second Data Entry (SDE). Two types of issues arise. The first is that an observation (individual, farm, or household) exists in only one of the two data entry versions. The second is that both exist, but the versions have non-congruent answers.

a. Observation only present in one data entry version

These cases (occurred in all sections) were sent for questionnaire pulling. The information was then used to update answers by deleting inexistent observations or adding missing observations to the data entry version where they lacked.

b. Observations with differing answers in each data entry version

These cases (occurred in all sections) were sent for questionnaire pulling. The received information was then used to update the data. The assumption was that the answers in the questionnaire are the correct ones.

2. Range checks

Based on the ranges given in the questionnaire, in all sections all observations outside of the permitted ranges were flagged. To address this each type of error (all cases were a number in range 1-4 was 6) or even each case (each observation outside the range) was analysed.

The method to solve the issue was to either look for answer to similar questions (e.g., options are 1 – Week, 2 – Month and answer is 3) to see if there is a pattern (e.g., all other answers are: 2 – Month) or if there was a column swap (e.g., column one is months worked out of the past 12, column 2 weeks worked out of the past 4. If the answer is 4, 12 instead of 12, 4 and the rest is consistent with this, it is assumed columns got switched).

3. Skip checks

Based on the skips demanded by the questionnaire, in all sections, cases when the skip was not followed were flagged. In cases when this was due to a "0" or another placeholder for "no information" or a single value was present, these where deleted.

In section E many skips were not respected or were not congruent with previous data cases. These cases were analysed to see if they could be changed without harming the overall structure of the data. When the data and the structure of the observation demanded the data should not be present, the data was deleted as ordered by the skip. If this was not clear, the potentially erroneous data was left in the cleaned file.

4. Consistency

a. Age checks

Sections E and G demand answer to come only from individuals above a certain age. If the age was not met yet there was a record for this person, that record was deleted as it should not have existed in the first place.

If a person should have answered but was not asked, then the skip determining question (is person above age limit) was changed to a yes, yet the rest left empty. This creates a skip error (no further information after a yes to being above the age limit) but since no information could be extracted for this individual, the error was kept.

b. Farm congruency

A certain number of farms did exist only in Section 3 or in Section 4. However both sections should cover the same universe (farms in the survey). Each case was analysed to see if it the farms were present in later sections (sections 6, 7, or 8) and if present added to the section where they were missing or – if not present – delete from the section were they wrongly existed.

5. Format of Section N3

All sections, if there is potentially more than one answer per household, are structured vertically, that is, household X's first answer is one row in the data, X's second answer another. Only section N3 was structured horizontally (column-wise), that is, one row existed only per household and if there was more than one answer, then more columns were filled out.

In order to make this look like the remaining sections, the data structure was changed from a horizontal (column-wise) format to a vertical (row-wise) one.

6. Incorrect variable labels

In sections E, R, and 4 some labels for certain variables were incorrect (number code and text that is represented by that number not the same as in the questionnaire). Each label was checked (in all sections) and corrected, taking the labels of the paper questionnaire as the true labels.

7. Restriction of the number of EAs

Due to the re-enumerating of one EA, the data set had to be reduced to 835 instead of 836 EAs. As a last step in the data cleaning on redundant EA was dropped, the EA code for another (was given to the data cleaner with a code starting with 99 to differentiate it from the rest) was corrected to produce a final clean data set.

APPENDIX 5. COUNTY CODES

County Name	County Code
Bomi	03
Bong	06
Grand Bassa	09
Grand Cape Mount	12
Grand Gedeh	15
Grand Kru	18
Lofa	21
Margibi	24
Maryland	27
Montserrado	30
Nimba	33
Rivercess	36
Sinoe	39
River Gee	42
Gbarpolu	45

APPENDIX 6. DISTRICT CODE BY COUNTY

County Code	County Name	District Code	District Name
03	Bomi	02	Klay
03	Bomi	04	Suehn Mecca
03	Bomi	06	Senjeh
03	Bomi	08	Dowein
06	Bong	02	Fuamah
06	Bong	04	Jorquelleh
06	Bong	06	Yeallequelleh
06	Bong	08	Panta
06	Bong	10	Salala
06	Bong	12	Sanoyeah
06	Bong	14	Suakoko
06	Bong	16	Zota
06	Bong	20	Tukpahblee
06	Bong	24	Kpaai
09	Grand Bassa	02	Owensgrove
09	Grand Bassa	04	District # 1
09	Grand Bassa	06	District # 2
09	Grand Bassa	08	St. John River City
09	Grand Bassa	10	Neekreen
09	Grand Bassa	12	Commonwealth
09	Grand Bassa	14	District # 3
09	Grand Bassa	16	District # 4
12	Grand Cape Mount	02	Garwula
12	Grand Cape Mount	04	Golakonneh
12	Grand Cape Mount	06	Porkpa
12	Grand Cape Mount	08	Commonwealth
12	Grand Cape Mount	10	Tewor
15	Grand Gedeh	02	Gbao
15	Grand Gedeh	04	Gboe-Ploe
15	Grand Gedeh	06	Konobo
15	Grand Gedeh	08	Tchien
15	Grand Gedeh	10	Glio-Twarbo
15	Grand Gedeh	12	Putu
15	Grand Gedeh	14	B'hai
15	Grand Gedeh	16	Cavala
18	Grand Kru	02	Lower Jloh
18	Grand Kru	04	Upper Jloh
18	Grand Kru	08	Bolloh
18	Grand Kru	10	Dorbor
18	Grand Kru	12	Forpoh

18	Grand Kru	16	Dweh
18	Grand Kru	18	Kpi
18	Grand Kru	20	Gee
18	Grand Kru	24	Nrokwia-Wesldow
18	Grand Kru	26	Felo-Jekwi
18	Grand Kru	28	Barclayville
18	Grand Kru	30	Grand Cess Wedabo
18	Grand Kru	32	Bleebo
18	Grand Kru	34	Trenbo
18	Grand Kru	36	Garraway
21	Lofa	02	Foya
21	Lofa	04	Kolahun
21	Lofa	06	Salayea
21	Lofa	08	Vahun
21	Lofa	10	Voinjama
21	Lofa	12	Zorzor
21	Lofa	14	Quardu Boundi
24	Margibi	02	Firestone
24	Margibi	04	Gibi
24	Margibi	06	Kakata
24	Margibi	08	Mambah Kaba
27	Maryland	02	Whojah
27	Maryland	04	Gwelekpoken
27	Maryland	06	Nyorken
27	Maryland	08	Karluway#1
27	Maryland	10	Karluway#2
27	Maryland	12	Pleebo/Sodoken
27	Maryland	14	Harper
30	Montserrado	04	Greater Monrovia
30	Montserrado	06	St. Paul River
30	Montserrado	10	Commonwealth
33	Nimba	02	Sanniquellie Mahn
33	Nimba	04	Yarpea Mahn
33	Nimba	06	Yarmein
33	Nimba	08	Gbehlay-Geh
33	Nimba	10	Twan River
33	Nimba	12	Garr-Bain
33	Nimba	14	Doe
33	Nimba	16	Gbi & Doru
33	Nimba	20	Boe & Quilla
33	Nimba	24	Zoe-Gbao
33	Nimba	26	Yarwein Mehnsonnoh
33	Nimba	28	Meinpea-Mahn

33	Nimba	30	Leewehpea-Mahn
33	Nimba	32	Wee-Gbehyi-Mahn
33	Nimba	34	Buu-Yao
36	Rivercess	02	Doedain
36	Rivercess	04	Fen River
36	Rivercess	06	Norwein
36	Rivercess	08	Central Rivercess
36	Rivercess	10	Beawor
36	Rivercess	12	Sam Gbalor
36	Rivercess	14	Jo River
36	Rivercess	16	Zarflahn
39	Sinoe	02	Greenville
39	Sinoe	04	Butaw
39	Sinoe	06	Sanquin Dist#2
39	Sinoe	08	Sanquin Dist# 3
39	Sinoe	10	Sanquin Dist# 1
39	Sinoe	12	Kulu Shaw Boe
39	Sinoe	14	Plahn Nyarn
39	Sinoe	16	Juarzon
39	Sinoe	18	Wedjah
39	Sinoe	20	Seekon
39	Sinoe	22	Pynes Town
39	Sinoe	24	Jeadepo
39	Sinoe	26	Jaedae
39	Sinoe	30	Bokon
39	Sinoe	32	Dugbe River
39	Sinoe	34	Kpayan
42	River Gee	02	Chedepo
42	River Gee	04	Karforh
42	River Gee	06	Nanee
42	River Gee	08	Gbeapo
42	River Gee	10	Nyenawliken
42	River Gee	12	Potupo
42	River Gee	14	Glaro
42	River Gee	16	Sarbo
42	River Gee	18	Tuobo
42	River Gee	20	Nyenebo
45	Gbarpolu	02	Koninga
45	Gbarpolu	04	Belleh
45	Gbarpolu	06	Bokomu
45	Gbarpolu	08	Bopolu
45	Gbarpolu	10	Gbarma
45	Gbarpolu	12	Gounwolaila

APPENDIX 7. ISCO OCCUPATION CODES

For Section E, questions 16, 31, and 45:

ISCO 08 Code	Title EN
1	Managers
11	Chief executives, senior officials and legislators
111	Legislators and senior officials
1111	Legislators
1112	Senior government officials
1113	Traditional chiefs and heads of village
1114	Senior officials of special-interest organizations
112	Managing directors and chief executives
1120	Managing directors and chief executives
12	Administrative and commercial managers
121	Business services and administration managers
1211	Finance managers
1212	Human resource managers
1213	Policy and planning managers
1219	Business services and administration managers not elsewhere classified
122	Sales, marketing and development managers
1221	Sales and marketing managers
1222	Advertising and public relations managers
1223	Research and development managers
13	Production and specialised services managers
131	Production managers in agriculture, forestry and fisheries
1311	Agricultural and forestry production managers
1312	Aquaculture and fisheries production managers
132	Manufacturing, mining, construction, and distribution managers
1321	Manufacturing managers
1322	Mining managers
1323	Construction managers
1324	Supply, distribution and related managers
133	Information and communications technology service managers
1330	Information and communications technology service managers
134	Professional services managers
1341	Child care services managers
1342	Health services managers
1343	Aged care services managers
1344	Social welfare managers
1345	Education managers
1346	Financial and insurance services branch managers
1349	Professional services managers not elsewhere classified
14	Hospitality, retail and other services managers
141	Hotel and restaurant managers
1411	Hotel managers
1412	Restaurant managers
142	Retail and wholesale trade managers
1420	Retail and wholesale trade managers

143	Other services managers
1431	Sports, recreation and cultural centre managers
1439	Services managers not elsewhere classified
2	Professionals
21	Science and engineering professionals
211	Physical and earth science professionals
2111	Physicists and astronomers
2112	Meteorologists
2113	Chemists
2114	Geologists and geophysicists
212	Mathematicians, actuaries and statisticians
2120	Mathematicians, actuaries and statisticians
213	Life science professionals
2131	Biologists, botanists, zoologists and related professionals
2132	Farming, forestry and fisheries advisers
2133	Environmental protection professionals
214	Engineering professionals (excluding electrotechnology)
2141	Industrial and production engineers
2142	Civil engineers
2143	Environmental engineers
2144	Mechanical engineers
2145	Chemical engineers
2146	Mining engineers, metallurgists and related professionals
2149	Engineering professionals not elsewhere classified
215	Electrotechnology engineers
2151	Electrical engineers
2152	Electronics engineers
2153	Telecommunications engineers
216	Architects, planners, surveyors and designers
2161	Building architects
2162	Landscape architects
2163	Product and garment designers
2164	Town and traffic planners
2165	Cartographers and surveyors
2166	Graphic and multimedia designers
22	Health professionals
221	Medical doctors
2211	Generalist medical practitioners
2212	Specialist medical practitioners
222	Nursing and midwifery professionals
2221	Nursing professionals
2222	Midwifery professionals
223	Traditional and complementary medicine professionals
2230	Traditional and complementary medicine professionals
224	Paramedical practitioners
2240	Paramedical practitioners
225	Veterinarians
2250	Veterinarians
226	Other health professionals
2261	Dentists

2262	Pharmacists
2263	Environmental and occupational health and hygiene professionals
2264	Physiotherapists
2265	Dieticians and nutritionists
2266	Audiologists and speech therapists
2267	Optometrists and ophthalmic opticians
2269	Health professionals not elsewhere classified
23	Teaching professionals
231	University and higher education teachers
2310	University and higher education teachers
232	Vocational education teachers
2320	Vocational education teachers
233	Secondary education teachers
2330	Secondary education teachers
234	Primary school and early childhood teachers
2341	Primary school teachers
2342	Early childhood educators
235	Other teaching professionals
2351	Education methods specialists
2352	Special needs teachers
2353	Other language teachers
2354	Other music teachers
2355	Other arts teachers
2356	Information technology trainers
2359	Teaching professionals not elsewhere classified
24	Business and administration professionals
241	Finance professionals
2411	Accountants
2412	Financial and investment advisers
2413	Financial analysts
242	Administration professionals
2421	Management and organization analysts
2422	Policy administration professionals
2423	Personnel and careers professionals
2424	Training and staff development professionals
243	Sales, marketing and public relations professionals
2431	Advertising and marketing professionals
2432	Public relations professionals
2433	Technical and medical sales professionals (excluding ICT)
2434	Information and communications technology sales professionals
25	Information and communications technology professionals
251	Software and applications developers and analysts
2511	Systems analysts
2512	Software developers
2513	Web and multimedia developers
2514	Applications programmers
2519	Software and applications developers and analysts not elsewhere classified
252	Database and network professionals
2521	Database designers and administrators
2522	Systems administrators

2523	Computer network professionals
2529	Database and network professionals not elsewhere classified
26	Legal, social and cultural professionals
261	Legal professionals
2611	Lawyers
2612	Judges
2619	Legal professionals not elsewhere classified
262	Librarians, archivists and curators
2621	Archivists and curators
2622	Librarians and related information professionals
263	Social and religious professionals
2631	Economists
2632	Sociologists, anthropologists and related professionals
2633	Philosophers, historians and political scientists
2634	Psychologists
2635	Social work and counselling professionals
2636	Religious professionals
264	Authors, journalists and linguists
2641	Authors and related writers
2642	Journalists
2643	Translators, interpreters and other linguists
265	Creative and performing artists
2651	Visual artists
2652	Musicians, singers and composers
2653	Dancers and choreographers
2654	Film, stage and related directors and producers
2655	Actors
2656	Announcers on radio, television and other media
2659	Creative and performing artists not elsewhere classified
3	Technicians and associate professionals
31	Science and engineering associate professionals
311	Physical and engineering science technicians
3111	Chemical and physical science technicians
3112	Civil engineering technicians
3113	Electrical engineering technicians
3114	Electronics engineering technicians
3115	Mechanical engineering technicians
3116	Chemical engineering technicians
3117	Mining and metallurgical technicians
3118	Draughtspersons
3119	Physical and engineering science technicians not elsewhere classified
312	Mining, manufacturing and construction supervisors
3121	Mining supervisors
3122	Manufacturing supervisors
3123	Construction supervisors
313	Process control technicians
3131	Power production plant operators
3132	Incinerator and water treatment plant operators
3133	Chemical processing plant controllers
3134	Petroleum and natural gas refining plant operators

3135	Metal production process controllers
3139	Process control technicians not elsewhere classified
314	Life science technicians and related associate professionals
3141	Life science technicians (excluding medical)
3142	Agricultural technicians
3143	Forestry technicians
315	Ship and aircraft controllers and technicians
3151	Ships' engineers
3152	Ships' deck officers and pilots
3153	Aircraft pilots and related associate professionals
3154	Air traffic controllers
3155	Air traffic safety electronics technicians
32	Health associate professionals
321	Medical and pharmaceutical technicians
3211	Medical imaging and therapeutic equipment technicians
3212	Medical and pathology laboratory technicians
3213	Pharmaceutical technicians and assistants
3214	Medical and dental prosthetic technicians
322	Nursing and midwifery associate professionals
3221	Nursing associate professionals
3222	Midwifery associate professionals
323	Traditional and complementary medicine associate professionals
3230	Traditional and complementary medicine associate professionals
324	Veterinary technicians and assistants
3240	Veterinary technicians and assistants
325	Other health associate professionals
3251	Dental assistants and therapists
3252	Medical records and health information technicians
3253	Community health workers
3254	Dispensing opticians
3255	Physiotherapy technicians and assistants
3256	Medical assistants
3257	Environmental and occupational health inspectors and associates
3258	Ambulance workers
3259	Health associate professionals not elsewhere classified
33	Business and administration associate professionals
331	Financial and mathematical associate professionals
3311	Securities and finance dealers and brokers
3312	Credit and loans officers
3313	Accounting associate professionals
3314	Statistical, mathematical and related associate professionals
3315	Valuers and loss assessors
332	Sales and purchasing agents and brokers
3321	Insurance representatives
3322	Commercial sales representatives
3323	Buyers
3324	Trade brokers
333	Business services agents
3331	Clearing and forwarding agents
3332	Conference and event planners

4211	Bank tellers and related clerks
4212	Bookmakers, croupiers and related gaming workers
4213	Pawnbrokers and money-lenders
4214	Debt-collectors and related workers
422	Client information workers
4221	Travel consultants and clerks
4222	Contact centre information clerks
4223	Telephone switchboard operators
4224	Hotel receptionists
4225	Enquiry clerks
4226	Receptionists (general)
4227	Survey and market research interviewers
4229	Client information workers not elsewhere classified
43	Numerical and material recording clerks
431	Numerical clerks
4311	Accounting and bookkeeping clerks
4312	Statistical, finance and insurance clerks
4313	Payroll clerks
432	Material-recording and transport clerks
4321	Stock clerks
4322	Production clerks
4323	Transport clerks
44	Other clerical support workers
441	Other clerical support workers
4411	Library clerks
4412	Mail carriers and sorting clerks
4413	Coding, proof-reading and related clerks
4414	Scribes and related workers
4415	Filing and copying clerks
4416	Personnel clerks
4419	Clerical support workers not elsewhere classified
5	Service and sales workers
51	Personal service workers
511	Travel attendants, conductors and guides
5111	Travel attendants and travel stewards
5112	Transport conductors
5113	Travel guides
512	Cooks
5120	Cooks
513	Waiters and bartenders
5131	Waiters
5132	Bartenders
514	Hairdressers, beauticians and related workers
5141	Hairdressers
5142	Beauticians and related workers
515	Building and housekeeping supervisors
5151	Cleaning and housekeeping supervisors in offices, hotels and other establishments
5152	Domestic housekeepers
5153	Building caretakers
516	Other personal services workers

5161	Astrologers, fortune-tellers and related workers
5162	Companions and valets
5163	Undertakers and embalmers
5164	Pet groomers and animal care workers
5165	Driving instructors
5169	Personal services workers not elsewhere classified
52	Sales workers
521	Street and market salespersons
5211	Stall and market salespersons
5212	Street food salespersons
522	Shop salespersons
5221	Shop keepers
5222	Shop supervisors
5223	Shop sales assistants
523	Cashiers and ticket clerks
5230	Cashiers and ticket clerks
524	Other sales workers
5241	Fashion and other models
5242	Sales demonstrators
5243	Door to door salespersons
5244	Contact centre salespersons
5245	Service station attendants
5246	Food service counter attendants
5249	Sales workers not elsewhere classified
53	Personal care workers
531	Child care workers and teachers' aides
5311	Child care workers
5312	Teachers' aides
532	Personal care workers in health services
5321	Health care assistants
5322	Home-based personal care workers
5329	Personal care workers in health services not elsewhere classified
54	Protective services workers
541	Protective services workers
5411	Fire-fighters
5412	Police officers
5413	Prison guards
5414	Security guards
5419	Protective services workers not elsewhere classified
6	Skilled agricultural, forestry and fishery workers
61	Market-oriented skilled agricultural workers
611	Market gardeners and crop growers
6111	Field crop and vegetable growers
6112	Tree and shrub crop growers
6113	Gardeners, horticultural and nursery growers
6114	Mixed crop growers
612	Animal producers
6121	Livestock and dairy producers
6122	Poultry producers
6123	Apiarists and sericulturists

6129	Animal producers not elsewhere classified
613	Mixed crop and animal producers
6130	Mixed crop and animal producers
62	Market-oriented skilled forestry, fishery and hunting workers
621	Forestry and related workers
6210	Forestry and related workers
622	Fishery workers, hunters and trappers
6221	Aquaculture workers
6222	Inland and coastal waters fishery workers
6223	Deep-sea fishery workers
6224	Hunters and trappers
63	Subsistence farmers, fishers, hunters and gatherers
631	Subsistence crop farmers
6310	Subsistence crop farmers
632	Subsistence livestock farmers
6320	Subsistence livestock farmers
633	Subsistence mixed crop and livestock farmers
6330	Subsistence mixed crop and livestock farmers
634	Subsistence fishers, hunters, trappers and gatherers
6340	Subsistence fishers, hunters, trappers and gatherers
7	Craft and related trades workers
71	Building and related trades workers, excluding electricians
711	Building frame and related trades workers
7111	House builders
7112	Bricklayers and related workers
7113	Stonemasons, stone cutters, splitters and carvers
7114	Concrete placers, concrete finishers and related workers
7115	Carpenters and joiners
7119	Building frame and related trades workers not elsewhere classified
712	Building finishers and related trades workers
7121	Roofers
7122	Floor layers and tile setters
7123	Plasterers
7124	Insulation workers
7125	Glaziers
7126	Plumbers and pipe fitters
7127	Air conditioning and refrigeration mechanics
713	Painters, building structure cleaners and related trades workers
7131	Painters and related workers
7132	Spray painters and varnishers
7133	Building structure cleaners
72	Metal, machinery and related trades workers
721	Sheet and structural metal workers, moulders and welders, and related workers
7211	Metal moulders and coremakers
7212	Welders and flamecutters
7213	Sheet-metal workers
7214	Structural-metal preparers and erectors
7215	Riggers and cable splicers
722	Blacksmiths, toolmakers and related trades workers
7221	Blacksmiths, hammersmiths and forging press workers

7222	Toolmakers and related workers
7223	Metal working machine tool setters and operators
7224	Metal polishers, wheel grinders and tool sharpeners
723	Machinery mechanics and repairers
7231	Motor vehicle mechanics and repairers
7232	Aircraft engine mechanics and repairers
7233	Agricultural and industrial machinery mechanics and repairers
7234	Bicycle and related repairers
73	Handicraft and printing workers
731	Handicraft workers
7311	Precision-instrument makers and repairers
7312	Musical instrument makers and tuners
7313	Jewellery and precious-metal workers
7314	Potters and related workers
7315	Glass makers, cutters, grinders and finishers
7316	Sign writers, decorative painters, engravers and etchers
7317	Handicraft workers in wood, basketry and related materials
7318	Handicraft workers in textile, leather and related materials
7319	Handicraft workers not elsewhere classified
732	Printing trades workers
7321	Pre-press technicians
7322	Printers
7323	Print finishing and binding workers
74	Electrical and electronic trades workers
741	Electrical equipment installers and repairers
7411	Building and related electricians
7412	Electrical mechanics and fitters
7413	Electrical line installers and repairers
742	Electronics and telecommunications installers and repairers
7421	Electronics mechanics and servicers
7422	Information and communications technology installers and servicers
75	Food processing, wood working, garment and other craft and related trades workers
751	Food processing and related trades workers
7511	Butchers, fishmongers and related food preparers
7512	Bakers, pastry-cooks and confectionery makers
7513	Dairy-products makers
7514	Fruit, vegetable and related preservers
7515	Food and beverage tasters and graders
7516	Tobacco preparers and tobacco products makers
752	Wood treaters, cabinet-makers and related trades workers
7521	Wood treaters
7522	Cabinet-makers and related workers
7523	Woodworking-machine tool setters and operators
753	Garment and related trades workers
7531	Tailors, dressmakers, furriers and hatters
7532	Garment and related pattern-makers and cutters
7533	Sewing, embroidery and related workers
7534	Upholsterers and related workers
7535	Pelt dressers, tanners and fellmongers
7536	Shoemakers and related workers

754	Other craft and related workers
7541	Underwater divers
7542	Shotfirers and blasters
7543	Product graders and testers (excluding foods and beverages)
7544	Fumigators and other pest and weed controllers
7549	Craft and related workers not elsewhere classified
8	Plant and machine operators, and assemblers
81	Stationary plant and machine operators
811	Mining and mineral processing plant operators
8111	Miners and quarriers
8112	Mineral and stone processing plant operators
8113	Well drillers and borers and related workers
8114	Cement, stone and other mineral products machine operators
812	Metal processing and finishing plant operators
8121	Metal processing plant operators
8122	Metal finishing, plating and coating machine operators
813	Chemical and photographic products plant and machine operators
8131	Chemical products plant and machine operators
8132	Photographic products machine operators
814	Rubber, plastic and paper products machine operators
8141	Rubber products machine operators
8142	Plastic products machine operators
8143	Paper products machine operators
815	Textile, fur and leather products machine operators
8151	Fibre preparing, spinning and winding machine operators
8152	Weaving and knitting machine operators
8153	Sewing machine operators
8154	Bleaching, dyeing and fabric cleaning machine operators
8155	Fur and leather preparing machine operators
8156	Shoemaking and related machine operators
8157	Laundry machine operators
8159	Textile, fur and leather products machine operators not elsewhere classified
816	Food and related products machine operators
8160	Food and related products machine operators
817	Wood processing and papermaking plant operators
8171	Pulp and papermaking plant operators
8172	Wood processing plant operators
818	Other stationary plant and machine operators
8181	Glass and ceramics plant operators
8182	Steam engine and boiler operators
8183	Packing, bottling and labelling machine operators
8189	Stationary plant and machine operators not elsewhere classified
82	Assemblers
821	Assemblers
8211	Mechanical machinery assemblers
8212	Electrical and electronic equipment assemblers
8219	Assemblers not elsewhere classified
83	Drivers and mobile plant operators
831	Locomotive engine drivers and related workers
8311	Locomotive engine drivers

8312	Railway brake, signal and switch operators
832	Car, van and motorcycle drivers
8321	Motorcycle drivers
8322	Car, taxi and van drivers
833	Heavy truck and bus drivers
8331	Bus and tram drivers
8332	Heavy truck and lorry drivers
834	Mobile plant operators
8341	Mobile farm and forestry plant operators
8342	Earthmoving and related plant operators
8343	Crane, hoist and related plant operators
8344	Lifting truck operators
835	Ships' deck crews and related workers
8350	Ships' deck crews and related workers
9	Elementary occupations
91	Cleaners and helpers
911	Domestic, hotel and office cleaners and helpers
9111	Domestic cleaners and helpers
9112	Cleaners and helpers in offices, hotels and other establishments
912	Vehicle, window, laundry and other hand cleaning workers
9121	Hand launderers and pressers
9122	Vehicle cleaners
9123	Window cleaners
9129	Other cleaning workers
92	Agricultural, forestry and fishery labourers
921	Agricultural, forestry and fishery labourers
9211	Crop farm labourers
9212	Livestock farm labourers
9213	Mixed crop and livestock farm labourers
9214	Garden and horticultural labourers
9215	Forestry labourers
9216	Fishery and aquaculture labourers
93	Labourers in mining, construction, manufacturing and transport
931	Mining and construction labourers
9311	Mining and quarrying labourers
9312	Civil engineering labourers
9313	Building construction labourers
932	Manufacturing labourers
9321	Hand packers
9329	Manufacturing labourers not elsewhere classified
933	Transport and storage labourers
9331	Hand and pedal vehicle drivers
9332	Drivers of animal-drawn vehicles and machinery
9333	Freight handlers
9334	Shelf fillers
94	Food preparation assistants
941	Food preparation assistants
9411	Fast food preparers
9412	Kitchen helpers
95	Street and related sales and service workers

951	Street and related service workers
9510	Street and related service workers
952	Street vendors (excluding food)
9520	Street vendors (excluding food)
96	Refuse workers and other elementary workers
961	Refuse workers
9611	Garbage and recycling collectors
9612	Refuse sorters
9613	Sweepers and related labourers
962	Other elementary workers
9621	Messengers, package deliverers and luggage porters
9622	Odd job persons
9623	Meter readers and vending-machine collectors
9624	Water and firewood collectors
9629	Elementary workers not elsewhere classified
0	Armed forces occupations
01	Commissioned armed forces officers
011	Commissioned armed forces officers
0110	Commissioned armed forces officers
02	Non-commissioned armed forces officers
021	Non-commissioned armed forces officers
0210	Non-commissioned armed forces officers
03	Armed forces occupations, other ranks
031	Armed forces occupations, other ranks
0310	Armed forces occupations, other ranks

APPENDIX 8. ISIC OCCUPATION CODES

ISIC Codes (Rev. 4) for Section E, Questions 17, 32, 46 and 53

A - Agriculture, forestry and fishing
- 01 - Crop and animal production, hunting and related service activities
- 02 - Forestry and logging
- 03 - Fishing and aquaculture

B - Mining and quarrying
- 05 - Mining of coal and lignite
- 06 - Extraction of crude petroleum and natural gas
- 07 - Mining of metal ores
- 08 - Other mining and quarrying
- 09 - Mining support service activities

C - Manufacturing
- 10 - Manufacture of food products
  - 101 - Processing and preserving of meat
  - 102 - Processing and preserving of fish, crustaceans and mollusks
  - 103 - Processing and preserving of fruit and vegetables
  - 104 - Manufacture of vegetable and animal oils and fats
  - 105 - Manufacture of dairy products
  - 106 - Manufacture of grain mill products, starches and starch products
  - 107 - Manufacture of other food products
  - 108 - Manufacture of prepared animal feeds

491 - Transport via railways

492 - Other land transport

4921 - Urban and suburban passenger land transport

4922 - Other passenger land transport

4923 - Freight transport by road

493 - Transport via pipeline

50 - Water transport

51 - Air transport

52 - Warehousing and support activities for transportation

53 - Postal and courier activities

I - Accommodation and food service activities

55 - Accommodation

56 - Food and beverage service activities

561 - Restaurants and mobile food service activities

562 - Event catering and other food service activities

563 - Beverage serving activities

J - Information and communication

58 - Publishing activities

59 - Motion picture, video and television programme production, sound recording and music publishing activities

60 - Programming and broadcasting activities

61 - Telecommunications

62 - Computer programming, consultancy and related activities

63 - Information service activities

K - Financial and insurance activities

64 - Financial service activities, except insurance and pension funding

65 - Insurance, reinsurance and pension funding, except compulsory social security

66 - Activities auxiliary to financial service and insurance activities

L - Real estate activities

68 - Real estate activities

M - Professional, scientific and technical activities

69 - Legal and accounting activities

70 - Activities of head offices; management consultancy activities

71 - Architectural and engineering activities; technical testing and analysis

72 - Scientific research and development

73 - Advertising and market research

74 - Other professional, scientific and technical activities

75 - Veterinary activities

N - Administrative and support service activities

77 - Rental and leasing activities

78 - Employment activities

79 - Travel agency, tour operator, reservation service and related activities

80 - Security and investigation activities

81 - Services to buildings and landscape activities

82 - Office administrative, office support and other business support activities

O - Public administration and defense; compulsory social security

84 - Public administration and defense; compulsory social security

P - Education

85 - Education

Q - Human health and social work activities

86 - Human health activities

87 - Residential care activities

88 - Social work activities without accommodation

R - Arts, entertainment and recreation

90 - Creative, arts and entertainment activities

91 - Libraries, archives, museums and other cultural activities

92 - Gambling and betting activities

93 - Sports activities and amusement and recreation activities

S - Other service activities

94 - Activities of membership organizations

95 - Repair of computers and personal and household goods

96 - Other personal service activities

T - Activities of households as employers; undifferentiated goods- and services-producing activities of households
for own use

97 - Activities of households as employers of domestic personnel

98 - Undifferentiated goods- and services-producing activities of private households for own use

U - Activities of extraterritorial organizations and bodies

99 - Activities of extraterritorial organizations and bodies